THE NATURAL RESOURCE CURSE IN SUB-SAHARAN AFRICA: EVIDENCE AND POTENTIAL REVERSAL

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ABSTRACT

THE NATURAL RESOURCE CURSE IN SUB-SAHARAN AFRICA: EVIDENCE AND POTENTIAL REVERSAL

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MA in Financial Economics, Graduate School of Social Sciences

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It is a well-documented fact, that Sub-Saharan Africa is highly blessed with natural resources, including the minerals, forests, oil and coal. Despite those blessings, no other region on earth seems to display an economic performance as poor as Sub-Saharan Africa, setting a paradox of great concern in Development Economics. This study investigates whether natural resource endowment represents a curse for Sub-Saharan African economy. Several policies and regulations have been implemented by governments, in an attempt to remedy the economic agony of the region, but there does not seem to be some light at the end of the tunnel till these days. The policies for social inclusion —a framework to improve terms for individuals and groups to take part in socio-economic development— have been launched by the World Bank to end the desperation. This study explores such policies and evaluates their efficiency in reversing

the curse. Twenty resource-rich Sub-Saharan African countries are investigated through panel data estimation models. The proxy of economic performance (the annual real GDP growth rate) is initially regressed on natural resource variables (mineral rents, coal rents, forest rents, agricultural land, forest area). The same proxy is ultimately regressed on social inclusion variables (public sector management and institutions, resource allocation, structural policies, macroeconomic management). Results of the study show the existence of a natural resource curse in SSA, arising from coal, forest, and minerals exploitation. The study also finds an overall efficiency of social inclusion policies in promoting the growth of Sub-Saharan African economy.

Key Words: Sub-Saharan Africa, Natural resource curse (paradox of plenty), Dutch Disease, Resource drag, Rent-Seeking, Policies for social inclusion.

ÖZET

SAHRA-ALTI AFRİKA ÜLKELERİNDE DOĞAL KAYNAK LANETİ : KANITLAR VE POTANSİYEL ÇÖZÜM

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Sahra-Altı Afrika ülkelerinin mineral, orman ve kömür gibi doğal zenginlikler bakımından çok şanslı olduğu bilinen bir gerçektir. Bu şansa rağmen Sahra-Altı Afrika ülkelerinin tüm dünyada benzeri olmayan bir iktisadi başarısızlık göstermesi gelişme iktisadı için büyük bir paradok yaratmaktadır. Bu çalışmamızda doğan kaynak zenginliğinin Sahra-Altı Afrika ekonomileri için bir lanet oluşturup oluşturmadığı incelenmektedir. Bölge devletleri iktisadi başarısızlığı gidermek için çok çeşitli politikalar ve düzenlemeler uygulasa da görünürde tünelin sonundaki ışık görünmemektedir. Dünya Bankası bu çaresizlikten kurtarmak için toplumsal kapsama politikaları paketini – farklı birey ve grupları iktisadi ve toplumsal gelişmeye katkıda

bulunmasını sağlayan bir çerçeve- yürürlüğe koydu. Bu çalışma bahsi geçen bu toplsumal kapsama politikalarının, doğal kaynak lanetini ortadan kaldırma hedefinde ne kadar etkin olduklarını değerlendirecektir. Panel veri teknikleriyle yirmi doğal kaynak zengini Sahra-Altı Afrika ülkesi incelenmektedir. İktisadi performans göstergesi olarak kullanılan GSYH'nin yıllık artış hızının öncelike doğal kaynak değişkenleri (mineral, kömür, orman rantları, tarımsal alan, orman alanı gibi) ile olan ilişkisi ele alınmıştır. İktisadi performans göstergesi daha sonra, önceki kontrol değişkenleri koruyarak toplumsal kapsama ile ilgili değişkenlerin (kamu sektörü idaresi ve kurumları, kaynak tahsisinde etkinliği, yapısal uyum politikaları ve makroekonomi idaresi gibi) yer aldığı regresyon analizine tabi tutulmuştur. Çalışmanın sonuçları Sahra-Altı Afrika ülkeleri için özellikle kömür, orman ve mineral rantlarından kaynaklanan bir doğal zenginlik laneti olduğuna işaret etmektedir. Ayrıca toplumsal kapsama politkalarının Sahra-Altı Afrika ülkelerinde GSYH büyümesine destek verebildiği de bulgulanmaktadır.

Anahtar Kelimeler: Sahra-Altı Afrika, Doğal kaynak laneti (bolluk paradoksu), Hollanda Hastalığı, Kaynak Sızıntısı, Rant-arama, Toplumsak kapsama politikaları.

To My Parents

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SSA	Sub-Saharan Africa
LIC	Low Income Country
LMIC	Lower Middle Income Country
R&D	Resesrch and Development
CPIA	Country Policy and Institutional Assessment
IDA	International Development Association
GDP	Gross Domestic Product
LSDV	Least Square Dummy Variable
SD	Standard Deviation

CHAPTER 1

GENERAL INTRODUCTION

1.1. Background

Throughout the history of Development Economics, few phenomena have generated as much curiosity as the resource curse, or equivalently the paradox of plenty, referring to the empirical evidence that the countries or regions endowed with huge amount of natural resources tend to have relatively worse economic growth and development structures. The first use of the expression "resource curse" is attributed to the economist Richard M. Auty (1993), who underlined the fact that countries endowed with abundant natural resources usually experience not only a poor economic performance, but also a high level of corruption and violence than other countries. Even though the name was coined in 1993, the phenomenon is as old as the industrial revolution, which triggered the crucial need of natural resources in the manufacturing processes. The resulting boom in the natural resources market, which, at a first glance, appeared as an economic advantage and a blessing for the endowed countries, quickly turned into a curse, placing the resource-rich nations into a sad development trap. Long before Auty's work, a considerable number of development economists have addressed the resource curse, disclosing quite important findings. The various studies they conducted have shed some light on the old paradox and can be classified into four main

schools of thought, chronologically ranging from the structuralist approach of the 1950s to the recent institutional theories, passing through the rent-seeking behaviour and the resource drag perception.

Early analyses of the resource curse are ascribed to the structuralists, who built their theory around the decline in the terms of exchange between the primary and the finished products (Prebisch, 1950), the volatile characteristic of the primary products' prices, and an almost non-existent connection between the natural resource sector and the rest of the economy (Hirschman, 1958). The fluctuation of crude oil prices provides a perfect illustration. The oil crisis of 1973 affected the barrel price in the following year (1974), with an increase from the initial price of 3 dollars to 12 dollars. In 1986, the inverse trend was observed, with a decline in the barrel price from 27 dollars to less than 10 dollars. The famous Dutch disease is another illustration of the structuralist theses, defined as a causal relationship between the increase in the economic development of a specific sector, natural resources for instance, and a decline in other sectors, such as the industry or agriculture. The resulting increase of the revenues in the growing sector leads to an appreciation of the concerned nation's currency compared to other nations. The Dutch disease takes its roots from a crisis in the Netherlands in the 1960s, caused by the discoveries of huge natural gas deposits in the North sea. The fortunate discovery caused the Dutch guilder to appreciate considerably, and as a result, exports of all non-oil products became less competitive in the international market. Addressing the Dutch disease, Neary and Van Wijnbergen (1986) emphasize that by standing as the bedrock of the economy, natural resources booms hinder the industrial sector, either through an appreciation of real exchange rate or the absorption of production factors. Besides Netherlands, many countries around the World have experienced the Dutch disease, namely Angola, where 99.3% of total exports were obtained from oil and diamonds in 2005; Democratic Republic of the Congo with a major focus on diamonds export. Venezuela with its oil and many other nations should be cited.

Nevertheless, the structuralist explanations and the dutch disease particularly have not benefited from empirical tests' support (Moran, 1983; Dawe, 1996; Fosu, 1996). Leite and Weidmann (2002) do not view the Dutch disease thesis as an adequate explanation of the paradox of plenty. On the other hand, Auty (2001a) rejects the Dutch

disease theory through his study on multiple natural resource-endowed countries, revealing several exceptions to the curse such as Norway. As the most cited exception to the resource curse, Norway has escaped the paradox through a systematic management of its oil production as well as the saving of oil revenues. Today, Norway lies in the pool of developed countries.

The structuralist approach of the resource curse as investigated so far is followed by the rent-seeking behaviour, defined as the use of a corporation, association or a population's resources, to generate personal gain, without contributing to society's development through wealth creation. The rent-seeking activities are a serious nuisance to economic growth, particularly the activities related to natural resource abundance (Torvik, 2002; Robinson et al., 2006; Sandbu, 2006). A rent-seeking model was presented by Torvik (2002). The model displays how an increase in natural resources raises the number of entrepreneurs engaged in rent-seeking activities and causes a decrease in the number of entrepreneurs running productive firms. A classic example of the Rent-seeking activities is a corporation or a group of people that influence the government or public officials to obtain tarrif protection, loan subsidies or grants. The same phenomenon is observed when the company in charge of the extraction of a resource seeks restriction on imports of the given resource. While such activities generate financial profits to the company, they present no advantage to the society, taxpayers in particular. Torvik (2002) emphasizes that as the level of natural resources increases, the total income and welfare decreases. However, some countries with abundant natural resources have achieved their economic potential with an amazing growth and income level, which puts a boundary to the rent-seeking perception (Bulte et al., 2005). In other words, resource-endowed countries come in different shapes, some belonging to the top ranking nations in terms of development, and others experiencing a severe economic agony. Various economic models of rent-seeking have been developed on the basis of this disparity, with initial conditions and consequent outcomes (Acemoglu, 1995; Baland and François, 2000). In addition, the rent-seeking activities are not uniquely associated to the natural resource sector; they span all domains, including foreign aid, social security and monopoly rents (Lederman and Maloney, 2008).

Alongside the Dutch disease and the rent-seeking theses, a third theory emerges that claims its rightful place in the assessment of the paradox of plenty : the resource drag, defined as the below average production of mineral resources. The concept of resource drag was first introduced by Sachs and Warner (1995) in their attempt to explain the natural resource curse. They put forward the hypothesis that the curse is caused by the below average resource growth. A static or declining mineral sector will inevitably cause a decline in the economic growth. However, they failed to test their hypothesis empirically. Davis (2011) was the first to test the hypothesis announced by Sachs and Warner. After controlling for changes in mineral production, Davis found that booming mineral and energy economies grow faster than they otherwise would. Simultaneously, busting mineral and energy economies grow slower than they otherwise would. He concludes that "the relatively slower growth in minerals and energy economies may simply reflect a resource drag, whereby optimally managed per capita resource production does not grow substantially over time and hence introduces a drag on the measured growth of per capita economic output". Alexeev and Conrad (2009) claim that for resource based economies, the resource drag is seldom observed in the long run, but becomes more manifest in the short run, due to a stagnant or declining mineral production. Similar to previous explanations of the paradox of plenty, the resource drag finds its limit at the gate of Norway and other exceptions to the curse, failing to explain why those particular countries, unlike many other resource-rich nations, enjoy a continuous growth.

Finally, the range of resource curse theories is bounded by the recent institutional approach. Basically, this school of thought is based on the idea that countries blessed with natural resources can achieve their development potential only if they preview strong institutions that promote economic growth. Conversely, this approach claims that resource-endowed nations cannot escape the resource curse trap with weak institutions. Sub-Saharan Africa is found guilty on this particular point. Countries like Nigeria, Democratic Republic of Congo, Angola and many others provide a convincing illustration. Mehlum et al. (2006a, b) state that better institutions can prevent the resource curse. According to Humphreys et al. (2007), there is a need to elaborate adequate policies that restrict the activities and powers of private and public actors, as

these could inhibit better living conditions in oil producing countries, particularly those with weak institutions.

In the same realm of institutions, a great number of analysts have addressed the efficiency of fiscal policies in managing the volatility of natural resources. In that regard, Atkinson and Hamilton (2003) support that the paradox of plenty is the repercussion of a government's failure to handle huge revenues from resources. They highlight a threefold combination of elements that have produced incredibly high savings, namely : natural resources, macroeconomic regulations, and public expenditure regulations. Davis (2001) corroborates the significance of fiscal policies in the avoidance of the resource curse by emphasizing the adoption of stabilization funds for non-renewable resources. Here, the case of Norway comes to mind for their successful management of natural resources' revenues, through a saving system, in order to secure a glorious future of the nation. A different angle of approach is ascribed to Papyrakis and Gerlagh (2007) who stress a causal effect between resource abundance and corruption and hence, weak institutions. Using the United States of America as a case study, they found that resource endowment in some regions has promoted corruption, a low investment power, a poor academic performance and an inefficiency of Research and Development (R&D). Today, the resource curse is affecting nations in every continent and based on that evidence, the phenomenom should be elevated to a global concern. However, Norway's famous achievement in preventing its blessings from turning into a curse, along with other resource-rich countries like Botswana, Malaysia, Indonesia and Thailand has pulled an important trigger for a recognition that resource curse is a tamable phenomenon. Inspired by the above mentioned exceptions, various solutions have been proposed to hedge against the calamitous trap of the resource curse. The proposed solutions range from the macroeconomic adjustments to the institution and democracy strengthening framework.

The diversification of economic base holds a notorious place among the macroeconomic solutions. According to Barbier (2005), a diversification of the economic engine would mitigate the currency appreciation which in turn would efficiently tackle the curse. This solution proposal is built around the development of manufacturing sector which is by and large inhibited by the resource abundance. Adam

Smith draws attention on the fact that extraction and exports of resources generate huge revenues and this will inevitably retard the manufacturing sector (Smith, 1776). Moving along the same line of thought, some published works of the 1950s and 1960s reveal that the resource sectors had a weak correlation with all the other economic sectors; and hence, the industry sectors, no matter how strong they are, could be hindered by an abundance of resources (Prebisch, 1950; Baldwin, 1966).

Next to the diversification as a macroeconomic remedy to the paradox of plenty stands the privatization of state-owned enterprises. Boardman and Vining (1989) and Ascher (1999) announced that privatization of state-owned enterprises yields efficiency and better management of enterprises. Privatization offers a guarantee that resource extraction is well priced (Ascher, 1999). However privatization bears a meaning only if the rule of law prevails; otherwise the process of privatization would cause more harm to the existing economy. According to Susan Rose-Ackerman (1998), privatizing state-owned enterprises is comparable to large infrastructure projects in that it creates favorable conditions for corruption.

Finally, recent analyses implement the establishment of institutions that promote economic growth with a threefold skeleton : market-creating, market-stabilising, market-regulating and market-legitimising institutions. Market-creating and market-stabilising institutions such as property rights, the credibility of the rule of law and macroeconomic adjustments have proven to be adequate for low-income economies. On the other hand, market-legitimising institutions such as democratic institutions have been shown to be favorable for developed nations. According to Acemoglu et al. (2001), Easterly and Levine (2003) and Rodrik (2005), institutions are more determinant in the promotion of economic growth than the classical macroeconomic parameters. However, the institutional standpoint is not exempted from critics. Glaeser et al. (2004) support that growth in income and human capital pave the way to better institutions, through a collaboration between citizens and governments and not the other way around.

In the perspective of promoting development, the World Bank has launched the adoption of social inclusion policies and equity, aiming to improve terms for individuals and groups to take part in social development. The program spans gender equality, equity of public resource use, social protection and labor, and policies and institutions

for environmental sustainability (World Bank). The policies for social inclusion allow people to have a hand in decisions which affect their lives, and enable them to enjoy equal access to markets and services. This initiative stands as a cornerstone in the World Bank Group's dual goals of ending extreme poverty by 2030 and promoting shared prosperity. Individuals and groups are excluded or included based on their identity, namely the gender, race, caste, religion and disability status. Inclusion and exclusion could equally result from individuals economic classes or the assets they own. The exclusion that results from those factors hampers the social stability and inhibits the economic welfare of nations. A serious wastage of effectiveness occurs when exclusion is practiced, as the excluded population might actually contain more talents than the included population. In this perspective, the case of Africa holds attention. Race-wise, people from african descent are still excluded amongst other groups. In terms of casts, the case of India and Nepal can not be neglected, within the scope of a system that relegates the untouchables to the lowest social class. Worldwide, gender and disability are still serious factors of exclusion although attempts of female emancipation and inclusion of the disabled through training have produced positive results. In most countries, some religions have established a radical and formal barrier against other confessional groups to the extent that they are unable to practice any type of economic activity. According to Hall and Patrinos (2012), indigenous people around the world continue to face exclusion that is rooted in large part in their displacement from their traditional lands. Such social facts do not serve the economic progress of nations. There is a need to reverse the tendency through an inclusion program. Social inclusion policies and equity cluster have been designed by the World Bank in that regard. The inclusion would occur in three main areas : the markets, services and spaces (World Bank). The three spheres are equally important to the extent that, implementing inclusion in one, say the markets, and neglecting the two others would be a vain effort (World Bank).

The social inclusion measures would be of a paramount importance for resource-endowed countries as they would strengthen the human resources of thoses countries, which in turn would have a considerably positive effect on the management of natural and capital resources. African nations would particularly benefit from these policies

since they are notorious for different forms of exclusion such as tribalism, ethnicity, corruption, absence of transparency and mismanagement of natural resources.

While the initiative of the World Bank to end poverty and secure a happier international community through the social inclusion policies is being adopted by several governments, the reports of efficiency of those policies have remained speculative and theoretical. Theoretical studies do not serve the universal knowledge due to a lack of tangible and unquestionable results. The empirical investigation of the efficiency of those policies belongs to the scope of this study. We use data and econometric analyses to achieve this goal by targeting the Sub-Saharan African countries. This marks a facet of the contribution of our work to the literature.

