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Resource Abundance and Material Wellbeing in Africa

An investigation of the Resource Curse

by

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Abstract: Natural resources and their impact on growth has received significant academic attention through the theory of the resource curse. Most literature has studied the relationship between natural resource abundance and economic growth. However, the resource curse argues that development, in general, is negatively affected by resource abundance and that it can be avoided through quality institutions and governance. This thesis contributes to the literature on the resource curse by evaluating the relationship between resource abundance and material wellbeing in Africa. The empirical analysis was conducted through a panel data analysis, which finds support for the resource curse theory in Africa in various aspects: (i) there is a negative relationship between material wellbeing and resource abundance, (ii) it finds that the resource curse is mitigated where governance and institutions are of higher quality, (iii) there is a negative relationship between resource abundance and taxation. These findings show that the resource curse is not only evident in terms of the impact of resource abundance on economic growth, but also on other indicators of development, such as material wellbeing.

Key Words: Natural resource curse, Resource abundance, Material wellbeing, Taxation, Africa, Institutions

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List of Abbreviations

AfDB	African Development Bank
EITI	The Extractive Industries Transparency Initiative
GCRI	Global Conflict Risk Index
GDP	Gross Domestic Product
GRD	Government Revenue Dataset
ICTD	The International Centre for Tax and Development
IMF	International Monetary Fund
NRGI	Natural Resource Governance Institute
OLS	Ordinary Least Squares
RGI	Resource Governance Index
WDI	World Development Indicators
WGI	Worldwide Governance Indicators

1 Introduction

Natural resource extraction has occurred for thousands of years. As the population of the world continues to grow, so will the demand for natural resources (Lilford, 2017). Natural resources are vital components in many products and core input factors for industries such as construction, ceramics, cosmetics, drugs, detergents, electronics, glass, metal, paints, plastics and paper. Natural resources increase a country's stock of assets and therefore are expected to increase opportunities for economic development (Bulte, Damania & Deacon, 2004). The resource curse theory, however, cautions that a positive relationship between resource endowment and economic development cannot be taken for granted. Resource extraction may benefit economic elites rather than contribute to poverty reduction (Otto, Andrews, Cawood, Doggett, Guj, Stermole, Stermole & Tilton, 2006: 240). In many countries resource extraction has contributed to forced land evictions of indigenous populations (Dunlap, 2021), environmental degradation and intoxication (Ite, Ibok, Ite and Petters, 2013), and modern slavery (Bales & Sovacool, 2021). As a result, empirical evidence provides a mixed picture (Davis & Tilton, 2005; Koitsiwe & Adachi, 2015; Sachs & Warner, 1995; Sarraf & Jiwanji, 2001; Sharma & Pal, 2021).

The extractive industry has a particularly strong impact on African nations due to the continent's natural resource abundance in combination with a young and growing population (Hermele & Gregow, 2011; Maroun, Ram & Kok, 2019). Since early colonial rule, natural resources contributed to government and export revenue (Moore, Prichard & Fjeldstad, 2018). However, evidence suggests that transforming this wealth into higher standards of living and development has been challenging (Lundgren, Thomas & York, 2013: 9). Consequently, Africa is characterized by high growth rates and low human development (Beare, 2017).

The extractive sector expanded dramatically during the last decades (Bebbington, Hinojosa, Bebbington, Burneo & Warnaars, 2008; Ross, 2001). Resource-rich countries may benefit from this development through efficient taxation, i.e. taxation that maximizes fiscal income from resource extraction (Tilton, 2004). But resource taxation should go beyond immediate economic gains and in addition compensate for negative externalities (Hughes, 1975; Otto et al., 2006). In theory, resource taxation can improve the allocation of public goods in an

economy that will enhance the wellbeing of its citizens (Otto et al., 2006). However, there is a lack of well-designed fiscal regimes in parts of Africa which limit efficient taxation, and by extension, revenues from the extractive industries (Hermele & Gregow, 2011; Lundgren, Thomas & York, 2013).