1.2. Statement of the Problem

A quick look at Sub-Saharan African economy through the last fifteen years sets a ground for investigation. The region has recorded a notable growth in terms of the real Gross Domestic Product, with countries like Ethiopia, Democratic Republic of the Congo, Ivory Coast, Mozambique, Tanzania and Rwanda being cited among the fastest growing economies in the world (World Bank's World Development Indicators and CIA World Factbook, 2016). This fact leaves many economists wondering whether the classic and notorious resource curse phenomenon is still alive in Sub-Saharan Africa. In other words, has the curse been successfully managed in the recent years? The answer to this question calls for a revisit of the phenomenon. What is more, the policies for social inclusion and equity launched by the World Bank to promote economic growth in developing countries have been adopted for almost a decade by Sub-Saharan African governments. However, the reports of efficiency of those policies have remained speculative and theoretical. Theoretical studies do not serve the universal knowledge due to a lack of tangible and unquestionable results. There is a need for an empirical investigation.

1.3. Purpose of the Study

This work investigates whether natural resource endowment represents a curse for Sub-Saharan African economy and evaluates the effeciency of social inclusion policies in reversing the curse. Sub-Saharan Africa is known for being a huge reserve of natural resources, including the minerals, forests, coal and oil. The region equally possesses other factors of development such as a young and large labor force and a certain level of physical capital. However, compared to other regions of the world, the overall economy of Sub-Saharan Africa is quite poor. This study seeks to determine whether natural resources affect the economic growth in a negative way by controlling for human and physical capitals. In addition, we seek to determine whether the policies for social inclusion and equity recommended by the World Bank would be efficient in promoting the economic growth of Sub-Saharan Africa.

1.4. Primary Research Questions and Hypotheses

The present study is concerned with the following questions :

1.) Is the abundance of natural resources a curse for Sub-Saharan African economy ?

2.) Are the policies for social inclusion efficient in reversing the curse ?

To investigate our research questions, we put forward the hypothesis that the abundance of resources is not a curse, but rather a driver of Sub-Saharan African economy.

In addition, we assert that the policies for social inclusion are efficient in promoting the economic growth of Sub-Saharan Africa.

1.5. Research Design

In the scope of this study, econometrics and quantitative methods are applied to several development indicators in Sub-Saharan Africa, using panel data estimation models. Twenty resource-rich countries out of the 48 countries of Sub-Saharan Africa are investigated. The data is composed of the real GDP growth as a proxy of economic

performance, natural resource variables (mineral rents, coal rents, forest rents, agricultural land, forest area) and indicators of social inclusion policies (public sector management and institutions, resource allocation, structural policies, macroeconomic management). We use 280 observations for each resource variable over 14 time periods (2000 - 2013) and 180 observations for each social inclusion variable over 9 time periods (2005 - 2013). The study is presented in two major parts. Initially, the real GDP growth is regressed on natural resource variables, controlling for human and physical capitals. This first part is intended to find evidence of the resource curse. The ultimate part of the study is concerned with the efficiency of social inclusion policies in reversing the curse. For that purpose, the real GDP growth is regressed on the social inclusion policies' variables, controlling for resource variables.

1.6. Significance of the Study

Speaking of achieving better living standards and a sophisticated economy, Dr Kwame Nkrumah, Ghana's first president and a notable fighter for Africa's development, declared in his book "I speak of Freedom : A statement of African Ideology" that "Although most Africans are poor, the continent is potentially extremely rich" (Nkrumah, 1961). The significance of the present study takes its shape in Nkrumah's statement. It is an evidence that several regions worldwide are prone to the resource curse phenomenon, but none actually displays symptoms as chronic and as severe as Sub-Saharan Africa. Some alarming statistics need to be stated to illustrate this point. Natural resource-wise, a country is labeled as resource-rich if exports of non-renewable natural resources such as oil, minerals and metals account for more than 25% of the value of the country's total exports (International Monetary Fund's Guide on Resource Revenue Transparency, 2007, pages 54-56). Sticking to this definition of IMF, and considering the data from the last decade (2005 – 2015), 20 nations from Sub-Saharan Africa are resource-rich, out of the 56 countries recorded all over the world. In other words, more than a third of the world's resource-rich countries belong to SSA region, a thought-provoking statistic. However, although the natural resources account for a great percentage of the total GDP of SSA, the vast majority of its countries are

rated as Low Income Countries (LIC) and Lower Middle Income Countries (LMIC), making that region of the black continent a paramount choice for natural resource curse analysis.

The contribution of this study to the literature is twofold : first, for so long, Sub-Saharan Africa has been the classic example of natural resource curse phenomenon. This study provides an up-to-date insight into the question and determines whether any improvement has been made in recent years. Secondly, this study sheds some light on the social inclusion policies and their contribution to the region's economic growth.

CHAPTER 2

LITERATURE REVIEW

The field of Economics is not exempted from paradoxical situations, where observations or processes fail to comply with rationally established principles, assumptions or even the common sense. Under the roof of such situations stands the resource curse, equally known as the paradox of plenty, underlining the fact that the countries or regions endowed with huge amount of natural resources tend to have the worst economic growth and development structures. More technically, the paradox of plenty stresses the existence of a negative correlation between the natural resources and the economic welfare of a given country or region. The phenomenon was empirically confirmed by the series of works undertaken by Sachs and Warner (1995, 1997a,b,c, 1999a,b, 2001), by the means of cross-sectional studies. Though they did not use a robust econometric method — they used cross-sectional studies —, their findings pulled an important trigger for future investigations on the matter. While the early empirical findings are attributed to Sachs and Warner, the term "resource curse" was actually coined by the British economist Richard M. Auty who was addressing how the countries endowed with abundant natural resources usually experience not only a poor economic performance, but also a high level of corruption and violence than other countries. (Auty, 1990, 1991, 1993, 1994a,b).

Probably, no paradox in Development Economics has ever generated as much curiosity as the resource curse. Nevertheless, the phenomenon Auty observed is as old as

the industrial revolution. The industrial revolution triggered a considerable need for natural resources in the manufacturing processes. The resulting boom in the natural resources market, which, at a first glance, appeared as an economic advantage and a blessing for the endowed countries, quickly turned into a curse, placing the resource-rich nations into a sad development trap, with a poor economic performance. In fact, long before the works of Auty and Sachs and Warner, a considerable number of development economists have addressed the matter, disclosing quite important findings. The various studies they conducted have shed some light on the old paradox and can be classified into four main schools of thought, chronologically ranging from the structuralist approach of the 1950s to the recent institutional theories, passing through the rent-seeking behaviour and the resource drag perception. We devote some sections of this chapter to the different characteristics of those schools of thoughts.

2.1. Resource Curse Theories

2.1.1. The Structuralist and the Dutch Disease Perception

Early analyses of the resource curse are ascribed to the structuralists, who built their theory upon the decline in the terms of exchange between the primary and the finished products (Prebisch, 1950), the volatility of primary product prices, and the limited linkages between the natural resource sector and the rest of the economy (Hirschman, 1958). The fluctuation of crude oil prices is commonly used as an illustration. The oil crisis of 1973 affected the barrel price in the following year (1974), with an increase from the initial price of 3 dollars to 12 dollars. In 1986, the inverse trend was observed, with a decline in the barrel price from 27 dollars to less than 10 dollars.

The famous Dutch disease is another illustration of the structuralist theses. It is the phenomenon observed when a boom in one sector of the economy causes a crisis in other sectors. The resulting increase of the revenues in the growing sector leads to an appreciation of the given nation's currency compared to other nations' currencies. The Dutch disease takes its roots from a crisis in the Netherlands in the 1960s, caused by the

discoveries of huge natural gas deposits in the North sea. The fortunate discovery caused the Dutch guilder to appreciate considerably, and as a result, exports of all non-oil products became less competitive in the international market. Addressing the Dutch disease, Neary and Van Wijnbergen (1986) emphasize that, in the context where natural resources are the cornerstone of an economy, a boom in that sector will inevitably hinder the industrial sector, either through an appreciation of real exchange rate or an absorption of production factors. Furthermore, the revenues generated by the natural resource sector is generally far insufficient to cover the losses resulting from the industrial sector inactivity. Besides Netherlands, many countries around the World have experienced the Dutch disease, Angola for instance, where 99.3% of total exports were obtained from oil and diamonds in 2005; Democratic Republic of the Congo, with a major dependence on diamonds export; Venezuela with its oil should be cited.

Nevertheless, the structuralist explanations and particularly the Dutch disease have not been confirmed by some emprirical tests (Moran, 1983; Dawe, 1996; Fosu, 1996). Leite and Weidmann (2002) do not view the Dutch disease thesis as an adequate explanation of the paradox of plenty. They criticize the idea that a decline in industrialization or manufacturing has a negative effect on growth. In addition, Auty (2001a) rejects the Dutch disease theory through his study on multiple natural resource-endowed countries, revealing several exceptions to the curse such as Norway. As the most cited exception to the resource curse, Norway has escaped the paradox through a systematic management of its oil production as well as the saving of oil revenues, and lies in the pool of developed countries. The structuralist approach of the resource curse as investigated above is followed by the rent-seeking behaviour.

2.1.2. The Rent-Seeking Theory

The rent-seeking is defined as the use of a corporation, association or a population's resources, to generate personal gain, without contributing to society's development through wealth creation. The rent-seeking has proved to be an underlying cause of the resource curse. The concept refers to all the activities that harm the political and institutional stability such as corruption. The rent-seeking activities are a serious

nuisance to economic growth, particularly, the activities related to natural resource abundance (Torvik, 2002; Robinson et al., 2006; Sandbu, 2006). A classic example of the Rent-seeking activities is a corporation or a group of people that influence the government or public officials to obtain tarrif protection, loan subsidies or grants. The same phenomenon is observed when the company in charge of a resource extraction seeks restriction on imports of the given resource. While such activities generate financial profits to the company, they present no advantage to the society, taxpayers in particular. The practices of rent-seeking put the resource revenues in the hands of a small group of people and thus, making it difficult for the governments to ensure the general welfare of their populations. Additionally, the time and efforts spent on such practices decrease the time that should be devoted to productive activites. This leads to a progressive waste of the human capital as people are more interested in easy and illicit gains rather than actually working hard and develop professional skills. According to Tornell and Lane (1999), the rent-seeking results in a loss of tax base, as a greater share of resources ends up in non taxable inefficient activities.

To a certain degree, the rent-seeking and all the activities sourrounding it are determined by the institutional environment. This standpoint is supported by a group of analysts according to whom, public and private actors' responses to rent-seeking are constrained by the institutional climate and become problematic when institutional constraints are weak (Deacon and Muella, 2005; Mehlum, Moene et al., 2006). That is why they recommand the establishment of healthy and strong institutions that would efficiently hinder such activities. In that sense, Tornell and Lane (1994; 1996; 1999) developed a model of rent-seeking based on the principle that, without institutions that restrict the government's response to demands for redistribution, more resources are distributed than are created at the outset. Another rent-seeking model was presented by Torvik (2002) and displays how an increase in natural resources raises the number of entrepreneurs engaged in rent-seeking activities and causes a decrease in the number of entrepreneurs running productive firms. Torvik (2002) emphasizes that an increased amount of natural resources decreases total income and welfare.

However, some countries with abundant natural resources have achieved their economic potential with an amazing growth and income level, which puts a boundary to

the rent-seeking perception (Bulte et al., 2005). In other words, resource endowed countries come in different shapes, some belonging to the top ranking nations in terms of development and others experiencing a severe economic agony. Various economic models of rent-seeking have been developed on the basis of this disparity, with initial conditions and consequent outcomes (Acemoğlu, 1995; Baland and François, 2000). In addition, the rent-seeking activities are not uniquely associated to the natural resource sector; they span many other domains, including foreign aid, social security and monopoly rents (Lederman and Maloney, 2008).

2.1.3. The Resource Drag Theory

Alongside the Dutch disease and the rent-seeking theses, a third theory emerges that claims its rightful place in the assessment of the paradox of plenty : the resource drag. Some studies support that the resource curse is an immediate consequence of weaker growth in the resource sector. Early studies only address the theoretical angle of the term. Sachs and Warner (1995) propose the resource drag hypothesis and leave it without test. Alexeev and Conrad (2009) claim that for resource-based economies, the resource drag is seldom observed in the long run but is more manifest in the short run, due to a stagnant or declining mineral production. Davis (2011) undertakes an empirical work and points out that “the relatively slower growth in mineral and energy economies may suggest a resource drag, where optimally managed per capita resource production does not grow substantially over time. This introduces a drag on the measured growth of per capita economic output”. Making use of statistical tools, Davis (2011) was the first to test the hypothesis established by Sachs and Warner (1995). After controlling for changes in mineral production, Davis found that booming mineral and energy economies grow faster than they otherwise would. Simultaneously, busting mineral and energy economies grow slower than they otherwise would.

Similar to previous explanations of the paradox of plenty, the resource drag finds its limit at the gate of Norway and other exceptions to the curse, failing to explain why those particular countries, unlike many other resource-rich nations enjoy a growing economy.

2.1.4. The Institutional Approach to Resource Curse

Finally, the range of resource curse theories is bounded by the recent institutional approach. This last school of thought is based on the idea that countries blessed with natural resources can achieve their development potential only if they preview strong institutions that promote economic growth. Conversely, this approach claims that resource-endowed nations cannot escape the resource curse trap with weak institutions. Sub-Saharan Africa is found guilty on this particular point. Countries like Nigeria, Democratic Republic of the Congo, Angola, and many others provide a convincing illustration. Mehlum et al. (2006a, b) state that better institutions can prevent the resource curse. According to Humphreys et al. (2007), there is a need to elaborate adequate policies that restrict the activities and powers of private and public actors who could inhibit better living conditions in oil producing countries, particularly those with weak institutions. In the same realm of institutions, a great number of analysts have addressed the efficiency of fiscal policies in managing the volatility of natural resources. In that regard Atkinson and Hamilton (2003) support that a government failure to handle huge revenues from resources leads to the paradox of plenty. They highlight a threefold combination of elements that have produced incredibly high savings, namely : natural resources, macroeconomic regulations, and public expenditure regulations. Davis (2001) corroborates the significance of fiscal policies in the avoidance of the resource curse by emphasizing the adoption of stabilization funds for non-renewable resources. Here the case of Norway comes to mind for their succesful management of natural resources' revenues through a saving system, securing a healthy economy. A different angle of approach is ascribed to Papyrakis and Gerlagh (2007) who stress a causal effect between resource abundance and corruption, and hence weak institutions. Using the United States of America as a case study, they found that resource endowment in some regions has promoted corruption, a low investment power, a poor academic performance and an inefficiency of Research and Development (R&D).

The economic approaches have taken the leading role in explaining the resource curse, relegating the institutional and political perceptions to an almost useless standpoint. However the complexity of each of those economic approaches along with

their similarities at some points relaunch the debate on their accuracy. Hence, to a certain degree, the economic explanations, with emphasy on the dutch disease, are not appropriate to explain the economic agony in which the nations blessed with natural resources are crawling (Amuzegar, 1999). In the same line of thought, Ross (2001) emphasizes that early hypotheses should be taken with caution. More and more contemporary studies focus on the impact of political institutions on the economic welfare of nations prone to the paradox of plenty. Those are studies that test explicitly for the effect of institutions such as democracy, transparency, human rights etc… on natural resource revenue management. It appears that political forces may actually shape the economic base and provide a framework to understand how governments are supposed to allocate revenues (Okruhlik, 1999).

More explicitly, this last school of thought stresses the fact that huge revenues from natural resources determine the nature of a country or region. Hence abundant reserves of natural resources can exacerbate corruption, conflict and governmental instability. Strong fiscal and political bodies are therefore required, in order to avoid the collapse of the economy. Ross (2000), Lam and Wantchekon (2003), and Morrison (2005) introduce the concepts of "political resource curse" and "political Dutch Disease" to describe the economic disaster resulting from extremely corrupt and irresponsible governments. Here, rather than treating the resource dependence as an exclusively economic phenomenon, the analysts link it to political instability, political repression and a failure to build democratic regimes (Wantchekon, 2002). Sala-i-Martin and Subramanian (2003)'s results corroborate the primacy of institutions. Using Nigeria as a case study, they found that huge amounts of natural resources lead to weaker institutions, through corruption, which in turn have a negative impact on growth. After institutions are controlled for, natural resources have a positive effect on growth.

Finally, it is of paramount importance to note that the institutional approach of the paradox of plenty, unlike the other schools of thoughts, explain why some resource dependent countries escape the curse. In less developed countries where natural resource discoveries have a much higher impact and are confronted with generally weaker and less adaptable institutions, natural resource revenues are more likely to be captured and to not benefit a state broadly (Leite and Weidmann, 2002). Power (2002) supports this

point by making a comparision between the classic resource dependent nations and the United States and Australia. In other words, if a country's institutions are weak, the destabilizing influence of resource revenues may be severe. Conversely, for countries that possess a strong institutional organisation, the effect of the curse is considerably inhibited.

2.2. Mitigation of the Resource Curse

Today, the resource curse is affecting nations in every continent and based on that evidence, the phenomenon should be elevated to a global concern. However, Norway's famous achievement in preventing its blessings from turning into a curse, along with other resource-rich countries like Botswana, Malaysia, Indonesia and Thailand has pulled an important trigger for a recognition that resource curse is a tamable phenomenon. Inspired by the above mentioned exceptions, various solutions have been proposed to hedge against the calamitous trap of the resource curse. The solutions range from the macroeconomic adjustments to the late institution and democracy strengthening framework.