Empirical research investigating the resource curse focused on the impact of resource abundance or dependence on economic growth. The theory, however, argues for a more general effect on development and wellbeing (Otto et al., 2006). This thesis, therefore, will look at the relationship between resource abundance and material wellbeing in Africa. Wellbeing is an inclusive measure of the general standard of living of a population and therefore can offer a more nuanced perspective on the impact of resources on development. The relationship between income from resources and economic development is contingent on the quality of political and economic institutions (Hermele & Gregow, 2011). Previous empirical research used general measures for institutional quality such as government effectiveness. In a developing country, however, government effectiveness could vary across different functions and, therefore, might underestimate the positive effect of institutions governing natural resources. To mitigate this problem, this study uses the Resources Governance Index, which measures how extractive resources are governed by their countries.

The empirical analysis is based on a panel data analysis for 54 countries between 1990 – 2014. This study finds a significant positive impact of mineral rents on wellbeing. The positive effect is dependent on the quality of resource governance institutions. Mineral rents without good resource governance have a negative impact on wellbeing. There is no significant positive effect if resource abundance is measured with income from natural resources. This is not surprising, given that mineral rents, as opposed to income, measure taxable profits from resources. The results also confirm that general measures for the quality of political and economic institutions may not be suitable to grasp variations in governance quality. The following two sections explain the importance of the topic and the reasoning behind it in more detail.

1.1 Research Problem

Following the pioneering works of Sachs and Warner (1995) the majority of studies of the resource curse have looked at the effects of natural resources on economic growth. The most common proxy for resource wealth has been primary exports to total exports or GDP. This

measure indicates “resource dependence” rather than “resource abundance” (Brunnschweiler & Bulte, 2008). The large variety of findings on the resource curse recognizes a need for further research (Koitsiwe & Adachi, 2015). The understanding of the effect, both positive and negative, of natural resource abundance is crucial to be able to create policies that can mitigate and avoid potential problems (Hajkowicz, Heyenga & Moffat, 2011).

Evaluating the resource curse hypothesis based on the relationship between natural resources on economic growth neglects other dimensions of wellbeing. Natural resources could impede growth but reduce poverty or promote growth and increase economic marginalization. Despite the general trend in the resource curse literature, this was mentioned already in the early works of Sachs and Warner (1995). They argued that the welfare implications of resource abundance can differ from the growth implications. They called for further analysis to be able to issue appropriate policies to enhance economic growth in resource abundant countries. Brunnschweiler and Bulte (2008) elaborate on this as they argue that there is a need to focus on other measures of natural resource abundance and wellbeing. In some cases, natural resources have been used to promote development while it has been misused and instead hurt development in others (Bulte, Damania & Deacon, 2004; Davis & Tilton, 2005). Research on natural resources and development is far from being settled. Bulte, Damania and Deacon (2004) explored the impact of natural resources, channeled through institutional quality, on development indicators. They found that when holding institutions and income constant, there is typically no significant effect between natural resource abundance and development indicators. By contrast, Apergis and Katsaiti (2018) studied the relationship between poverty and oil, natural gas and coal. They found that fossil energy sources worsen poverty.

1.2 Aim and Scope

This thesis aims to create a deeper understanding of the resource curse and how resource abundance impacts material wellbeing in Africa. Following the findings and reasoning of Brunnschweiler and Bulte (2008), this thesis will investigate how resource abundance, rather than dependence, impacts material wellbeing. The objective is to explore the effects of alternative measures of resource abundance, such as resource revenue and mineral rent, has on material wellbeing. More specifically, the goal of the thesis is to analyze all 54 African

countries over the years 1990-2014. Consequently, this thesis seeks to answer the following research question:

What is the relationship between material wellbeing and resource abundance in Africa?

Resource abundance is an indicator of how a country is endowed with natural resources. In the literature on the resource curse, this is most commonly measured as the ratio of resource exports to GDP. This measure conveys how dependent a country is on natural resources rather than how abundant it is (Brunnschweiler & Bulte, 2008). Resource abundance is more appropriately measured by resource wealth (Koitsiwe & Adachi, 2015). In this instance, it is measured through resource revenues and mineral rents, where the former accounts for total income while the latter measure net profits from resources.