2.2.1. Diversification of Economic Base

The diversification of economic base holds a notorious place among the macroeconomic solutions. Diversification can not only strengthen the economic situation of a country, but can equally change its political dynamics. There is therefore a need to encourage actions towards this end. According to Barbier (2005), a diversification of the economic engine would mitigate the currency appreciation, which in turn would efficiently tackle the curse. This solution proposal is built around the development of manufacturing sector, which is by and large inhibited by the resource abundance. Adam Smith draws attention on the fact that extraction and exports of resources generate huge revenues and this will inevitably retard the manufacturing sector (Smith, 1776). Moving along the same line of thought, some published works of the 1950s and 1960s reveal that the resource sectors had a weak correlation with all the

other economic sectors; and hence the industry sectors, no matter how strong they are, could be hindered by an abundance of resources (Prebisch, 1950; Baldwin, 1966).

One mechanism aiming at diversifying the economic base is the establishment of industries that would otherwise not be competitive. In order to maintain profitability in those industries, the governments can implement more trade barriers, diverting revenues from the extrative industry to promote the uncompetitive industries. Such protectionist policies often result in an economy that is unsustainable and a private industry that is precariously intertwined with the public sector. Additionally, the use by extrative industries of local goods and services is another path leading to diversification. This approach is illustrated by Norway. But the businesses that grow out of it are likely to be specific to the extrative sector or are unlikely to have significant demand, independent of the extrative industry to maintain their profitability in downturns, or once the resource has been exhausted.

The use of resource revenues as a guarantee for foreign investment also stands in the realm of diversification (Mane, 2005). But this last aspect might not be safe in the sense that the revenues from resource exploitation would not benefit the whole nation but just the leaders, more particularly in countries with weak institutions. Just as resource-backed loans have been taken out by many corrupt governments for personal benefit and without the knowledge of their constituents, using the resource revenues to invest in other sectors, though potentially promising, can both over-commit resource revenues and provide further opportunities for corrupt deals. Overall, while diversification is an important component of economic and social harmony, many of the mechanisms that are used to encourage diversification can be problematic. For instance, the establishement of industries is one way of diversifying the economic base. However, care should be taken to promote productive industries — manufacturing, agricultural, tansportation — instead of the extractive industries. For a country experiencing natural resource curse, establishing more extractive industries would obviously aggravate the curse.

2.2.2. Privatization of State-Owned Enterprises

Next to the diversification as a macroeconomic remedy to the paradox of plenty stands the privatization of state-owned enterprises. Privatization has proved to be efficient in the prevention of the curse through a series of studies. Boardman and Vining (1989) and Ascher (1999) announced that privatization of state-owned enterprises yields efficiency and better management of enterprises. In addition, privatization offers a guarantee that resource extraction is well priced (Ascher, 1999). The early wave of privatization has produced mixed results. Privatization does usually lead to increased efficiency, better management of the enterprise and reduced opportunity for diversion of revenues to off-budget priorities (Boardman and Vining, 1989; Ascher 1999; Megginson and Netter, 2001). Moreover, in the resource sector, privatization can increase the pressure to take into account the negative externalities of resource development and to ensure that extraction is properly priced. It ensures that the entity extracting the resource pays royalties that reflect the rent owed to the owners of the resource, and reduces contradictory priorities that result when governments are responsible both for resource extraction and for protecting public goods (Ascher, 1999).

However the net effects of privatization are not necessarily an improvement of the economic welfare. Besides its advantages, privatization does little to address broader development problems plaguing the countries prone to the curse (Summers and Pritchett, 1992). Hence the process of privatization is just as capturable as the process of state-owned enterprises. Moreover, while privatization can be beneficial in a competitive environment, in the cases where there are numerous market failures and the underlying institutional problems are not addressed, privatization is likely to be a weak tool to address the root of problems of the curse (Megginson and Netter, 2001; Palley, 2003; Birdsall and Subramanian, 2004). From some angle of view, privatization bears a meaning only if the rule of law prevails, otherwise the process of privatization would cause more harm to the existing economy. According to Susan Rose-Ackerman (1998), privatizing state-owned enterprises is comparable to large infrastructure projects in that it creates favorable conditions for corruption. Therefore, there is a need to enforce the rule of law in order for privatization to take proper effect.

2.2.3. Institutions Promoting Economic Growth

Recent analyses recommend the establishment of institutions that promote economic growth. Such institutions can be grouped as follows : market-creating, market-stabilising, market-regulating, and market-legitimising institutions. Market-creating and market-stabilising institutions such as property rights, the credibility of the rule of law and macroeconomic adjustments have proven to be adequate for the economic growth of low-income countries. On the other hand, market-legitimising institutions such as democratic institutions have been shown to be favorable for economic growth of developed nations. According to Acemoglu et al. (2001), Easterly and Levine (2003) and Rodrik (2005), institutions are more determinant in the promotion of economic growth than the classical macroeconomic parameters. It is an evidence that macroeconomic reforms represent a cornerstone in averting the paradox of plenty, but there is an urgent need to implement institutions ensuring that the economic measures are carried out with integrity. Institutions are expected to adjust incentives for citizens as well as for those who should be representing citizens' preferences within the government. For citizens, incentives need to be adjusted in such a way that productive activities and investments have a higher expected benefit than rent-seeking activities (Auty, 2000). For government agents, incentives need to be aligned such that implementing the will of their constituents has a higher expected benefit than rent-seeking activities.

The separation of powers holds an important place within the realm of institutions. In fact, stimulating competition between different government agencies could increase the accountability and sanction agents who are not acting according to their principals' wishes (Keohane, 2002). The traditional checks and balances illustrates the separation of powers, especially in countries with strong institutions, with numerous decision-makers ensuring that pressure to keep officials accountable comes not just from below or above, but from different angles, increasing the credibility of those in power (Keefer and Knack, 2002). According to Persson et al. (1997), the power of checks and balances comes from creating conflicts of interests between different bodies of government while also requiring them to agree on policy. However the institutional standpoint is not exempted from critics. Glaeser et al. (2004) support that growth in

income and human capital pave the way to better institutions through a collaboration between citizens and governments and not the other way around. The authors point out the existence of an endogeneity problem in previous literature, where institutional variables were measurement based rather than constant based, leading to incorrect inferences. In the same line of thought, Kurtz and Schrank (2007a,b) question the idea according to which institutions have a causal effect on growth. They argue against the ad hoc assumptions of the empirical literature regarding institutions and governance, especially given the weakness in commonly used governance and institutional measures.

The strategies aiming to mitigate the economic agony resulting from resource abundance as mentioned above — the diversification of the economic base, the privatization of state-owned enterprises, the establishement of institutions promoting economic growth — have been implemented by Sub-Saharan African countries for a long period of time. But there does not seem to appear some light at the end of the tunnel. Contrary to the expectations, the adoption of those strategies has seen the economy of Sub-Saharan Africa collapse over time. Today, thirty-two out of the forty-eight Sub-Saharan African countries are among the Heavily Indebted Poor Countries of the world (World Bank Data). The International Finance Corporation (IFC) reported claims (loans and guarantees) of 26 billion US dollars at the end of June 2016 on forty-two Sub-Saharan African countries.

The most recent form of remedy to the problem has been launched by the World Bank and known as : the policies for social inclusion. The policies for social inclusion have been put into execution in Sub-Saharan Africa for almost a decade but have not yet been empirically tested for efficiency. We devote the next section to those policies.

2.3. Policies for Social Inclusion and Equity Cluster

According to the World Bank, the policies for social inclusion is a whole package containing gender equality, equity of public resource use, building human resources, social protection and labor, and policies and institutions for environmental sustainability. The concept of social inclusion emerged from the “social exclusion” that originated in France in the early 1970’s in the perspective of promoting social

integration and solidarity (Barry, 1998). At the European level, the concept was first used by the European Commission. It was thought that the social exclusion was an outcome of the failure to implement social rights. The European Observatory on National Policies for Combating Social Exclusion was consequently established in 1990. Cousins (1999) presents its aim as guaranteeing the social rights to all citizens of the European Union and allowing their participation in major social and economic opportunities in society. Generally speaking, people who are socially excluded lack the skills and capabilities that are required to secure and keep a job, and for that reason, they are usually cut off from the world of work and education. Such people are predisposed to social isolation, poor housing and diseases. Individuals and groups are excluded or included based on their identity, namely the gender, race, caste, religion and disability status. The exclusion that results from those factors hampers the social stability and inhibits the economic welfare of nations as the excluded population could actually contain more talented individuals than the included population. Several facts illustrate the social exclusion phenomenon both worldwide and in some particular regions. The case of folks from African descent draws attention, as they are still excluded amongst other groups. Gender and disability are other forms of exclusion that occur worldwide, although attempts of female emancipation and inclusion of the disabled through training have produced positive results. Regionally speaking, the case of India and Nepal can not be neglected, with the system of casts that relegates the untouchables (people considered to be unpure) to the lowest social class. In some countries, religions have established a radical and formal barrier against other confessional groups to the extent that they are unable to practice any type of economic activity. According to Hall and Patrinos (2012), indigenous people around the world continue to face exclusion that is rooted in large part in their displacement from their traditional lands.

The facts mentioned above do not serve the economic progress of nations. There is a need to reverse the tendency through an inclusion program. Social inclusion policies and equity cluster have been designed by the World Bank in that regard. This initiative stands as a cornerstone in the World Bank Group’s dual goals of ending extreme poverty by 2030 and promoting shared prosperity. The inclusion according to the World Bank would occur in three main areas : markets, services, and spaces. The three spheres are

equally important to the extent that, implementing inclusion in one, say the markets and neglecting the two others would be a vain effort. The European Commission in charge of the combat against social exclusion in Europe has adopted the Joint Report on Social Inclusion in 2004, in the form of a communication to the European Parliament, the Economic and Social Committee, and the Committee of Regions, to provide information on the evolution of the combat. The Joint Report defines the social inclusion as :

> A process which ensures that those at risk of poverty and social exclusion gain the opportunities and resources necessary to participate fully in economic, social, and cultural life and to enjoy a standard of living and well-being that is considered normal in the society in which they live. It ensures that they have greater participation in decision-making which affects their lives and access to their fundamental rights.

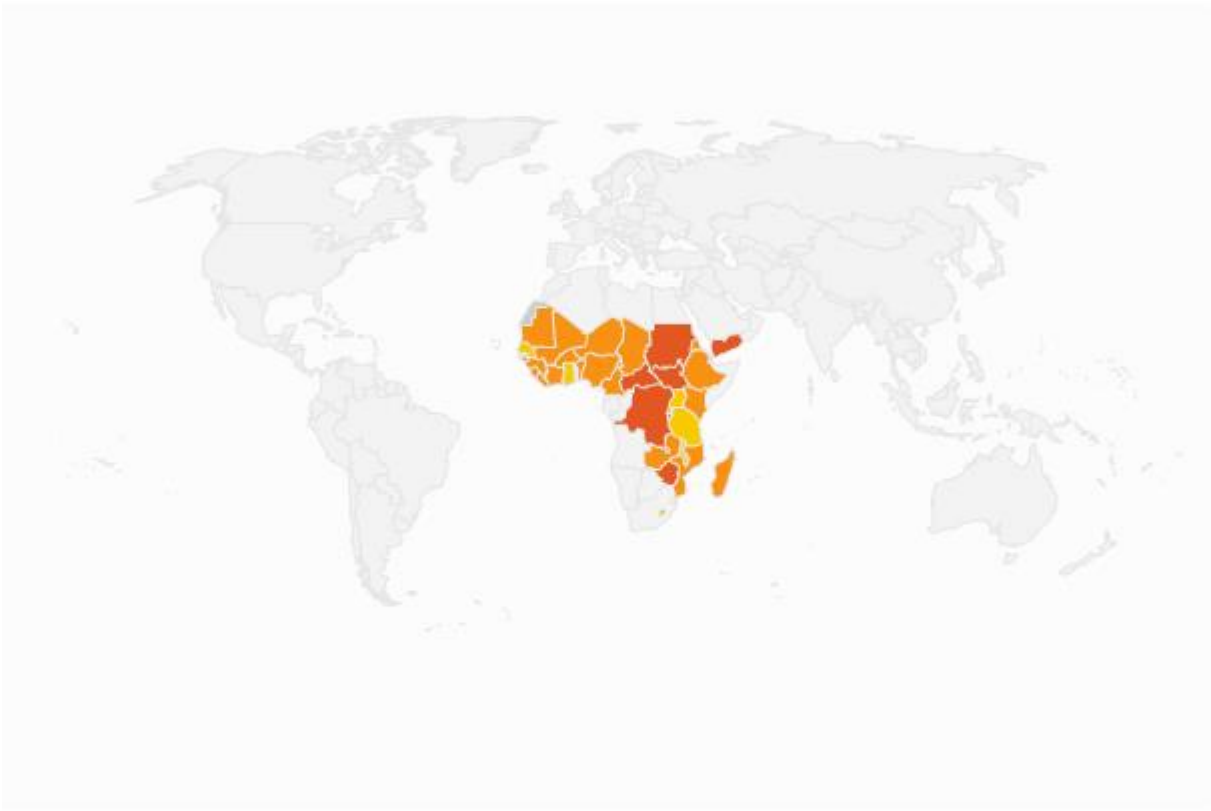
The social inclusion measures would be of a paramount importance for resource-endowed countries as they would strengthen the human resources of thoses countries, which in turn would have a considerably positive effect on the management of natural and capital resources. Sub-Saharan African nations being particularly prone to tribalism and ethnicity, corruption, absence of transparency and mismanagement of natural resources would enormously benefit from these policies. Since the scope of this study is confined to Sub-Saharan Africa, we have considered the analysis of some clusters to shed light on the situation of the region in social inclusion sector. These clusters are namely : the public sector management and institutions, and the structural policies.

2.3.1. The Public Sector Management and Institutions Cluster

The public sector management is an important indicator of social inclusion. It covers governance and public sector capacity issues such as property rights and rule-based governance, quality of budgetary and financial management, efficiency of revenue management, quality of public administration, transparency, accountability and corruption in public sector (World Bank, CPIA Africa). As of the year 2015, the average governance ranking of Sub-Saharan African countries is 3.0 on a scale of scores ranging

from 1 which is the lowest score to 6 as the highest score (World Bank, CPIA Africa). Although this regional score is relatively low compared to other IDA (International Development Association) countries who scored around 3.2, it should be acknowledged that the region is not falling below the average. From all the components of the public sector management, the efficiency of revenue mobilization claims the best performance with a record of 3.4 for the region (World Bank, CPIA Africa), followed by the quality of budgetary and financial management with a score of 3.1; the scores for other components are weak.

Figure 1 : Illustrative Map of Public Sector Management and Institutions in Sub-Saharan Africa



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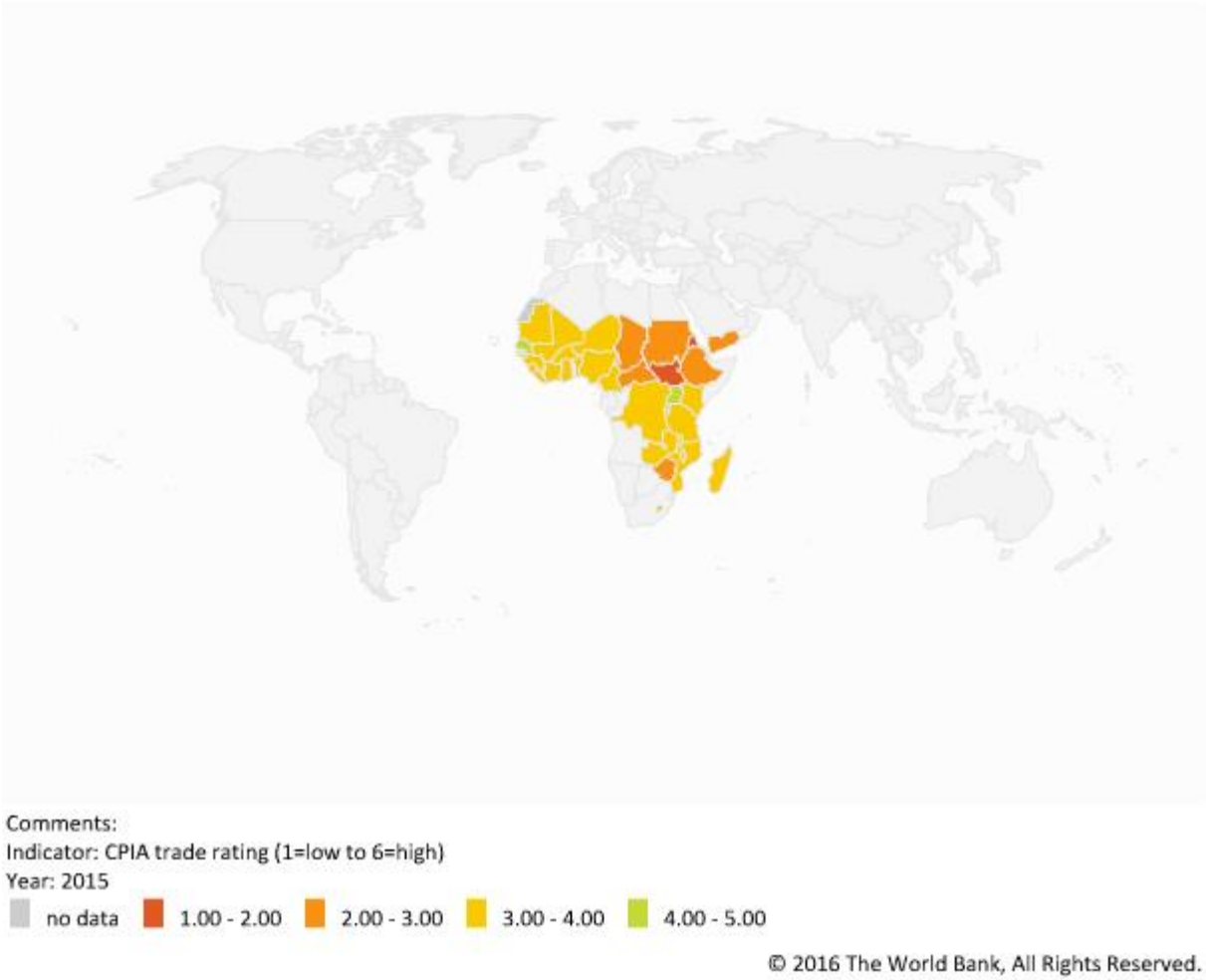
2.3.2. Structural Policies

As an indicator of policies for social inclusion, the structural policies span regulations affecting the trade, the financial sector and the business environment (World Bank, CPIA Africa). The estimation for Sub-Saharan Africa is 3.2 as of the year 2015. The score for each component of this indicator vary considerably, with the trade scoring the best performance, while the financial sector holds the lowest record. As far as structural policies are concerned, Sub-Saharan Africa is on a foot of equality with other IDA countries. Taken individually, some SSA countries actually are in advance of other IDA countries.

Figure 2 : Illustrative Map of Structural Policies in Sub-Saharan Africa



While the initiative of the World Bank to end poverty and secure a happier international community through the social inclusion policies is being adopted by Sub-Saharan African governments, the reports of efficiency of those policies have remained speculative and theoretical. Theoretical studies do not serve the universal knowledge due to a lack of tangible and unquestionable results. There is a need for an empirical test.

2.4. Human Resources and Economic Performance

Although natural resources represent a cornerstone in many countries' revenue like in Sub-Saharan Africa, the human and capital resources have their words to say in the achievement of a healthy economy. The concept of resource is not limited to the natural constituents such as mineral deposits, water, forests and lands but covers the human (skills, abilities, intellect, educational standards) and capital (buildings, machinery, tools, equipment and financial instruments) components as well. This section addresses the importance of human resources in the economic welfare.

From a business perspective, the human resources or human capital refer to the elements of an organization that generate added-values, through their skills and abilities. In this sense, allusion is made to individuals employed in the organization. However, in Economics, the concept takes a more intangible meaning. According to the United Nation Economics Commission for Africa (UNECA, 1990), the realm of human resources spans the knowledge, skills, attitudes, physical and management effort required to manipulate capital, technology and land among other things, to produce goods and services for human consumption. Clearly, the components of human resources can be grouped in two categories. The first category refers to the labor force that is used in the production of goods and services. The second category on the other hand comprises elements that are obtained through education and training, namely knowledge, competency and experience. Schultz (1961) defines human capital based on its individual aspects. It is "something akin to property", he affirms. Some authors relate the concept to an accumulation process, emphasizing on knowledge and skills obtained throughout educational activities such as compulsory education, postsecondary education and vocational education (De la Fuente and Ciccone, 2002). Another

conception of human capital is linked to its production-oriented aspect. In that sense, it encompasses factors such as cleverness, awareness, instruction, practice, and ethical principles like honesty, lawfulness, reliability, punctuality, hard work, etc… (Frank and Bemanke, 2007).

For many years, human resources have not been given much importance in the development process in countries endowed with abundant natural resources. Early literature on the importance of human resources for economic growth is ascribed to Adam Smith in "the wealth of nations" (1937). The knowledge was spread that development within any society results in large part from individuals who have accumulated knowledge through education or initiation. Skilled and well-trained labor would be able to determine the adequate amount of natural resources to exploit and the critical time frame of exploitation in order to avoid overexploitation that will lead to diminishing returns and the destruction of the resource. For Alfred Marshal (1930) the human resources are the most valuable asset a society can possess and education should be a national investment. The primacy of human resources is also discussed by Harrison (1973, p3) :

> Human resource constitutes the ultimate basis for the wealth of a nation's capital. Resources are passive factor of production; human beings are the active agents who accumulate capital, exploit natural resources, build social, economic and political organization. Clearly, a country which is unable to develop the skills and knowledge of its people and to utilize them effectively in the national economy will be unable to develop anything else.

Some studies have disclosed useful results about the relevance of human resources in economic growth. Researches conducted by Hicks (1980), Landau (1983, 1986), Burnet et al. (1995), Barros (1991), Ojo and Oshikoya (1995) show a positive linkage between the human resources and the economic growth. For example, Barro (1991) used 98 countries as cross sectional units between 1960 and 1985 and as proxies of human resources he chose school enrolment rates. Results of his study show the existence of a positive correlation between the growth rate of real per capita GDP and

the enrolment rates. Burnet, Marble and Patrinos (1995) based their investigation on East Asia and concluded that massive investment in both primary and lower secondary education is the driving force of the economic growth experienced in that region of the world. Ojo and Oshikoya (1995) studied african countries and found literacy rate and average year of schooling to be positively related to economic growth although their coefficients were statistically insignificant. The work of Ncube (1999) claims its rightful place in the literature. He incorporated total enrollment into the standard growth model and found a strong long run linkage with the economic growth in Zimbabwe. However, a range of studies display a negative relationship between education and human capital. Islam (1995), Caselli et al. (1996) and Hoeffler (1999) consistently found a negative effect of human resource on growth, using student-teacher ratio and adult literacy as human resource proxies. Lau, Jamison and Louat (1991) studied 58 developing countries from 1960 to 1986 using average educational attainment of the labour force and concluded that, primary education has an estimated negative effect in Africa, Middle East and North Africa, and insignificant effect on South Asia and Latin America.

2.4.1. Measurement of Human Resources

The measurement of human resources follows three approaches : the output-based approach, the cost-based approach and the income-based approach.

The Output-Based Approach

In order to measure the stock of human capital, some economists suggest the use of school enrollment rates (Baro, 1991 ; Baro and Lee, 1993). This method assumes that human capital spans a large number of elements, but education is the most important component. Individuals are directly tested to see whether they have certain attributes relevant to economic activities. The main limitation of this approach is that it does not take into account most of human capital attained beyond that elementary level such as logical and analytical reasoning and scientific and technological knowledge. Psacharopoulos and Arriagada (1986 and 1992) and Barro and Lee (1996) suggested the

average years of schooling to measure the stock of human capital. This proxy presents several advantages over school enrollment. First, it is a valid measure of human capital stock. Second, it measures the level of investment made in the current labor force. Wachtel (1997) affirms that under certain conditions, the number of schooling years is equivalent to cost-based measures of human capital.

The Cost-Based Approach

The cost-based approach or equivalently the cost of production approach values the human capital stock as being the depreciated value of the monetary amount spent on investment in human capital. Kendrick (1976) and Eisner (1985, 1989) view the approach as the most appropriate, in that it quantifies the financial resources used all along education. The approach is not exempted from limitations. First, it is only supply-side based, while in reality the value of human capital is also determined by the demand for it. This makes cross-sectional and inter-temporal comparisons difficult. Second, the method fails to take into account the heterogeneity of individuals.

The Income-Based Approach

In this approach, all future income and gains of an individual are predicted (Farr, 1853). Its main limitation is that it relies on the assumption that labor is paid according to its marginal productivity. In practice, factors such as market power, trade unions, discrimination, etc affect wages. The measure is also sensitive to the choice of discount rate and the retirement age. There is a common limitation to the above approaches : formal education and training are not the only determinants of human capital. Some of an individual's capital is innate to them and, in some sense, a non-produced asset. Hence the asset created by education could only be regarded as improvements in human capital by education and training.

2.5. Capital Resources and Economic Performance

Capital resources or equivalently the physical capital refer to the goods made and used to produce other goods and services. The endogenous growth models proposed by Romer (1986) and Lucas (1988) underline three important factors that impact the long-run productivity growth, namely : the investment in human capital, the investment in research and development (R&D) and the investment in physical capital, with a focus on the machinery and equipment. However the literature on the third factor is not vast, showing that much importance is not granted to it. The fact that the richest nations on earth are notorious for concentrating considerable machinery and equipments (M&E) sheds a light on their contribution to the economic welfare. The results of Delong and Summers (1991) would be of great service in that regard. They found that a one percent increase in machinery and equipment shifted the long run productivity growth from 0.2% to 0.3%. Auerbach, Hassett and Oliner (1999), Delong and Summers' data to test for the existence of a link between investment in capital resources and economic growth in OECD countries found that returns to investment in equipment and structures were fully consistent with the neoclassical growth model. In Canada, Sargent and James (1997) found an elasticity of output with respect to physical capital which is close to 1. According to Fortin (1999), Canada tends to make less investments in Machinery and Equipment compared to the United States, and this explains why the productivity gap between the two countries keeps on increasing. The position of Fortin will be reinforced by the statistical evaluation of Rodriguez and Sargent (2001) who recall that, in 1999, investment in M&E was almost 50% lower in Canada than in the United States and the gap has been maintained for long particularly when measured in terms of M&E capital stock per worker. Thus the capital resource occupies an equally important position in economic growth as the natural and human resources. As a matter of fact, for some analysts, such as Landes (1969), the machine is at the heart of the new economic civilization.

2.6. Botswana's Success

Alongside Norway, Botswana has become a famous illustration of the rare countries that have escaped the curse resulting from resource abundance. In 1967, an unprecedented discovery of diamond reserves all across Africa was made in Botswana. The newly independent nation had a unique chance to build a glorious future. The exploitation of the resource, managed by a branch of the De beers company, called Debswana, yielded about 50 % of the total revenues over years. The revenues from the diamond exploitation account for more than 75 % of the nation's total exports revenues (Sarraf and Jiwanji, 2001). However, Botswana, unlike the large majority of resource-dependent economies, has managed to avoid the scenario of one watching their blessings suddenly turn into a curse. Beside being cited as the least corrupt African country, at the same level of estimated corruption in Taiwan, Uruguay and Qatar, the young nation enjoys the reputation of being one of the fastest growing economies in the world over the past forty years. Between 1966 and 1988, Botswana's GDP grew at an annual rate of 14.5 %, one of the highest growths in the world.

The driving forces of Botswana's heroic performance both economically and institutionally deserve a careful investigation as this could ignite the hope of its fellow African states towards the mitigation of the resource curse. Some sources ascribe the country's success to the incredible leadership of Seretse Khama, the nation's first president, but also to the fact that, the institutions originally established by its rulers were not twisted by colonization (Acemoglu, Johnson et al., 2003; Robinson, 2003; Poteete and Gramajo, 2005). According to Dunning (2005), Botswana displays an unusual influence on De Beers company and possesses an important market power of its own. Alongside these historical hypotheses, Botswana has adopted a long term planning framework and overseas reserves to control the negative effects of resource revenue volatility on short term expenditures. In addition, the exchange rate regime has played a major role in the country's achievement. The pula (Botswan's currency) has been pegged to other currencies since independence, ranging from the South African Rand to a basket of currencies, through the US dollar (Poteete and Gramajo, 2005). Using this financial strategy, the leaders have successfully avoided the currency appreciation.

Human and capital developments claim their rightful place in the heroic story. At the independence, the young nation had insignificant assets and poor infrastructures. There were only two secondary schools with a five-year education with almost 80 graduate students. But the government was concerned with the human and capital sectors and allocated high proportions of diamond revenues in those sectors, unleashing a spectacular improvement. The reforms undertaken by Botswana are expected to influence other African nations taken in the trap of poverty and economic agony.

CHAPTER 3

METHODOLOGY

3.1. Methodological Overview

This study assesses the resource curse phenomenon through a case study of Sub-Saharan Africa. To that end, it primarily investigates whether there exists a negative correlation between natural resources and the economic growth of the region. In other words, we seek to determine whether the abundance of resources represents a curse to the region's economy. It is well known that Sub-Saharan African region is blessed with natural resources, including the minerals, forests, oil, coal and natural gaz. However, despite those blessings, SSA statistically stands as the most miserable region in the world. The various measures implemented by governments to hedge against the problem are yet to produce meaningful results. The policies for social inclusion —a framework recommended by the World Bank to mitigate the misery— have been adopted by SSA governments for almost a decade. The results of those policies vary from a year to another and from a country to another, and have remained speculative. This study will test them empirically and determine whether they have positively impacted the region. Twenty Sub-Saharan African countries are chosen in the scope of this research, including the current largest economy of the whole continent : Nigeria.

3.2. Population/Sample of the Study

The target population in this study is Sub-Saharan Africa, the area of the African continent that lies South of the Sahara desert and spans forty-eight countries. A sample of twenty countries out of the forty-eight SSA countries will be investigated, due to the unavailability of data.

Figure 3 : Map of Sub-Saharan Africa (Area in red)

Table 1 : Selected Sub-Saharan African Countries

(Source : International Monetary Fund. Estimates as of 2015)

Country	Nominal GDP ($ billions)	Income Level
Angola	102	Upper Middle Income
Botswana	13.1	Upper Middle Income
Central African Republic	1.6	Low Income
Cameroon	28.5	Lower Middle Income
Congo Republic	8.9	Lower Middle Income
Gabon	13.8	Upper middle Income
Ghana	37.7	Lower Middle Income
Guinea	6.7	Low Income
Equatorial Guinea	10	Upper Middle Income
Mali	11	Low Income
Namibia	12.9	Upper Middle Income
Niger	7.1	Low Income
Nigeria	490.207	Lower Middle Income
Sierra Leone	4.3	Low Income
Chad	11.7	Low Income
Tanzania	46.2	Low Income
South Africa	312.957	Upper Middle Income
Democratic Rep. of Congo	39.1	Low Income
Zambia	24.5	Lower Middle Income
Zimbabwe	13.9	Low Income

3.3. Study Plan

In this study, we investigate whether natural resources negatively impact the economy of Sub-Saharan African countries, and whether social inclusion policies could promote the growth of the region. To achieve our research goals, panel data analysis is applied to several development indicators, using panel data estimation models. Since we

seek to answer two questions, two panel data are utilized. The first panel data is composed of the annual real GDP growth, natural resource variables and control variables. 280 observations are used for each resource variable over 14 time periods (2000 - 2013). The second panel data comprises the annual real GDP growth, indicators of social inclusion policies, and control variables. It covers 9 time periods (2005 – 2013) with 180 observations for each variable. The cross-sectional units of the study are the 20 Sub-Saharan African countries selected for investigation. GRETL is used as regression software.

3.4. Variables of the Study

3.4.1. Panel Data 1

The primary panel data in this study is made of a dependent variable (annual real GDP growth), natural resource variables, and control variables.

Dependent variable : the dependent variable in this work is the economic growth or the economic performance of Sub-Saharan African region. Though Economists consider the GDP as the appropriate measure of economic growth, there is a debate on the type of GDP to consider during researches, in order to induce effective results. As far as this study is concerned, the economic growth is proxied by the annual percentage growth rate of the real GDP. It describes the percentage by which the real GDP increases every year. The variable is estimated at market prices and based on constant 2010 U.S. dollars. We justify our choice by the fact that the real GDP values are adjusted for differences in price levels (inflation) to reflect the exact changes in real output over time. Since the real GDP removes the effects of inflation, it provides the most adequate measure of economic growth. Henceforth the term GDP will have the connotation of real GDP.

Explanatory variables : our goal in this first section is to determine whether natural resources have an impact on the economy of SSA countries and, in case of impact, specify if they are a curse or a blessing in the growth process. The natural resources by definition refer to resources produced by nature, without human beings

intervention, such as land, minerals, forests, oil, coal, natural gaz, water etc… The indicators of natural resources in this study are : the agricultural land, the forest area, the coal rents, the forest rents, and the mineral rents.

The agricultural land (sq.km) is defined as the portion of land that is appropriate for agricultural activities such as growing crops and feeding livestock (World Bank).

The forest area (sq.km) is the portion of land supporting trees, exception made for trees in inner cities' gardens and parks, as well as plants cultivated for agricultural purposes (World Bank).

The Coal rents (% of GDP) refer to the profits generated by both hard and soft coal exploitation. Estimations are given as a percentage of the Annual real GDP growth rate (World Bank).

The forest rents (% of GDP) represent the profits generated by forests exploitation of any type, particularly the roundwood harvest (World Bank).

Mineral rents (% of GDP) represent the profits generated by minerals exploitation (World Bank).

Control Variables : the choice of control variables is based on the fact that there exists an interdependence between natural resources and other factors of production, namely the human capital and the physical goods. Hence, to avoid likely endogeneity, we control for the following variables:

The average years of total schooling : it is the average years of education completed among people at the age of 15 and above. The data includes men and women.

The labor force : it is composed of people at the age of 15 and above who meet the International Labor Organization definition of the economically active population, that is "the people who supply labor for the production of goods and services during a specified period. It includes both the employed and the unemployed (World Bank).

The agricultural machinery (tractors) : it is the quantity of wheel and crawler tractors used to cultivate, harvest, water, … (World Bank).

The gross capital formation (% of GDP) : the variable is composed of all fixed assets used in the economy as well as inventories (World Bank).