Wellbeing is an inclusive measure of the general standard of living of a population as it does not divide it into groups of wealthy or poor, it captures all social groups. Wellbeing includes three dimensions: material, relational, and subjective. This thesis will focus on the material dimension as it is related to aspects of the resource curse. Material wellbeing concerns standards of living and practical welfare. More specifically, this includes income, assets and wealth, employment and livelihood activities, physical health and (dis)ability, education and skills, environmental quality, and access to services and amenities. These items combined are often referred to as 'human capital' (White, 2010), or 'capabilities' according to Amartya Sen (1989). Most commonly, income is used as a measure for material wellbeing but it has shown to be insufficient as it only captures the economic dimension of it (Bulte, Damania & Deacon, 2005; Lahoti, Jayadev & Reddy, 2018). Instead, the measurement of consumption is more applicable as an indicator of material wellbeing as it captures the aspect of material deprivation. As a result, this measurement is a more direct measurement of material wellbeing than income is for those with fewer assets and resources (Meyer & Sullivan, 2003). This is mainly because of the high income inequalities in most developing counties the measure of income, most commonly measured through GDP per capita, is not sufficient to measure wellbeing. Income could give a misleading indication, while material wellbeing measured through consumption is more direct (OECD, 2015). Additionally, income from the informal sector is common in developing countries which indicates that it is not recorded in the official records. Consumption, the measurement of material wellbeing, captures these instead (OECD, 2015).

To elaborate on the understanding of the relationship between resource abundance and material wellbeing the aspect of taxes is considered. This aspect is added to measure the relationship between resource abundance and the overall fiscal capacity of governments. The aim is to see if resource endowed countries perform poorly on overall revenue mobilization. This is an outcome that will exacerbate the effect of resource abundance on material wellbeing. The additional research question that is to be answered is:

What is the relationship between resource abundance and taxation?

Material wellbeing does not come from natural resource rents or revenues alone, the general ability of the government to collect taxes also impacts material wellbeing. Literature suggests that the resource curse can manifest itself through demotivating governments to collect taxes because they rely on the wealth from natural resources instead (Besley & Persson, 2014; Ross, 2001). This is an indicator of institutional quality and governance and is linked to the aspect of the resource curse which argues that natural resources are detrimental to the quality of institutions (Davis & Tilton, 2005; Hermele & Gregow, 2011; Ross, 2001). The role of institutions is therefore a key to the analysis. As a result, the study both contributes to the literature on the resource curse and the literature on institutions in general.

1.3 Outline of the Thesis

The thesis is structured as follows. Section 2 covers previous empirical research on the resource curse and its origin, its connection to material wellbeing, and finally the importance of taxation in natural resource-rich countries. Section 3 presents the data used in the investigation and its sources. A more comprehensive outline of the variables and data is presented in the methodological section, section 4. This section also introduces the econometric model and explains the methodology used in the study. Section 5 follows with the empirical analysis where the results are presented and discussed. Finally, section 6 concludes and summarizes the key findings of the analysis, possible policy implications and future research.

2 Previous Research

2.1 Resource Curse

To be able to understand the resource curse it is beneficial to have a general understanding of what natural resources are. In an economy, resources are factors of production used to promote growth or development. Natural resources are provided by the nature and are therefore present without human intervention. Consequently, it is important to differentiate natural resources from other types of resources such as human, physical and institutional and social capital (Basedau, 2005). The wealth of countries are said to be made of these forms of capital where natural resources are one category of them (Lay & Mahmoud, 2004). Natural resources are often classified as either *renewable resources* such as wood, fish and grains and *non-renewable raw materials* such as gemstones, gas, oil and metals. Following, a more economically relevant perspective is presented by Rick Auty (1997) where he distinguishes between "point" resources and "diffuse" resources. The former refers to resources such as oil and minerals which are concentrated in an area and can be controlled at relatively low costs. The latter refers to resources such as food and agricultural products which are typically dispersed over a wide geographical area and where government control is weaker.