3.4.2. Panel Data 2

The ultimate panel data of this study is made of a dependent variable (annual real GDP growth rate) and 4 explanatory variables that represent the social inclusion policies. We control for the explanatory variables used in the first panel data.

Dependent Variable : We seek to determine the impact of the social inclusion policies on the economic growth. Hence the dependent variable remains the same as in the first section.

Explanatory variables : the ultimate aim of this study is to test the social inclusion policies for efficiency and determine whether they should be enforced to speed up the growth process of SSA countries. The achievement of such a goal requires the regression of the GDP growth rate on the indicators of social inclusion policies. We have collected the data for four explanatory variables for that purpose and provide their definition as follows :

The Macroeconomic management rating : it covers the monetary, exchange and aggregate demand policy framework (Word Bank). The countries are rated based on their performance on a scale of 1 (the lowest score) to 6 (the highest score).

The Public sector management and institutions cluster average : this indicator reveals the level of the property rights and rule-based governance, the quality of budgetary and financial management, the efficiency of revenue mobilization, the quality of public administration, the transparency, and the accountability in the public sector (World Bank). Similar to the macroeconomic management, the countries are rated based on their performance on a scale of 1 (the lowest score) to 6 (the highest score).

The Structural policies cluster average : this variable is concerned with the countries performance in trade, financial sector and business regulatory environment (World Bank). The rating system is the same as the two previous indicators.

The resource allocation index : this indicator reveals the fairness with which the distribution of resources, particularly the scarce resources, is carried out among producers, and the fairness with which the apportionment of scarce goods and services is conducted. The rating method obeys the one applied to previous indicators of social inclusion.

3.5. Data and Sources

The data in the scope of this study are presented as panel data. Data for Annual GDP growth, Agricultural land, Forest area, Coal rents, Forest rents, Mineral rents, Labor force, Improved sanitation facilities, Agricultural machinery and Gross capital formation, Macroeconomic management, public sector management and institutions, structural policies, and resource allocation index were collected from the World Bank's World Development Indicators' database. However, we collected data for the Average years of total schooling from the Barro-Lee Education database. Due to the issue of data availability for some years and some countries, our two panel data span different time periods. The first panel data counts 280 obervations for each variable over 14 time periods (2000 - 2013). The second panel data counts 180 observations for each variable over 9 time periods.

3.6. Procedures and Statistical Treatment

Before we implement the regression of the dependent variable on the explanatory variables, we go through a series of tests to avoid likely endogeneity problems and to ensure that estimates are not biased. First, we carry out the correlation test to evaluate the linkage between explanatory variables and check for high correlation. In case there is no multicollinearity, the variables can be used in the regression. Second, we implement the panel unit root test to make sure the variables are all stationary and that the regression will not be spurious. If some variables contain unit roots, we differentiate them until stationarity is induced. Afterwards, we conduct tests to determine the adequate panel data model for the study. Finally, we run the regression and interpret the various coefficients.

3.6.1. Panel Unit Root Test and Stationarity

We implement the panel unit root test to safeguard the upcoming regression from being spurious. Because we are working with a panel data, we use the generalization of the classic Augmented Dickey Fuller procedure (ADF) to test for unit roots. The ADF regression is written as

$$\Delta y_{it} = \mu_{it} + \varphi_i y_{i,t-1} + \sum_{j=1}^{p_i} \gamma_{ij} \Delta y_{i,t-j} + \varepsilon_{it}$$

y_{it} = observation on the dependent variable, for the cross-sectional unit i, in period t.

μ_{it} = deterministic term

φ_i = the autoregressive coefficient. It can be written as $(1 - \emptyset)$

p_i = lag order, specific to the cross sectional unit i

Basically, for each variable, we test for the joint null hypothesis that the time series corresponding to it contains a unit root (non-stationary), that is all individual time series contain a unit root, against the alternative hypothesis that at least one individual time series is stationary.

H_0 : φ_i = 0 for all units, i.e all unit time series of the given variable contain a unit root or are non stationary

H_1 : φ_i < 0 for at least one unit i.e at least one unit time series is stationary

The joint test statistic follows the Im, Pesaran and Shin (2003) method and the t-bar is compared with the critical values at 10%, 5% and 1% significance levels.

If the joint test statistic (Im-Pesaran-Shin t-bar) is more negative than all the critical values, then the null hypothesis of non-stationarity is rejected.

If on the other hand, the joint test statistic is less negative than all the critical values, the null hypothesis is not rejected, leading to the conclusion that the unit time series are non-stationary.

NB : the unit root test is performed for every variable.

3.6.2. Tests Determining the Adequate Panel Data Estimation Model

In Econometrics, a panel data is a multi-dimensional data; it contains observations of several events, collected over multiple time periods for a set of cross sectional units (countries, corporations, individuals,…). Depending on the number of cross sectional units (countries in our case) and the number of time periods, there exist three types of panel data estimation models : the pooled OLS estimation model, the fixed effects estimation model, and the random effects estimation model. The choice of the adequate model is determined by a series of tests. Before we address the relevant tests, we stress the characteristics of each model.

a-) The Pooled OLS Estimation Model

It is the simplest estimation model of panel data, expressed as :

$$y_{it} = X_{it}\beta + u_{it}$$

where :

i = each cross-sectional unit included in the research. We have :

i = unit 1, unit 2, …....., unit N. Cross-sectional units could be corporations, individuals or some random element. In this study, cross-sectional units are the twenty countries of SSA selected.

t = time or period

y_{it} = the observation on the dependent variable for cross-sectional unit i in period t

X_{it} = a $1 \times k$ vector of independent variables observed for the cross-sectional unit i in period t

β = a $k \times 1$ vector of parameters

u_{it} = error or disturbance term, specific to cross-sectional unit i in period t

b-) The Fixed Effects Estimation Model

The fixed effects model disintegrates the error term u_{it} into the unit-specific and time-invariant component α_i and the observation-specific error ε_{it} so that :

$$u_{it} = \alpha_i + \varepsilon_{it}$$

The $\alpha_i s$ are then treated as fixed parameters or unit-specific y intercepts which are to be estimated. Hence the fixed effects model is mathematically expressed as :

$$y_{it} = X_{it}\beta + \alpha_i + \varepsilon_{it}$$
$$= \alpha_i + X_{it}\beta + \varepsilon_{it}$$

c-) The Random Effects Estimation Model

This model decomposes the error term u_{it} into random drawings from a given probability distribution v_is and the observation-specific error ε_{it}, so that :

$$u_{it} = v_i + \varepsilon_{it}$$

and

$$y_{it} = v_i + X_{it}\beta + \varepsilon_{it}$$

Note that in this last case, $v_i s$ are not treated as fixed parameters but as random drawings from a given probability distribution.

Once the panel data estimation models have been introduced, we present the series of tests that need to be carried out, in order to determine the appropriate model for the study.

a-) Test for Fixed Effects Against Pooled OLS Estimation Model

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it}$$

The aim of this test is to choose the appropriate model between the Fixed effects estimation and the Pooled OLS estimation. We test the null hypothesis that all the cross

sectional units have a common intercept, that is, all the α_is are equal, in which case the pooled OLS model is preferable, against the alternative hypothesis that the α_is are unit-specific, that is they vary from one cross sectional unit to another but only remain constant within each unit. We have :

$H_0 : \alpha_1 = \alpha_2 = \cdots = \alpha_n$ i.e all the cross sectional units have a common intercept

$H_1 : \alpha_1 \neq \alpha_2 \neq \cdots \neq \alpha_n$ i.e the intercepts are unit-specific, they vary from one cross-sectional unit to another.

The F-test is used and compared with the p-value

If the p-value is smaller than the F-value, then the null hypothesis of a constant intercept for all cross-sectional units is rejected. The fixed effects model is therefore adequate.

If the p-value is greater than the F-value, then the null hypothesis of a constant intercept for all cross-sectional units is not rejected. The pooled OLS model is therefore adequate.

b-) Test for Random Effects Against Pooled OLS Estimation Model

The Breusch-Pagan test is used here. We test the null hypothesis that the variance of v_i equals zero, against the alternative hypothesis that v_i has non-zero variance.

$H_0 : \text{Var}(v_i) = 0$

$H_1 : \text{Var}(v_i) \neq 0$

If the null hypothesis is rejected, then the random effects model is adequate

If the null hypothesis is not rejected, then the pooled OLS model is adequate

c-) Choosing Between the Fixed Effects and the Random Effects Model

In case both the fixed effects model and the random effects model are found to be adequate in the two previous tests, we conduct a third and ultimate test called Hausman test, to choose the most appropriate model. We test the null hypothesis that the General Least Squares estimates (GLS) are consistent, or equivalently, the requirement of

orthogonality of the v_is and the X_i is satisfied, against the alternative hypothesis that the GLS estimates are inconsistent.

H_0 : the GLS estimates are consistent i.e Cov(X_{it} , v_i) $\neq$ 0

H_1 : the GLS estimates are inconsistent i.e Cov(X_{it} , v_i) $= 0$

The test is based on a measure H, of the distance between the fixed effects and the random effects estimates. If the value of H is large, then the fixed effects model is preferable. Else, we make use of the random effects model.

Once the adequate panel data estimation model is determined, we move on to the regression stage and proceed to the analysis of results.

CHAPTER 4

FINDINGS AND INTERPRETATIONS

Throughout this chapter, all the tests are applied to the two sets of data collected: data for resources in Sub-Saharan Africa and data for social inclusion policies. For simplicity, a separate section is devoted to each set of data.

4.1. Resources Data

4.1.1. Multicollinearity test

There exist two basic ways to check for multicollinearity : the examination of correlation coefficients between explanatory variables, and the variance inflation factors (VIFs). We address the two measures in this subsection.

a-) Correlation matrix

Table 2 : Correlation Matrix For Resource Variables

	Log(A.L.)	Log(F.A.)	Coal Rents	Forest Rents	Mineral Rents	Log(L.F.)	Av. Years of T. S.	Agri. Machin.	Gross Capital F.
Log(A.L.)	1.0000								
Log(F.A.)	0.2684	1.0000							
Coal Rents	0.1985	-0.0271	1.0000						
Forest Rents	-0.0786	0.1397	-0.129	1.0000					
Mineral Rents	0.1499	0.1943	0.0627	0.2361	1.0000				
Log(L.F.)	0.1481	0.3810	0.1956	0.2389	0.2017	1.0000			
Av. Years of T. S.	0.0469	0.3384	0.2725	-0.475	0.0451	-0.0700	1.0000		
Agri. Machin.	0.3964	0.1604	0.5755	-0.373	-0.0648	0.3682	0.4215	1.0000	
Gross Capital F.	-0.4393	-0.4421	-0.072	-0.246	-0.1165	-0.4421	0.0452	-0.1103	1.0000

The correlation coefficients in table 2 are quite small; there is no evidence of strong correlation between any two variables of the study. We can rule out the multicollinearity issue.

b-) Variance Inflation Factors (VIFs)

Table 3 : Variance Inflation Factors For Resource Variables

	Log(A.L.)	Log(F.A.)	C.R.	F.R.	M. R	Log(L.F.)	A.Y.T.S	A. M.	G.C.F.
VIF	2.482	1.917	1.678	2.04	1.173	2.536	2.180	2.665	1.647

The Variance Inflation Factor is the most rigorous way to check for high multicollinearity between variables. It assesses the level of multiple correlation between an independent variable and other independent variables, and measures the extent to

which the variance of an estimated regression coefficient rises because of collinearity. The VIFs for each independent variable in this study are given in the table above. A rule of thumb commonly used in Econometrics is that if VIF > 10 then multicollinearity is high. The values displayed in the table are quite small, suggesting the absence of multicollinearity between the variables under study.

4.1.2. Panel Unit Root Test and Stationarity

We implement the panel unit root test to ensure that the upcoming regression is not spurious. The test is carried out for each variable.

Hypothesis test :

$H_0 : \varphi_i = 0$ for all units, i.e all unit time series of the given variable contain a unit root or are non stationary.

$H_1 : \varphi_i < 0$ for at least one unit i.e at least one unit time series is stationary.

Table 4 : Panel Unit Root Test

Variable Series	ADF (Im-Pesaran-Shin) test	Order of Integration of series
GDP growth (annual %)	-3.2559***	I(0) or stationary
Agricultural land (sq.km)	-4.7352***	I(0) or stationary
Forest area (sq.km)	-3.3625***	I(0) or stationary
Coal rents (% of GDP)	-2.3246***	I(0) or stationary
Forest rents (% of GDP)	-2.3879***	I(0) or stationary
Mineral rents (% of GDP)	-3.4675***	I(0) or stationary
Labor force, total	7.2251	Non-stationary
Average years of schooling	2.6221	Non-stationary
Agricultural machinery, tractors	1.1502	Non-stationary
Gross capital formation (% of GDP)	-1.6357	Non-stationary

*, **, *** indicate rejection of the null hypothesis at 10%, 5% and 1% level of significance respectively.

I(0) : stationary time series, contains no unit root.

The joint test statistic (Im-Pesaran-Shin t-bar) for the GDP growth, the Agricultural land, the Forest area, the Coal rents, the Forest rents, and the Mineral rents is more negative than the critical values. The joint null hypothesis of non-stationarity is therefore rejected as far as those variables are concerned. Hence the series associated with them are stationary or I(0). The other variables i.e. Labor force, Average years of total

schooling, Agricultural machinery, and Gross capital formation contain unit roots and are said to be non-stationary. A process of differencing needs to be carried out on such variables until stationarity is induced.

Table 5 : Differencing of Non-Stationary Series

Variable series	Order of Integration of series before differencing	ADF (Im-Pesaran-Shin) test after differencing
Total natural resources rents (% of GDP)	I(1)	-3.7555***
Labor force, total	I(2)	-3.4062***
Average years of schooling	I(2)	-4.1692***
Agricultural machinery, tractors	I(2)	-3.4053***
Gross capital formation (% of GDP)	I(1)	-3.6293***

*, **, *** indicate rejection of the null hypothesis at 10%, 5% and 1% level of significance respectively.

I(1) : Integrated series of order 1, series that was differenced just once to induce stationarity.

I(2) : Integrated series of order 2, series that was differenced twice to induce stationarity.

Note : For a set of time series, the test for cointegration is subject to a condition. Unless all the series are integrated of order 1, the cointegration test cannot be performed. In our case, only 3 series out of the 11 were found to be integrated of order one, which does not satisfy the condition. Hence the cointegration test will not be implemented on the variables under study.

4.1.3. The Adequate Panel Data Estimation Model

As announced so far in the methodology chapter, we are concerned with the adequate estimation model for the collected data. In other words, which of the pooled OLS, fixed effects and random effects models describes our study the best. Three tests were needed to find the appropriate estimation model.

a-) Test for Fixed Effects Against Pooled OLS Estimation Model

Hypotheses :

$H_0 : \alpha_1 = \alpha_2 = \cdots = \alpha_n$ i.e all the cross sectional units have a common intercept

$H_1 : \alpha_1 \neq \alpha_2 \neq \cdots \neq \alpha_n$ i.e the intercepts are unit-specific, they vary from one cross-sectional unit to another.

Table 6 : Test Results for Fixed Effects Against Pooled OLS

Residual variance	F(19, 250)	P-value
9198.77/(280 - 30) = 36.7951	3.1601	1.8822e-005

Since the p-value = 1.8822e-005 is smaller than the F-value = F(N-1, NT-N-K) = F(19, 250) = 3.1601, the null hypothesis of a constant intercept for all cross-sectional units is rejected. Hence, the fixed effects estimation model is adequate.

b-) Test for Random Effects Against Pooled OLS Estimation Model

Hypotheses

H_0 : Var(v_i) = 0

H_1 : Var(v_i) $\neq$ 0

Table 7 : Test Results for Random Effects Against Pooled OLS

Breusch-Pagan test statistic LM	P-value
1.0296	0.3103

The second test is in favour of the random effects model. Since the p-value (0.3103) is smaller than the Lagrange Multiplier value LM = 1.0296, the null hypothesis of zero variances Var(v_i) = 0 is rejected.

c-) Hausman Test

Hypothesis test

H_0 : the GLS estimates are consistent i.e Cov(X_{it} , v_i) $\neq$ 0

H_1 : the GLS estimates are inconsistent i.e Cov(X_{it} , v_i) $= 0$

Table 8 : Hausman test results

Hausman test statistic H	P-value
32.7873	0.0003

The last test reveals the primacy of the fixed effects estimation model over the random effects. Hence the present study adopts the fixed effects model.

Now that our data is purified from any abnormality, we can proceed to the descriptive statistics of all resource variables implicated in the study. This includes their means, standard deviations and the maximum and minimum scores recorded. Note that we have collected a total of 280 observations for each resource variable. The summary is given in the following table.

Table 9 : Descriptive Statistics for all Resource Variables

Variable	Mean	Minimum	Maximum	Std. Dev.
Annual Real GDP growth rate	5.4329	-37.0120	63.3800	7.4818
Agricultural land	293,760	2840	981,250	246,810
Forest Area	244,810	11,668	1,572,500	342,090
Coal Rents	0.1829	0.0000	6.6604	0.7051
Forest Rents	5.3005	0.2662	27.8010	4.9832
Mineral Rents	2.6482	0.0000	21.3810	4.5093
Labor force	8,353,100	263,550	54,199,000	10,799,000
Av. Years of Total Sch.	5.3699	1.2300	11.4400	2.3162
Agricultural machinery	13,111	120	72,300	14,931
Gross capital formation	22.5930	1.0968	147.8800	16.0210

N = 280

The Annual real GDP growth describes the percentage by which the real GDP increases every year. The mean of 5.4329 % suggests that among the twenty (20) countries in the sample, the real GDP increases by 5.4329 % on average each year. The standard deviation of 7.4818 % implies that the annual growth for most of the countries represented falls between − 2.0489 % = (5.4329 % − 7.4818 %) and 12.9147 % = (5.4329 % + 7.4818 %). However, in practice a minimum growth of − 37.0120 % and a maximum of 63.3800 % were recorded. Such extreme values (outliers) are frequent in

statistical inference of any type and are generally caused by some factors. The minimum score of − 37.0120 % corresponds to Central African Republic's GDP growth rate in 2013 (see figure 4). In 2013, Central African Republic experienced severe military conflicts, all fuelled by religious, ethnic and political divisions, causing a fifth of the population to flee their homeland. As a result, the country suffered its worst economic instability since independence. Equatorial Guinea, on the other hand, has recorded the highest performance in the sample, with a GDP growth rate of 63.3800 % in 2001 (see figure 4). The economic boom in this case is attributed to an increase in oil production as well as huge methanol gaz exports in the course of that year.

The Agricultural land represents the portion of land that is appropriate for agricultural activities such as growing crops and feeding livestock (World Bank). The variable is measured in square kilometres (sq.km.). The average score of 293,760 sq.km. means that among the twenty countries in the sample, the land available for growing crops and feeding livestock covers an area of 293,760 square kilometres. This score is relatively high compared to the size of SSA countries.

Forest Area : the mean of 244,810 sq.km. implies that among the twenty countries in the sample, the forest covers an area of 244,810 square kilometres on average. This value, similarly to the Agricultural land is relatively high when compared to the size of SSA countries.

The Coal rents refer to the profits generated by both hard and soft coal exploitation. Estimations are given as a percentage of the Annual real GDP (World Bank). The average score of 0.1829 % suggests that the profits generated by coal exploitation among the twenty countries in the sample amount to 0.1829 % of GDP value of the countries.

The forest rents represent the total profits generated by the forests exploitation. The variable is estimated as a percentage of the annual GDP. The mean score of 5.3005 % implies that on average, the profits generated by the forests exploitation among the twenty countries in the sample amount to 5.3005 % of GDP value of the countries.

The Mineral rents represent the profits generated by minerals exploitation (World Bank). Estimations have been made as a percentage of the annual GDP. The mean value of 2.6482 % suggests that, on average, among the twenty countries in the

sample, the profits generated by the mineral exploitation amount to 2.6482 % of GDP value of the countries.

The Labor force : the mean of 8,353,100 for this value implies that, on average, there are 8,353,100 units of labor among the twenty countries in the sample. This value is relatively high compared to the population of SSA countries.

The Average years of total schooling indicates the average years of education completed among people at the age of 15 and above; the data include men and women. The mean score of 5.3699 suggests that among the twenty countries in the sample, individuals spend 5.3699 years in school on average.

The Agricultural machinery refers to the quantity of wheel and crawler tractors used to cultivate, harvest, water, … (World Bank). The mean of 13,111 suggests that among the twenty countries in the sample 13,111 wheel and crawler tractors are used, on average, for agriculture purposes. This number is relatively low compared to the size of the land available for farming in the twenty countries.

The Gross capital formation includes all fixed assets of the economy plus net changes in the level of inventories, expressed as a percentage of the GDP. The mean value of 22.5930 % suggests that, on average, the worth of fixed assets and net changes in inventories in the twenty countries in the sample amounts to 22.5930 % of GDP value of the entire region. The standard deviation of 16.0210 % implies that the Gross Capital Formation value for most of the countries represented falls between 6.572 % = (22.5930% − 16.0210 %) and 38.614 % = (22.5930 % + 16.0210 %). However, in practice a maximum of 147.88 % was recorded. This extreme value (outlier) was scored by Equatorial Guinea in 2001. Let's recall that in the same year, Equatorial Guinea recorded an unprecedented GDP growth rate of 63.3800 %, mainly due to increase in oil and natural gaz production. The exploitation of both resources fuelled the establishment of industries, the construction of roads, buildings, and many other fixed assets, thereby increasing the Gross Capital Formation value.

The descriptive statistics for three variables catch attention. Those are : the Agricultural land, the Forest area, and the Labor force. Measures for those variables are far higher compared to other variables in the table. For a better understanding of their variability, we use log transformation.

Table 10 : Descriptive Statistics with Three Log-Transformed Variables

Variable	Mean	Minimum	Maximum	Std. Dev.
Annual Real GDP growth rate	5.4329	-37.0120	63.3800	7.4818
Log(Agricultural land)	12.0730	7.9516	13.7970	1.2851
Log(Forest Area)	11.7330	9.3646	14.2680	1.1790
Coal Rents	0.1829	0.0000	6.6604	0.7051
Forest Rents	5.3005	0.2662	27.8010	4.9832
Mineral Rents	2.6482	0.0000	21.3810	4.5093
Log(Labor force)	15.2090	12.4820	17.8080	1.2856
Av. Years of Total Sch.	5.3699	1.2300	11.4400	2.3162
Agriculstural machinery	13111	120	72300	14931
Gross capital formation	22.5930	1.0968	147.8800	16.0210

N = 280

4.1.4. Panel Data Regression and Coefficients Analysis

The descriptive statistics reveal the abundance of natural resources in Sub-Saharan Africa. Common sense would expect such an endowment to promote the economic growth. But would this be verified for Sub-Saharan Africa? Or contrary to the expectation, will the abundance of resources hinder the economic performance of the region? To answer this question, we run the regression of the dependent variable (the annual real GDP growth rate) on the independent variables (resources), using the Fixed effects estimation model :

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it}$$

Where :

y_{it} = the observation on the dependent variable (annual real GDP growth rate) for cross-sectional unit i in period t

X_{it} = a $1 \times k$ vector of independent variables (vector of resource variables) observed for the cross-sectional unit i in period t

β = a $k \times 1$ vector of parameters

α_i = fixed parameter or unit-specific and time-invariant y intercept.

ε_{it} = observation-specific errors, recorded for the cross-sectional unit i in period t

i = cross sectional unit = each of the twenty SSA countries in this study

t = time period

The extended form would give :

$$y_{it} = \alpha_i + X_{1it}\beta_1 + X_{2it}\beta_2 + \ldots\ldots + X_{nit}\beta_n + \varepsilon_{it}$$

Applying the model to our study yields the following equation :

$$Annual\ GDP\ growth_{it} = \alpha_i + \beta_1 Natural\ resources_{it} + \beta_2 Human\ resources_{it} + \beta_3 Capital\ resources_{it} + \varepsilon_{it} \quad (1)$$

Substituting the indicators (proxies) for each type of resource in equation (1), we get the following model :

$$GDP\ growth_{it} = \alpha_i + \log(AL_{it})\beta_1 + \log(FA_{it})\beta_2 + CR_{it}\beta_3 + FR_{it}\beta_4 + MR_{it}\beta_5 + \log(LF_{it})\beta_6 + AYTS_{it}\beta_7 + AM_{it}\beta_8 + GCF_{it}\beta_9 + \varepsilon_{it} \quad (2)$$

Table 11 : Description of the Resources Model

Variable	Description
GDP growth	Annual Real GDP growth rate
AL	Agricultural Land
FA	Forest Area
CR	Coal Rents
FR	Forest Rents
MR	Mineral Rents
AYTS	Average Years of Total Schooling
LF	Labor Force, Total
AM	Agricultural Machinery, Tractors
GCF	Gross Capital Formation

Equation (2) is the general model. In order to get the specific form, we need to regress the GDP growth rate on the resource variables and obtain the various coefficients.

Regression of GDP Growth Rate on Resources Variables

Table 12 : Fixed Effects Regression for all Resource Variables

	Coefficient	Std. error	Significance
Constant	5.9575	219.7260	
Log(Agricultural land)	32.7537	12.6362	**
Log(Forest area)	−9.6377	3.9182	**
Coal rents	−0.5930	0.1407	***
Forest rents	−0.3181	0.2320	
Mineral rents	−0.3539	0.1603	**
Log(Labor force)	−19.7750	7.5497	***
Av. years of total school.	3.6730	1.3111	***
Agricultural machinery	−0.0004	0.0003	
Gross capital formation	0.1902	0.0434	***
Number of Observations	280		
Cross-sectional units	20		
Time periods	14		
R-squared	0.7385		
Std. Error of regression	6.2475		
F-Statistic	3.3202		

Note : *, **, *** indicate significance of the coefficients at 10%, 5%, and 1% respectively.

Coefficients Analysis

Let's recall that the primary section of this chapter investigates whether the abundance of natural resources represents a curse for Sub-Saharan African countries. A variable would represent a curse if its relationship with the GDP growth is negative. From the Fixed effects regression, we can observe that four natural resource variables out of the

five are significant, that is they have some degree of impact on the GDP growth of SSA countries. Such regressors are : the Agricultural land, the Forest area, the Coal rents, and the Mineral rents. The remaining variable (Forest rents) is non-significant.

The Agricultural land : this variable has been log-transformed and therefore interpretation will be made in percent scale. A positive coefficient of 32.7537 describes the relationship between the variable and the annual real GDP growth rate. The value of the GDP across the twenty Sub-Saharan African countries increases by 32.7537/100 = 0.327537 % for each percent increase in the agricultural land.

The forest area (sq.km) : this variable has equally been log-transformed. The coefficient associated to the forest area is −9.6377. Since it is negative, we conclude that there exists an inverse relationship between the annual GDP growth of the twenty countries in the sample and their forest areas. Thus, the value of the GDP across the twenty Sub-Saharan African countries decreases by 9.6377/100 = 0.096377 % on average, for each percent increase in the forest area. The inverse relationship provides an evidence of natural resource curse to a certain degree. This coefficient might be confusing since it appears to be small at first glance. However, recalling that the annual GDP amounts to trillions/billions of US dollars, and knowing that the coefficient depicts its percent change, makes things easier. There is a particular need to stress the severity of the curse as 0.096377 % is a quite alarming statistic. Let's observe the situation from a more realistic perspective. The GDP value of Sub-Saharan Africa as a whole amounted to 3,480,690,000,000 US dollars as of the year 2015. That value would decrease by more than 3 billion US dollars, that is by 3,480,690,000,000 x 0.00096377 = 3,354,581,121 US dollars, for each percent increase in the forest area.

The Coal rents (% of GDP) : this variable is estimated as a percentage of the annual GDP. A negative coefficient of −0.5930 describes the relationship between the variable and the annual GDP growth rate. This number estimates the change in the annual GDP growth (in percentage term) as a result of a one percent change in the coal rents. The inverse relationship suggests that the value of the GDP across the twenty SSA countries decreases by 0.5930 % on average, for each percent increase in the coal rents. This finding also provides the evidence of a curse on the economy of SSA countries.

Basically, the increase in the coal profits hinders the economic performance at a proportion of 0.5930 %.

The Mineral rents (% of GDP) : estimations for this variable have been made as a percentage of the annual GDP. There exists an inverse relationship between the annual GDP growth of the twenty countries in the sample and their mineral rents, displayed by the negative coefficient of −0.3539. The value of the GDP across the twenty SSA countries decreases by 0.3539% on average, for each percent increase in the minerals' profits.

The following variables were used as controlled variables.

The total labor force : this variable has been log-transformed and interpretation should be made in percent scale. The labor force is inversely related to the annual GDP growth of the twenty countries, with a coefficient of −19.7750. This result suggests that the value of the GDP across the twenty Sub-Saharan African countries decreases by 19.7750/100 = 0.197750 % on average, for each percent increase in labor force.

The Average years of total schooling : this variable is positively related to the annual GDP growth rate, with a coefficient of 3.6730. The value of the GDP across the twenty SSA countries increases by 3.6730% on average, as a result of one unit increase in average years of schooling.

The agricultural machinery : the coefficient associated to this variable is −0.0004. The regressor has an inverse correlation with the annual GDP growth of the twenty countries, giving the signal of a curse on the economy of SSA. The value of the GDP across the twenty SSA countries decreases by 0.0004% on average, for each additional tractor.

The Gross capital formation (% of GDP) : the Gross capital formation is positively related to the annual GDP growth, with a coefficient of 0.1902. The variable includes all fixed assets of the economy plus net changes in the level of inventories (World Bank). Data were collected as a percentage of the total GDP. The value of the GDP across the twenty SSA countries increases by 0.1902 % on average, for each percent increase in the amount of fixed assets and inventories. This finding is of a particular interest since African nations in general are thought of as having no industries or an insignificant number of them. To comprehend the significance of this variable for

the economy of SSA countries, one could state that the plant, the machinery, the equipment, the buildings, the transport infrastructure, and inventories are actually driving the economy of the region up, at a proportion of 0.1902 %.

Statistical Properties of the Regression Model

Standard error of the regression : the standard error of the regression is a quite important statistic in regression analysis as it shows the accuracy of the model. It measures how far the population mean is likely to be from the sample mean; or equivalently, it is the variation in the dependent variable that is not explained by the model. The smaller the error, the more accurate the model. The score of 6.2475 is considerably small, suggesting that our model is accurate. Basically, only 6.2475 % of the variation in the GDP growth is not explained by the model.

Within R-squared and LSDV R-squared: these statistics refer to the portion of the total variation in the dependent variable that is explained by variation in the independent variable. In the scope of this study, we shall focus on the Within R-squared since we did not include individual dummies. The within R-squared is 0.7385, which means 73.85% of the variation in the economic growth of Sub-Saharan Africa is explained by variation in the available resources (natural, human and capital). This number is relatively high and around 24 % above the average.

Panel Data Regression Model

Let's recall the general model of our study, as given by equation (2)

$$GDP\ growth_{it} = \alpha_i + \log(AL_{it})\beta_1 + \log(FA_{it})\beta_2 + CR_{it}\beta_3 + FR_{it}\beta_4 + MR_{it}\beta_5 + \log(LF_{it})\beta_6 + AYTS_{it}\beta_7 + AM_{it}\beta_8 + GCF_{it}\beta_9 + \varepsilon_{it} \quad (2)$$

Plugging the coefficients obtained from the regression in the equation, we get the particular equation that links the economic performance of the twenty SSA countries as a whole to the natural resources of the region, over a timespan of 14 years (2000 - 2013).

$$GDP\ growth_{it}=5.9575+32.7537\log(AL_{it}) - 9.6377\log(FA_{it}) - 0.5930CR_{it} - 0.3181FR_{it} - 0.3539MR_{it} - 19.7750\log(LF_{it}) + 3.6730AYTS_{it} - 0.0004AM_{it} + 0.1902 + \varepsilon_{it} \quad (3)$$

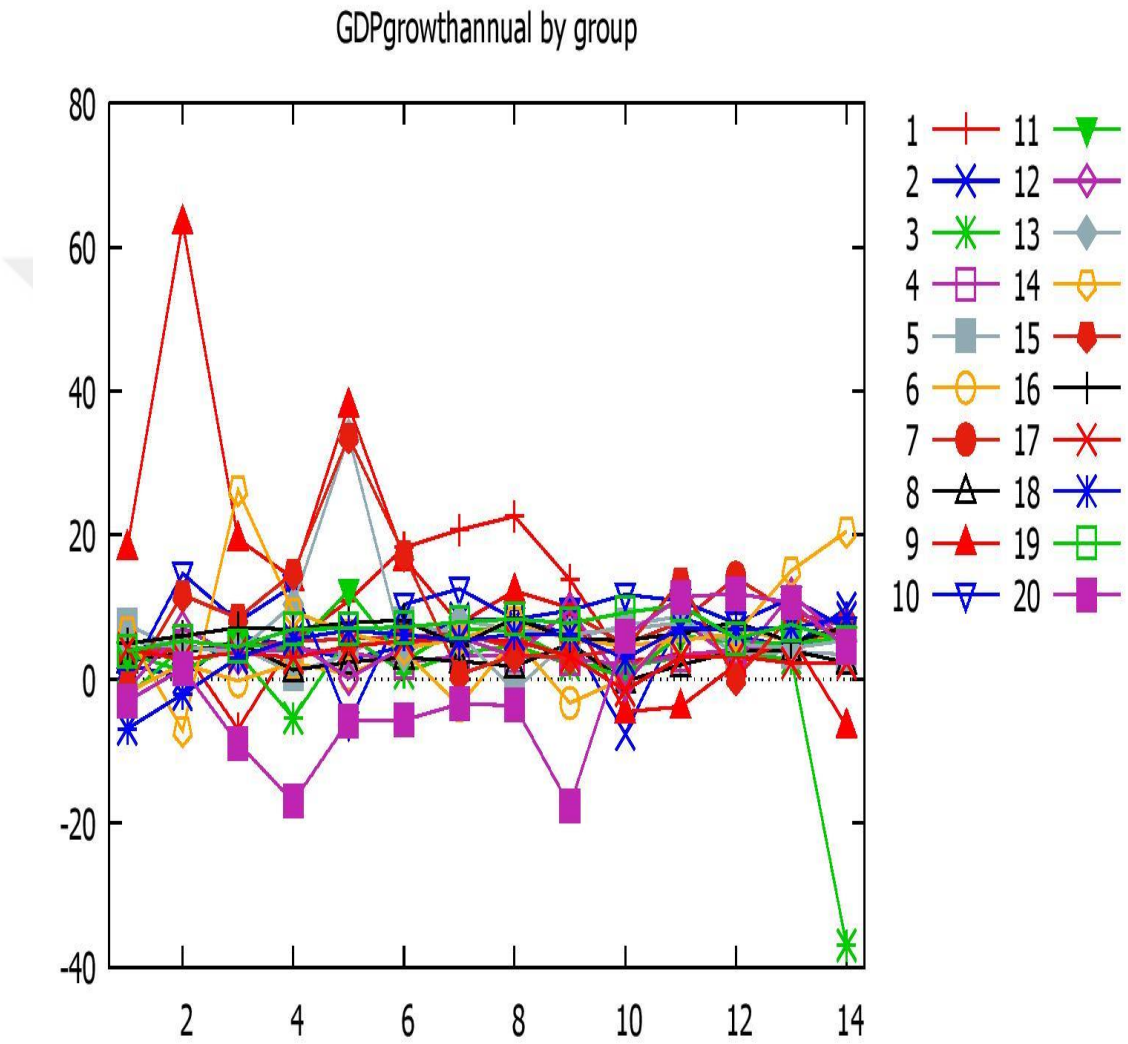
Variable	Description
GDP growth	Annual Real GDP growth rate
AL	Agricultural Land
FA	Forest Area
CR	Coal Rents
FR	Forest Rents
MR	Mineral Rents
LF	Labor Force
AYTS	Average Years of Total Schooling
AM	Agricultural Machinery, Tractors
GCF	Gross Capital Formation

Recapitulation and Inference

This primary section of our analysis sought to answer the following question :
Is the abundance of natural resources a curse for Sub-Saharan African economy ?
Our analysis of the resource variables revealed the following relationships : the Forest area, the Coal rents, the Forest rents, and the Mineral rents are inversely related to the annual GDP growth of the 20 SSA countries in the sample. Our findings in this primary section lead to the following inference : the economy of Sub-Saharan African countries suffers from a natural resource curse. The curse arises fundamentally from coal, forest and minerals exploitation.