The resource curse is a paradox that suggests that resource-rich countries have slower growth than resource-poor countries. After resource abundant countries suffered from low growth throughout the 1980s and early 1990s Auty (1993) termed this phenomenon the resource curse. He argued that this should be interpreted as a tendency rather than a law. Following, the economists Sachs and Warner (1995, 2001) are the authors of the most influential work on the existence of a resource curse. Their studies use statistical methods to correlate resource abundance with economic growth for more than 80 countries over the years 1970-1990. They discovered a negative relationship between a high ratio of natural resource exports to GDP and growth rates. They concluded that they had discovered a surprising feature of modern economic

growth where economies with abundant natural resources have had a slower growth rate than natural-resource-scarce economies. Their findings inspired more research on the topic as their estimates could have been biased if there had been any missing variables that are correlated with the resource term in the regression (Bulte, Damania & Deacon, 2004).

In line with the pioneering works of Sachs and Warner (1995), early studies on the resource curse focused on resource abundant countries' declining terms of trade for primary products and a failure to create a competitive manufacturing sector, the so-called Dutch disease hypothesis. This holds that there is an appreciation of the exchange rate as a result of a resource boom followed by shrinkage of the tradable manufacturing sector (Bulte, Damania & Deacon, 2004). Collier and Goderis (2007) found that output can be positively affected by resource booms in the short-run but negative long-run effects. The Dutch disease theory has not managed to explain the resource curse on its own. Due to its predicted monotonic negative effect, it fails at explaining why some resource-rich countries such as Norway have been economically successful but Sierra Leone has not (Boschini, Pettersson & Roine, 2007).

In more recent years the trend has been to explain the resource curse through the channel of the political economy of resource rents and bad institutions. Natural resources can be of advantage to a country if the government and other entities know how to efficiently use the generated wealth (Davis & Tilton, 2005). This implies that it is other circumstances and conditions which are the impediment to development and growth rather than the natural resources alone. As a result, Hermele & Gregow (2011) argue that the resource curse should be reconsidered as policy failures. From the institutionalist point of view, a sufficient way to avoid the resource curse would be through strengthened economic linkages between the extractive sector and the rest of the economy. Resource-led growth can then be beneficial if regulatory, legislative and policy frameworks are both pro-development and pro-growth which focus on mobilizing and integrating financial, technical and human resources (Beare, 2017). Boschini, Pettersson and Roine (2007) find that the effect natural resources have on a country's development depends on both the institutional setting and the types of natural resources the country is endowed with. Potential problems caused by natural resources can be countered by good institutional quality. Resource-rich countries are only cursed if they have low-quality institutions and the curse is reversed if institutions are of good quality. Diamonds and precious metals have a generally larger effect on the economy, both positive and negative. Meanwhile, Ross (2001) argues that oil especially has a negative effect on democracy. He identifies three causal mechanisms that

explain the relationship between oil exports and authoritarian rule; the *rentier effect*, the *repression effect*, and the *modernization effect*. The first effect occurs when the government is the main receiver of the resource revenue. The government does not have the same need to tax the population which results in weakened demand for accountability and representation from the government. The *rentier effect* can also result in greater spending on patronage which can alleviate dissent among the population and prevent the formation of social interest groups. The second mechanism, the *repression effect*, occurs because governments of resource-rich countries tend to spend more money on internal security and thereby repress the democratic aspirations of the people. This is consistent with the findings of Collier and Hoeffler (1993) and de Soysa (2000) who find that civil war is more likely where there is natural resource wealth. The third mechanism, the *modernization effect*, is a social mechanism and not political like the other two effects. This mechanism has its origin in the modernization theory which argues that democracy is caused by cultural and social changes. These are in turn caused by economic development. This mechanism links back to the Dutch disease hypothesis as well as it argues that resource-rich governments tend to interrupt structural change in the economy by impeding the modernization process.