Graphs

Figure 4 : Panel Plot of GDP Growth Rates for the 20 SSA Countries



The graphs of the annual GDP growth rates are labelled as follows :

1= Angola	6= Gabon	11= Namibia	16= Tanzania
2= Botswana	7= Ghana	12= Niger	17= Sth. Africa
3= Central African Republic	8= Guinea	13= Nigeria	18= D. R. Congo
4= Cameroon	9= Equatorial Guinea	14= Sierra Leone	19= Zambia
5= Congo	10= Mali	15= Chad	20= Zimbabwe

We devote this section to short graphical interpretations of the economic performance of the twenty SSA countries included in our sample, over 14 years : 2000-2013.

Botswana stands as the only SSA country that has successfully managed its resources and achieved a relatively healthy economy. The stability of the country's economy is readily displayed in the panel plot. Its GDP growth (graph 2) shows less fluctuations and tends to increase across the fourteen years. Three other graphs are quickly spotted from the above panel plot, namely the GDP growth of Central African Republic (graph 3), Equatorial Guinea (graph 9) and the GDP growth of Zimbabwe (graph 20).

In 2013, Central African Republic has recorded an abnormally low GDP growth rate of −37.0120 %, caused by severe military conflicts, all fuelled by religious, ethnic and political divisions.

Equatorial Guinea's economy has achieved its highest performance in 2001 with an annual GDP growth rate of 63.3800 %. This is due in great part to an additional oil production in the course of that year as well as an increase in the methanol gas exports. The following decrease in performance can be attributed to the resource mismanagement.

Overall, Zimbabwe has recorded the worst economic performance in the sample, with the annual GDP growth rate ranging from -3.06 % in 2000 to -17.67 in 2008. This failure is attributable to the natural resources mismanagement.

So far, we have discovered the impact of natural resources on Sub-Saharan African economy. Hereafter we base our investigation on the policies for social inclusion : the macroeconomic management, the public sector management and institutions, the structural policies, and the resource allocation. Are such policies efficient in reversing the curse? The methodology will be identical to the one used in the first part. For that reason, some details will be skipped.

4.2. Social Inclusion Policies Data

4.2.1. Multicollinearity Test

a-) Correlation Matrix

Table 13 : Correlation Matrix For Social Inclusion Variables

	Macroeconomic Management	Publlic Sector Management	Structural Policies	Resource Allocation
Macroeconomic Management	1.0000			
Publlic Sector Management	0.2254	1.0000		
Structural Policies	0.1770	0.2820	1.0000	
Resource Allocation	0.0545	0.3202	0.0396	1.0000

As observed from the table, the correlation coefficients are small, suggesting the absence of collinearity between the explanatory variables.

b-) Variance Inflation Factors

Table 14 : Variance Inflation Factors For Social Inclusion Variables

	Macroeconomic Management	Publlic Sector Management	Structural Policies	Resource Allocation
VIF	2.056	4.706	3.027	2.993

The small values of Variance Inflation Factors in the table suggest the absence of multicollinearity between social inclusion variables.

4.2.2. The Adequate Panel Data Estimation Model

Similar to the first section, we need to determine the adequate estimation model for the social inclusion policies data.

a-) Test for Fixed Effects Against Pooled OLS Estimation Model

Hypotheses :

$H_0 : \alpha_1 = \alpha_2 = \cdots = \alpha_n$ i.e all the cross sectional units have a common intercept

$H_1 : \alpha_1 \neq \alpha_2 \neq \cdots \neq \alpha_n$ i.e the intercepts are unit-specific, they vary from one cross-sectional unit to another.

Table 15 : Test Results for Fixed Effects Against Pooled OLS

Residual variance	F(19, 253)	P-value
9280.19/(280 - 27) = 36.6806	3.4851	2.9513e-006

Since the the p-value = 2.9513e-006 is smaller than the F-value = F(N-1, NT-N-K) = F(19, 253) = 3.4851, then the null hypothesis of a constant intercept for all cross-sectional units is rejected, suggesting that the fixed effects model is adequate.

b-) Test for Random Effects Against Pooled OLS Estimation Model

Hypotheses

H_0 : Var(v_i) = 0

H_1 : Var(v_i) $\neq$ 0

Table 16 : Test Results for Random Effects Against Pooled OLS

Breusch-Pagan test statistic LM	P-value
5.1304	0.0235

The second test is in favour of the random effects model. Since the p-value (0.0235) is smaller than the Lagrange Multiplier value LM = 5.1304, the null hypothesis of zero variances Var(v_i) = 0 is rejected.

c-) Hausman Test

Hypothesis test

H_0 : the GLS estimates are consistent i.e Cov(X_{it} , v_i) $\neq$ 0

H_1 : the GLS estimates are inconsistent i.e Cov(X_{it} , v_i) = 0

Table 17 : Hausman Test Results

Hausman test statistic H	P-value
27.8078	0.0002

The last test reveals the primacy of the fixed effects estimation model over the random effects. This second set of data will equally be treated using the fixed effects estimation model.

4.2.3. Panel Unit Root Test and Stationarity

Hypothesis test

H_0 : φ_i = 0 for all units, i.e all unit time series of the given variable contain a unit root or are non stationary

H_1 : φ_i < 0 for at least one unit i.e at least one unit time series is stationary

Table 18 : Panel Unit Root Test for Social Inclusion Variables

Variable Series	ADF (Im-Pesaran-Shin) test	Order of Integration of series
GDP growth (annual %)	-2.5315***	I(0) or stationary
Macroeconomic management	-3.7428***	I(0) or stationary
Public sector management and institutions cluster average	-1.3760	Non-stationary
Structural policies cluster average	-3.8833***	I(0) or stationary
Resource allocation index	-1.4053	Non-stationary

*, **, *** indicate rejection of the null hypothesis at 10%, 5% and 1% level of significance respectively.

I(0) : stationary time series, contains no unit root.

The joint test statistic (Im-Pesaran-Shin t-bar) for the GDP growth, the macroeconomic management, and the Structural policies is more negative than the critical values. The joint null hypothesis of non-stationarity is therefore rejected for those variables; the series associated to these variables are stationary or I(0). The other variables (Public sector management and institutions, and Resource allocation index) are non-stationary. We need to difference these latter variables to induce stationarity.

Table 19 : Differencing of Non-Stationary Series for Social Inclusion Variables

Variable series	Order of Integration of series before differencing	ADF (Im-Pesaran-Shin) test after differencing
Public sector management and institutions cluster average	I(1)	-2.7114***
Resource allocation index	I(1)	-2.1695***

*, **, *** indicate rejection of the null hypothesis at 10%, 5% and 1% level of significance respectively.

I(1) : Integrated series of order 1, series that was differenced once to induce stationarity

Note : The test for cointegration is not required since some series were initially stationary.

The descriptive statistics of the social inclusion variables is given in the table below. A total of 180 observations have been collected for each variable.

Table 20 : Descriptive Statistics for all Social Inclusion Variables

Variable	Mean	Minimum	Maximum	Std. Dev.
Annual Real GDP growth rate	5.3370	-37.0120	22.5930	5.8246
Macroeconomic management	3.6311	1.0000	5.6000	0.8080
Public sector management and institutions	2.8683	1.6000	3.9000	0.4993
Structural policies	3.1907	1.5000	4.1667	0.4947
Resource allocation	3.1153	1.4000	3.9500	0.5236

The macroeconomic management (1= low to 6= high) covers the monetary, exchange and aggregate demand policy framework (Word Bank). This variable is measured on a six-point scale, with higher values indicating an adequate macroeconomic management. The mean score of 3.6311 suggests that the twenty countries in the sample are above the midpoint of the scale and experience an acceptable macroeconomic management. The standard deviation of 0.8080 implies that the macroeconomic management for most of the countries represented falls between 2.8231 = (3.6311 - 0.8080) and 4.4391 = (3.6311 + 0.8080). The minimum and maximum scores recorded are respectively 1 and 5.6000. This suggests an accurate model.

The public sector management and institutions (1= low to 6= high) reveal the level of the property rights and rule-based governance, the quality of budgetary and financial management, the efficiency of revenue mobilization, the quality of public administration, the transparency, and the accountability in the public sector (World Bank). A six-point scale represents this variable, with higher scores indicating an appropriate management of state institutions. The average score of 2.8683 suggests that the twenty countries in the sample are slightly below the midpoint of the scale and hence have an insufficiency with respect to transparency.

Structural policies refer to the rules and regulations that govern trade, the financial sector and the business regulatory environment. The variable is measured on a six-point scale with higher values representing strong rules and regulations. The mean value of 3.1907 implies that rules and regulations are fairly strong within the twenty countries in the sample.

The Resource allocation (1= low to 6= high) represents the fairness with which the distribution of resources, particularly the scarce resources, is carried out among producers, and the fairness with which the apportionment of scarce goods and services is conducted. The average score of 3.1153 suggests that the distribution of resources within the twenty countries in the sample is slightly above the midpoint of the scale.

4.1.3. Panel Data Regression and Coefficients Diagnostic

We run the regression of the dependent variable (the annual GDP growth rate) on the independent variables (social inclusion policies) and the control variables (resource variables), using the Fixed effects estimation model :

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it}$$

The extended form gives :

$$y_{it} = \alpha_i + X_{1it}\beta_1 + X_{2it}\beta_2 + \ldots\ldots + X_{nit}\beta_n + \varepsilon_{it}$$

Applying the model to the proxies of social inclusion policies and control variables yields the following equation :

$$\begin{aligned} GDP\ growth_{it} = {} & \alpha_i + MM_{it}\beta_1 + PSMI_{it}\beta_2 + SP_{it}\beta_3 + RA_{it}\beta_4 + \log(AL_{it})\beta_5 + \\ & \log(FA_{it})\beta_6 + CR_{it}\beta_7 + FR_{it}\beta_8 + MR_{it}\beta_9 + \log(LF_{it})\beta_{10} + \\ & AYTS_{it}\beta_{11} + AM_{it}\beta_{12} + GCF_{it}\beta_{13} + \varepsilon_{it} \end{aligned} \quad (4)$$

Table 21 : Description of Social Inclusion Model

Variable	Description
GDP growth	Annual Real GDP growth rate
MM	Macroeconomic management
PSMI	Public sector management and institutions
SP	Structural policies
RA	Resource allocation
AL	Agricultural Land (Control Variable)
FA	Forest Area (Control Variable)
CR	Coal Rents (Control Variable)
FR	Forest Rents (Control Variable)
MR	Mineral Rents (Control Variable)
AYTS	Average Years of Total Schooling (Control Variable)
LF	Labor Force, Total (Control Variable)
AM	Agricultural Machinery, Tractors (Control Variable)
GCF	Gross Capital Formation (Control Variable)

Equation (4) describes the relationship between the economic performance and the policies for social inclusion (the macroeconomic management, the public sector management and institutions, the structural policies, and the resource allocation). To avoid misleading results, we have controlled for all resource variables used in the first section.

Regression of GDP Growth Rate on Social Inclusion Variables

Table 22 : Fixed Effects Regression for Social Inclusion Variables

	Coefficient	Std. error	Significance
Constant	−267.1330	346.9090	
Macroeconomic management	4.0728	1.2894	***
Public sector management & inst.	6.7103	3.3085	**
Structural policies	5.7864	2.5071	**
Resource allocation	−5.8085	2.7876	**
Log(Agricultural Land)	51.1412	22.8867	**
Log(Forest Area)	−13.0461	13.7918	
Coal Rents	−0.0136	0.7883	
Forest Rents	−1.8429	0.4443	***
Mineral Rents	0.1487	0.2155	
Average Years of Total Schooling	0.8068	1.3188	
Log (Labor Force)	−14.3040	10.9338	
Agricultural Machinery, Tractors	−0.0004	0.0005	
Gross Capital Formation	0.0860	0.0682	
Number of Observations	180		
Cross-sectional units	20		
Time periods	9		
R-squared	0.6685		
Std. Error of regression	4.4714		
F-Statistic	4.6972		

Note : in the previous table *, **, *** indicate significance of the coefficients at 10%, 5%, and 1% respectively.

Coefficients Analysis

This ultimate section was intended to investigate whether the policies for social inclusion could tip the balance towards a prosperous SSA economy and reverse its curse. The economic growth is used again as the explained variable, proxied by the annual GDP growth rate. It is observed from table 22 that all the four regressors are significant. They have an effect on the economic welfare of Sub-Saharan African countries.

The macroeconomic management rating (1= low to 6= high) : this variable is measured on a six-point scale, with higher values indicating an adequate macroeconomic management. The coefficient associated to it is 4.0728. This number describes the change in the annual GDP growth (in percentage term) as a result of an additional point in the rating. There exists a positive relationship between the annual GDP growth of the twenty countries in the sample and their macroeconomic management. Thus the value of the GDP across the twenty Sub-Saharan African countries increases by 4.0728 % on average, for each additional point scored in the monetary, exchange rate and aggregate demand policy. This positive correlation suggests the efficiency of macroeconomic management in redressing the economy of the region. Alternatively, a one unit increase in the macroeconomic management rating means to increase this score from Zimbabwe to South Africa or to improve the score by two standard deviations.

The public sector management and institutions cluster average (1= low to 6= high) : a six-point scale represents this variable. The coefficient of 6.7103 describes its relationship with the annual GDP growth rate. This number estimates the change in the annual GDP growth (in percentage term) as a result of a one-point increase in the rating. The value of the GDP across the twenty SSA countries increases by 6.7103 % on average, for each additional point scored in property rights, rule-based governance, quality of budgetary and financial management, quality of public administration, transparency and accountability in the public sector. This indicator of social inclusion policies equally displays a positive effect on the economic performance of SSA

countries. Alternatively, a one unit increase in the public sector management and institutions rating means to increase this score from Democratic Republic of Congo to Gabon or to improve the score by two standard deviations.

The structural policies cluster average (1= low to 6= high) : the structural policies refer to the rules and regulations that govern trade, the financial sector and the business regulatory environment. The variable is measured on a six-point scale. The coefficient of 5.7864 suggests that the value of the GDP across the twenty SSA countries increases by 5.7864 % on average, for each additional point scored in structural policies. This result equally displays an evidence of efficiency, enhancing Sub-Saharan African economy at a proportion of 5.7864 %. Alternatively, a one unit increase in the structural policies rating means to increase this score from Angola to Tanzania or to improve the score by two standard deviations.

The resource allocation index : unlike other indicators of social inclusion policies, the resource allocation is inversely related to the annual GDP growth of the twenty countries in the sample, with a coefficient of −5.8085. The variable represents the fairness with which the distribution of resources, particularly the scarce resources, is carried out among producers, and the fairness with which the apportionment of scarce goods and services is conducted. Estimations have been made on a six-point scale. Basically, the value of the GDP across the twenty SSA countries decreases by 5.8085 % on average, for each additional point scored. Alternatively, a one unit increase in the resource allocation rating means to increase this score from Congo Republic to Ghana or to improve the score by two standard deviations.

All the indicators of social inclusion policies are significant, with a notable impact on the economic performance of SSA countries. In addition, the indicators have been found to boost the performance of the region, except the resource allocation.

Statistical Properties of the Regression Model

Standard error of the regression : the score of 4.4714 is considerably small, suggesting that our model is highly accurate. Only 4.4714% of the variation in the GDP growth is not explained by the model.

Within R-squared and LSDV R-squared : individual dummies have not been included in the regression. For that reason, we base our analysis on the Within R-squared. From the table, the within R-squared is 0.6685, which means 66.85 % of the variation in the economic growth of Sub-Saharan Africa is explained by variation in policies for social inclusion. This number is relatively high and around 17 % above the average.