2.2 Resource Abundance and Material Wellbeing

The majority of studies of the resource curse have looked at the effects of natural resources on economic growth. It is important to differentiate the impact of natural resources on growth from its impact on other levels of development (Hermele & Gregow, 2011). Following the works of Sachs and Warner (1995), the most common proxy for resource wealth is the ratio of primary exports to total exports or GDP. This measure has been widely used because the data are easy to access and reliable (Apergis & Katsaiti, 2018). This measure has also been criticized for being a proxy for "resource dependence" rather than "resource abundance" (Brunnschweiler & Bulte, 2008). This indicates that the regression of Sachs and Warner shows that growth is hampered by primary export intensity rather than that resource abundance, in general, impedes growth. This relationship only measures one dimension of wellbeing, natural resources may impede growth but they could improve other aspects of welfare. As a result, Bulte, Damania and Deacon (2004) have extended the analysis of the resource curse to include more development and welfare criteria. They aimed to analyze if the negative relationship between natural resource abundance and economic growth is transmitted to other relevant social and

economic indicators. More specifically, they explored the impact of natural resources, channelled through institutional quality, on development indicators. They distinguish between point and diffuse resources in their analysis. Although, similarly to Sachs and Warner they use the share of resource exports to GDP as a measure for natural resource abundance. They find that when holding institutions and income constant, there is typically no significant effect between natural resource abundance and development indicators. Brunnschweiler and Bulte (2008) use an alternative measure of resource abundance and challenge the findings of Sachs and Warner. They find that when resource abundance is proxied by natural resource wealth instead of the share of exports to output (i) resource dependence is determined by resource abundance, institutions and constitutions, (ii) growth does not get affected by resource dependence, and (iii) growth and institutional quality is positively affected by resource abundance. The importance of differentiating between the measures used for resource abundance and its impact on economic growth has been emphasized by Sharma and Pal (2021). Their study uses a panel of 111 countries over the years 1996-2015 to examine the natural resource curse to see whether a higher level of dependency on natural resources or specialization in natural resources cause poor economic performance. Their primary variable of interest used as a proxy for resource dependence is total natural resource rent as a share of GDP. However, contrary to the findings of Brunnschweiler and Bulte (2008), their findings are in line with Sachs and Warner (1995). They find support for the resource curse hypothesis as their study suggests that resource-rich countries tend to grow at a slower rate than resource-deprived countries. They find evidence for this in both the short- and long run.

Current evidence of the resource curse appears to be empirically inconclusive and there is mixed evidence on the relationship between poverty and abundance of natural resources. If the wealth from the extractive sector is managed properly it can be used to provide financial nourishment. Thereby, standards of living can be raised and job creation within the manufacturing and service sector can be promoted (Shen, Muduli & Barve, 2015). Apergis and Katsaiti (2018) use a global sample that covers the years 1992-2014 to unravel the relationship between the Headcount Poverty Index and the share of oil, natural gas and coal exports on GDP. They find that fossil energy sources and corruption worsen poverty while both economic freedom and democracy alleviate it. Meanwhile, Hajkowicz, Heyenga and Moffat (2011) investigated the relationship between quality of life indicators and the gross value of mineral production in Australian regions. They found that mining has a positive association with communication access, educational attainment, housing affordability, employment, and income. Again, the findings of

these two studies suggest that the measure of resource abundance has a large influence on whether the resource curse is confirmed or not. These differences show that it is important that researchers pay particular attention to the choices they make when selecting variables and proxies.