Panel Data Regression Model

The general equation of the regression in this section is given by equation (4) :

$$GDP\ growth_{it} = \alpha_i + MM_{it}\beta_1 + PSMI_{it}\beta_2 + SP_{it}\beta_3 + RA_{it}\beta_4 + \log(AL_{it})\beta_5 + \log(FA_{it})\beta_6 + CR_{it}\beta_7 + FR_{it}\beta_8 + MR_{it}\beta_9 + \log(LF_{it})\beta_{10} + AYTS_{it}\beta_{11} + AM_{it}\beta_{12} + GCF_{it}\beta_{13} + \varepsilon_{it} \quad (4)$$

Plugging the coefficients obtained from the regression in the equation, we obtain the particular equation linking the economic performance of the twenty SSA countries to the social inclusion policies, over a timespan of 9 years (2005 - 2013).

$$GDP\ growth_{it} = -267.1330 + 4.0728MM_{it} + 6.7103PSMI_{it} + 5.7864SP_{it} - 5.8085RA_{it} + 51.1412\log(AL_{it}) - 13.0461\log(FA_{it}) - 0.0136CR_{it} - 1.8429FR_{it} + 0.1487MR_{it} - 14.3040\log(LF_{it}) + 0.8068AYTS_{it} - 0.0004\ AM_{it} + 0.0860GCF_{it} + \varepsilon_{it} \quad (5)$$

Where :

Variable	Description
GDP growth	Annual Real GDP growth rate
MM	Macroeconomic management
PSMI	Public sector management and institutions
SP	Structural policies
RA	Resource allocation
AL	Agricultural Land (Control Variable)
FA	Forest Area (Control Variable)
CR	Coal Rents (Control Variable)
FR	Forest Rents (Control Variable)
MR	Mineral Rents (Control Variable)
AYTS	Average Years of Total Schooling (Control Variable)
LF	Labor Force, Total (Control Variable)
AM	Agricultural Machinery, Tractors (Control Variable)
GCF	Gross Capital Formation (Control Variable)

Comparative effects of Social Inclusion Policies on Economic Growth

In this subsection we evaluate the separate impact of each social inclusion variable on the economic growth. We also observe the behaviour of natural resources upon adding a social inclusion variable. Six different regressions are used. Results are presented in the following table.

Table 23 : Comparative effects of Social Inclusion Policies on Economic Growth

Variables	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6
Macro. Econ. Man.	-	4.0728*** (1.2894)	3.6440*** (1.2216)	-	-	-
Public Sect.Man. &Inst.	-	6.7103** (3.3085)	-	3.1105*** (1.1024)	-	-
Structural policies	-	5.7864** (2.5071)	-	-	3.7133* (1.9919)	-
Resource allocation	-	−5.8085** (2.7876)	-	-	-	−0.8665* (0.4533)
Log(Agricultural Land)	27.5430*** (9.3423)	51.1412** (22.8867)	49.0630** (21.8614)	41.2183* (23.2681)	24.8700 (21.1552)	31.3897 (22.6036)
Log(Forest Area)	−25.5271*** (7.5671)	−13.0461 (13.7918)	−21.0899 (13.5759)	−25.8668 (21.8384)	−21.1931 (14.0798)	−25.7514 (23.6464)
Coal Rents	−0.3441** (0.1551)	−0.0136 (0.7883)	−0.0474 (0.7899)	−0.3612 (0.8079)	−0.2058 (0.8122)	−0.3673 (0.8138)
Forest Rents	−2.5040** (1.0234)	−1.8429*** (0.4443)	−0.7910 (1.3848)	−2.2986 (4.8246)	−2.3663 (3.7466)	−2.4504 (2.6785)
Mineral Rents	−0.5382** (0.2205)	0.1487 (0.2155)	0.0983 (0.2062)	0.0788 (0.2221)	0.0550 (0.2057)	0.0096 (0.2147)
Av. Years of Total Schooling	1.3959 (1.3564)	0.8068 (1.3188)	1.0182 (1.3283)	1.1406 (1.3644)	1.2795 (1.3528)	1.3116 (1.3704)
Log (Labor Force)	−12.8268 (10.6704)	−14.3040 (10.9338)	−19.1301* (10.6141)	−16.1601 (10.9020)	−8.5608 (10.9943)	−13.7383 (10.8548)
Agricultural Machin	−0.0009* (0.0005)	−0.0004 (0.0005)	−0.0006 (0.0005)	−0.0007 (0.0005)	−0.0009* (0.0005)	−0.0009** (0.0004)
Gross Capital Formation	0.1188* (0.0695)	0.0860 (0.0682)	0.0881 (0.0685)	0.1021 (0.0703)	0.1153* (0.0693)	0.1124 (0.0709)
N	180	180	180	180	180	180
R-squared	0.7141	0.6692	0.6284	0.6432	0.6094	0.6222
F-Statistic	5.4423***	4.6974***	4.8163***	4.7581***	4.9214***	4.8842***

Note : Robust standard errors in parentheses; *, **, *** indicate significance at 10%, 5%, and 1%.

In regression 1, the GDP growth is regressed on the natural resource variables, while controlling for human and physical capitals. The negative coefficients of natural resource variables confirm the findings of the first section : there exists a resource curse in SSA, arising form coal, forests and minerals exploitation.

Upon the introduction of social inclusion variables (regression 2), natural resource variables that were negatively related to GDP growth in regression 1 become insignificant (except the forests rents). The loss of significance can be attributed to the efficiency of social inclusion policies in reversing the curse.

In regression 3, 4 and 5, each social inclusion variable is separately introduced in the model without the others. Upon introduction, all the natural resource variables that were negatively related to GDP growth in regression 1 become insignificant. This proves the efficiency of those social inclusion variables in reversing the curse.

Regression 6 confirms the findings of regression 2, that is the resource allocation is inversely related to the GDP growth.

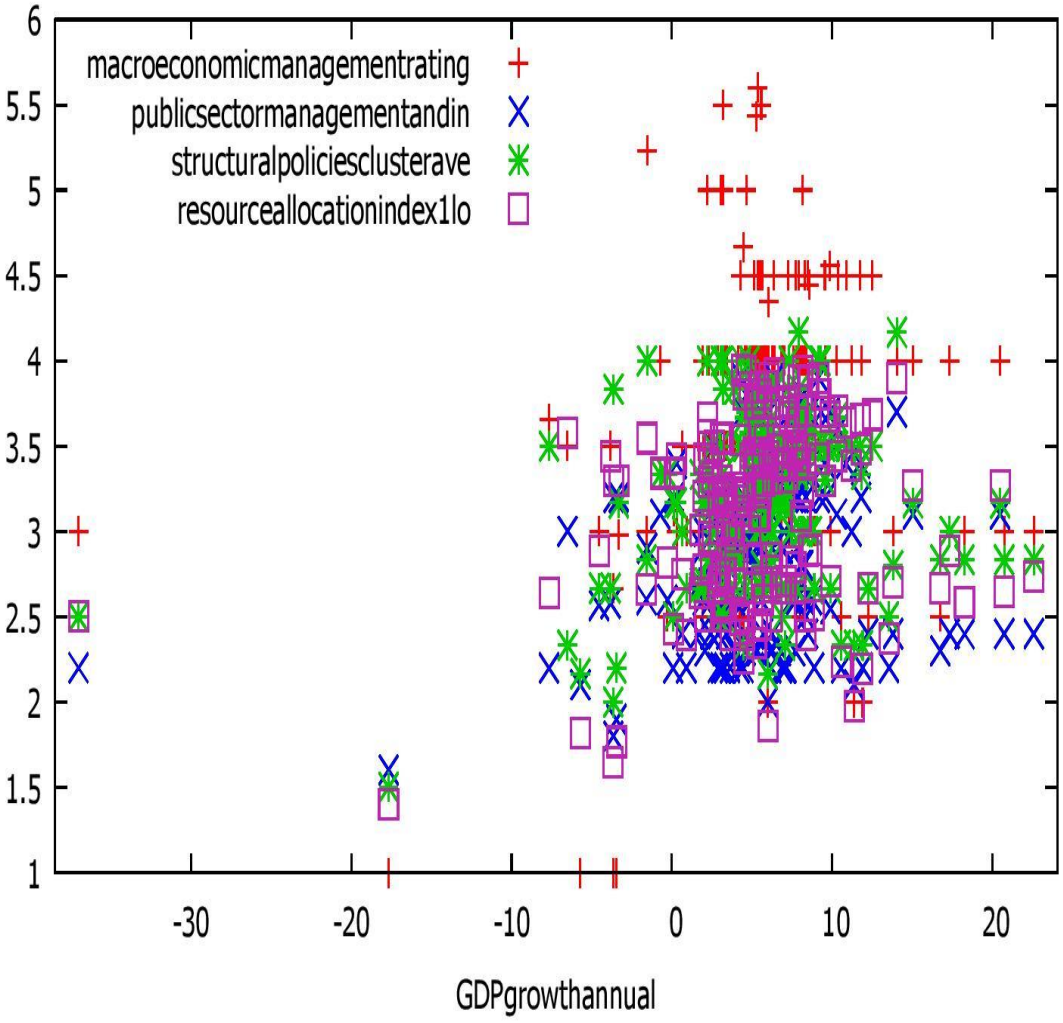
Recapitulation and Inference

This ultimate section of our analysis sought to answer the following question :
Are the policies for social inclusion efficient in reversing the economic curse of SSA countries?
Based on our analysis of the indicators of social inclusion policies, we recorded the following relationships :

The macroeconomic management, the public sector management and institutions cluster, and the structural policies are positively related to the annual GDP growth of the 20 Sub-Saharan African countries in the sample. Only the resource allocation displays a negative impact on the economic growth.

Our findings in this ultimate section lead to the following inference : most social inclusion policies are efficient in reversing the curse experienced by Sub-Saharan African countries. A reinforcement of those policies would tip the balance towards a prosperous economy of the region.

Figure 5 : Scatter plot of the GDP growth and the social inclusion policies



An upward sloping line can easily be drawn through the plot represented above. There is a graphical evidence that on average, the policies for social inclusion promote the economic growth of Sub-Saharan African countries. Their reinforcement over a timespan of several years would be promising for the region.

CHAPTER 5

CONCLUSION

5.1. Scope of the Research

In this study, we sought to investigate whether natural resources represent a curse for Sub-Saharan African economy and whether the policies for social inclusion launched by the World Bank could promote the economic growth of the region. The decision to conduct this study emerged from the general remark that Sub-Saharan African countries, despite being endowed with huge resources, record the worst economies on earth, with populations wallowing in daily misery. Some quite useful statistics illustrate the amount of resources in SSA. As far as natural resources are concerned, a country is labelled as resource-rich if exports of non-renewable natural resources such as oil, minerals and metals account for more than 25% of the value of the country's total exports (International Monetary Fund's Guide on Resource Revenue Transparency, 2007, pages 54-56). If we were to stick to this definition of IMF, 20 nations from Sub-Saharan Africa would be labeled as resource-rich out of the 56 countries recorded all over the World. Clearly, more than a third of the world's resource-rich countries belong to SSA region.

With such statistics, common sense would expect the region to build a strong, if not the strongest economy in the world. But surprisingly, Sub-Saharan Africa is

notorious for recording the worst economy, with most of its countries at the bottom of the world classification (The World Bank Country Profiles, the IMF World Economic Outlook Database, 2013). As addressed by Ghana's first president, "although most Africans are poor, the continent is potentially extremely rich" (Nkrumah, I speak of freedom : a statement of African ideology, 1961). This paradox displayed by SSA's economy motivated our research. To achieve our research goals, we investigated data for resource variables and indicators of social inclusion policies. The individuals in our sample are composed of the Sub-Saharan African countries that are regarded as resource rich. Based on the IMF criteria, there are twenty such countries.

We found that most natural resources have a negative relationship with the annual GDP growth rate of the twenty countries in the sample. Such resources are the Forest area, the Coal rents, the Forest rents, and the Mineral rents. This type of paradox is conventionally coined by Development Economists as the natural resource curse (Auty, 1993). Basically, the huge resources exploited by Sub-Saharan African countries are actually pulling their economies back. This finding confirms previous works.

The ultimate goal of this study was to shed some light on the place held by the policies for social inclusion in the economic performance of SSA. In other words, this part aimed to determine whether the policies for social inclusion could tip the scale in reversing the curse on the region's economy. The indicators used in this section were the public sector management and institutions, the structural policies, the resource allocation, and the macroeconomic management. Our analysis revealed an overall efficiency of such policies in promoting the growth of Sub-Saharan African economy. In fact, all the proxies were positively related to the annual GDP growth, except the resource allocation. Moreover, the policies have been found to alleviate the natural resource curse. The implementation of the policies for social inclusion in SSA is recent, with data available only from the year 2005. Their positive effect on growth suggests that inclusion, if implemented over a long timespan, will efficiently boost the economy of the region.

5.2. Original Contribution to Literature

The contribution of this study to the literature is twofold : first, for so long, Sub-Saharan Africa has been the classic example of natural resource curse phenomenon. This study provides an up-to-date insight into the question and determines whether any improvement has been made in recent years. We have controlled for the human capital and the physical capital to avoid likely endogeneity and biased estimates. Secondly, the study contributes to knowledge by investigating the policies for social inclusion. The World Bank has designed a whole package of social inclusion policies, intending to end extreme poverty and promote economic growth all over the world by 2030 (World Bank Group's dual goals). Although such policies have been addressed in some studies, they have not yet been tested for efficiency. This study tested their efficiency in solving the economic instability of Sub-Saharan African countries.

5.3. Limitations

The major issue this study had to deal with was the unavailability of data. More SSA countries would have been added to the investigation if their data had been available. In addition, the study would have spanned a period longer than fourteen years, had the data been accessible. Data for the years prior to 2000 are highly missing and data for more recent years (2014, 2015 and 2016) have not yet been disclosed. The most commonly used indicators for human resources are the labor force, the adult literacy rate, the family health, the fertility rate, the life expectancy at birth, etc... However we could only retrieve data for the labor force and the Average years of total schooling. We have used nine time periods (from 2000 to 2009) for the social inclusion policies unlike for the resource variables where fourteen time periods were considered (from 2000 to 2013). This is mostly due to the fact that Sub-Saharan African countries started to implement the social inclusion policies in different years and not long ago. For that purpose, data could only be obtained for nine years. Generally speaking, it is tedious to conduct research on Sub-Saharan Africa due to data issues.

5.4. Discussion

Sub-Saharan Africa displays the symptoms of a society cursed by its own blessings. This can be explained by various factors. The dutch desease claims an important place in the poor performance of the region. When SSA countries discover a new natural resource, mineral and oil mostly, they tend to heavily depend on its export, neglecting other sectors of the economy such as agriculture and manufactory. For instance oil and diamond exports in 2005 in Angola accounted for 99.3% of the country's total exports. As the revenues increased from the mineral or oil export, the national currency tended to appreciate compared to other nations. As a result, the products other than mineral and oil had become less competitive in the international market. Unfortunately, the revenue generated by the growing sector was far insufficient in general, to cover the losses incurred by other fragile sectors.

Moreover, SSA countries are generally notorious for their rent-seeking activities. A lot of literature address the corruption that is observed in the region. Many foreign and national companies are influencing the governments or public officials to obtain tarrif protection, loan subsidies or grants. Financial profits generated by such activities only benefit the foreign companies, at the expense of the society. There is a serious wastage of human capital when individuals devote their time to rent-seeking instead of engaging in productive activities.

Foreign powers share the blame in the poor economic performance of SSA. Though all African countries are officially independant, they are still subject to some form of dominance from former colonial powers. For instance, the monetary policy of former french colonies is somewhat determined by their former colonial power. Their currency (the Franc CFA) has been printed by the colonial power for more than a century and they are required to pay for the printing services. This lack of monetary autonomy hinders the economy of the concerned countries.

There is a need for SSA governments to invest in human resources. Human resources hold a place of note in the development of any society. Skilled and well trained labor is required to maximize productivity and to secure a better quality of products. Well educated individuals are needed to manage the countries' institutions and

determine the adequate policies for economic growth. Factors such as transparency, gender equality, individual rights and equity need to be promoted as they have a significant impact on development. Sanitation facilities should equally be improved, to increase life expectancy and guarantee a healthy society.

5.5. Implications for Further Research

Some further investigations are associated to this study. The vast majority of Sub-Saharan African countries can be classified into two groups : the anglophone countries and the francophone countries. A comparative study of the economic performance of the two groups of countries would contribute to the literature. This would be beneficial to the continent as a whole in the sense that the best performing group of countries will inspire the others, through their economic policies. This would equally determine the strenghts and weaknesses of each group of countries in terms of natural resources, human capital and physical capital. The study will shed light on the category of countries that are more subject to the natural resource curse, human resource mismanagement and the physical capital inadequacy.

From a more geographical perspective, there exist West African countries, Central African countries and East African countries. A comparative study could also be conducted on this basis, in order to assess the economic performance of each sub-region.

An important finding of our research was that the coal rents, forest rents, and mineral rents had a negative impact on the economic growth. Due to data unavailbility, we could not investigate the oil and natural gaz rents. Future studies on these latter variables could be carried out to draw a complete and more accurate conclusion.

Another research could aim to investigate the impact of unemployment, corruption, war and conflict on the economic growth of SSA countries. The findings from these potential studies would be of a great use in determining the adequate policies to implement in order to solve the various issues of the economy.

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