2.3 Taxation and Resource Abundance

One way for resource-rich countries to benefit from their natural resources is through taxation. The dramatic growth in mining activities in Africa in the past decades has enhanced the importance of the income derived from mining activities (Bebbington et al., 2008; Paredes & Rivera, 2017; van Os, McGauran & Römgens, 2013). Tilton (2004) argues that efficient mining taxation policies are a way to maximize the value of the resource revenues flowing to the government. Mining taxation can be viewed as monetary compensation from the extractive industry to correct for its negative externalities (Hughes, 1975; Otto et al., 2006). In general, mineral taxation can improve the allocation of public goods in the economy that will enhance the wellbeing of the citizens (Otto et al., 2006). However, there is a lack of well-designed fiscal regimes in parts of Africa which limits the revenues from the extractive industries (Hermele & Gregow, 2011; Lundgren, Thomas & York, 2013). Tax incentives are often used as means to attract domestic and foreign investment. These incentives are costly which has resulted in many countries forgo important revenues in exchange for little or even elusive benefits (Readhead, 2018). Paredes and Rivera (2017) find that additional tax revenue from the mining sector does not always enhance the provision of public goods and resource windfalls can crowd out other taxes in Chile. They find that budgets do not increase along with mining taxation but instead they substitute other taxes that put a high burden on society. Limited research has been done on the topic and there is still a need for further research on the relationship between mining taxation and the wellbeing of communities (Oyarzo & Paredes, 2018). According to Moore, Prichard and Fjeldstad (2018), the mining sector could contribute to welfare had it not been so undertaxed. Meanwhile, Tilton (2004) argues that an increase in mining taxation can have a positive effect on society in the short run but in the long run the costs of development activities and exploration of the mines will be reduced. Long-run welfare issues will not be solved by increased mining taxation either.

3 Data

The most frequent method to test the existence of a general resource curse has been through the use of statistical correlation analysis to show that resource-rich countries perform worse than resource-poor ones (Hermele & Gregow, 2011). More specifically, the goal of the thesis is to analyze all 54 African countries over the years 1990-2014. The empirical analysis will be done with the use of a panel dataset. The dataset was constructed with data obtained from eight different sources, mainly from the World Bank and the Natural Resource Governance Institute (NRGI). Due to limited data availability, the main sample includes all 54 African countries with reservation for missing data for certain years and variables (see appendix A for a list of countries). With the help of five-year averages, the gaps in the dataset have been limited and cover the years 1990-2014.

The data used for measuring natural resource abundance has been retrieved from both the NRGI and the World Bank. The NRGI provides data on various aspects of natural resources. For the purpose of this study, the dataset "Resource Revenue Dataset" has been used to create the independent variable *Resource Revenue*. It sporadically covers 47 African countries over the years 1980-2017. The dataset has compiled data on resource revenue from The Extractive Industries Transparency Initiative (EITI), International Monetary Fund (IMF), and The International Centre for Tax and Development (ICTD). The NRGI also provides the Resource Governance Index (RGI) for year 2013 and 2017. This study uses the latter where 81 natural resource producing countries are evaluated, 31 being African.

The Global Consumption Dataset (GDC) provided by the Global Consumption Income Project (GCIP) presents data on both national and global level that can be used to create a deeper understanding of the evolution of material wellbeing. Thereby, this dataset has been used to measure material wellbeing. The measurement of consumption provided by the GCD is based on consumption surveys that include the imputed value of various consumptions. The project aims to create and provide transparent and replicable data of income and consumption from a wide range of countries over a long period (1960-2015). The GDC draws data from various relevant sources, mainly from Povcalnet database provided by the World Bank, UNU-WIDER

World Income Inequality Database (WIID), and Luxemburg Income Study (LIS). The dataset covers 47 African countries.

Data that measures the quality of institutions and governance, apart from the RGI, have been retrieved from World Bank Worldwide Governance Indicators (WDI) and the ICTD/UNU-WIDER Government Revenue Dataset (GRD). The data from WDI covers most years after 1995 over 49 African countries. The GRD was developed as an act against the weakness in terms of coverage, transparency and accuracy of already existing country-level data on government revenue. Following, table 1 lists all variables, with a short explanation and source. A more detailed description of the variables and how they will be used is found in the following chapter.

TABLE 1
Variables and Sources

Variable Name	Description	Expected Relationship	Source
	Dependent Variables		
Material Wellbeing	*ln* Consumption per capita (2011 $ PPP)		GCIP (2018)
Tax share	Total Tax Revenue excluding social contributions (% of GDP)		GRD (UNU-WIDER, 2020)
	Independent Variables		
Conflict intensity	Measures conflict intensity on the national level	-	GCRI (EC JRC, 2017)
Corruption	Control of corruption measures to what extent public power is exercised for private gain. Measured in percentile rank.	-	GCRI (EC JRC, 2017)
GDP per capita	*ln* GDP per capita, PPP (constant 2017 international $)	+	WDI (World Bank, 2021a)
Government effectiveness	Perception of performance of policy and policy formulation and the quality of public services. Measured in percentile rank.	+	GCRI (EC JRC, 2017)
Mineral Rent	Mineral Rents (% of GDP).	-	WDI (World Bank, 2021a)
Resource Revenue	Resource Revenue (% of GDP)	-	NRGI(NRGI, 2020)
RGI score	An index that measures how well countries govern their extractive resources.	+	NRGI (2017)

Abbreviations: NRGI, Natural Resource Governance Institute. GCRI, Global Conflict Risk Index. WGI, Worldwide Governance Indicators. GDP, Gross Domestic Product. WDI, World Development Indicators. GRD, Government Revenue Dataset.

As demonstrated in table 1, the variables are expected to have either positive or negative effects on the dependent variables. Conflict intensity is expected to have a negative impact on both material wellbeing and tax share as well as conflicts disrupt or even retard the development of countries. Corruption is expected to have a negative impact on both material wellbeing and tax share because it does not distribute wealth to the population but instead stays in the hands of a few. This money is also usually not accounted for either, and would therefore not be apparent in the measurement of tax share. Both Government effectiveness and the RGI score are expected to have a positive impact on material wellbeing and tax share as they measure institutional quality which is argued to enhance development and the fiscal capacity of governments. GDP per capita is a general measure of the economy and income which is then also expected to have a positive impact on both material wellbeing and tax share. In accordance with the resource curse, mineral rent and resource revenue are expected to have a negative impact on both material wellbeing and tax share as resource abundance is argued to be detrimental to development and the economy.

Table 2 presents a summary of all the variables included in the study. This shows that the data provided by the NRGI, variable Resource Revenue and RGI Score have significantly fewer observations than their compliments Mineral Rent, Corruption, and Government effectiveness provided by the World Bank. There is generally a high variance between the countries, especially of the RGI score and Tax share. The span of the tax share shows that the variance is very large where the minimum tax share is 1.22% of GDP while the maximum accounts for 52.6% of GDP.

TABLE 2
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Conflict intensity	245	1.416	2.659	0	10
Corruption	245	6.575	1.426	2.625	10
Government effectiveness	245	6.47	1.291	3.052	9.65
GDP per capita (ln)	246	7.994	.929	6.144	10.511
Material Wellbeing (ln)	235	4.669	.623	3.622	6.481
Mineral Rent	259	.905	2.338	0	16.5
Resource Revenue	104	.096	.132	0	.687
RGI score	135	44.222	12.101	18	62
Tax share	239	13.666	8.099	1.228	52.645

There are some general limitations to the data included in the dataset. Jerven (2013), found that the reliability of statistics from sub-Saharan African countries is highly questionable as they do not reflect the reality properly. This becomes problematic when retrieving data from the World

Bank as their data is second source data and originates from national statistical systems (World Bank, 2021b). World Bank data is often used to evaluate the level of development of various sectors and regions, which then becomes the basis for where resources are to be allocated. The unreliable data is not only a statistical issue but it also affects the wellbeing of citizens in developing countries. As a result, Jerven argues that developing a strategy for improving statistical capacity is one of the most urgent challenges to African economic development. Despite this shortcoming, it is the best, or only data available and it can be used but it is important to not oversee this issue.

4 Methodology

To test the existence of a general resource curse the most frequent method has been to use statistical correlation analysis to demonstrate that resource-rich countries are performing worse than resource-poor ones (Hermele & Gregow, 2011). The nature of the data suggests a panel data analysis as it covers African countries over the years 1990-2014. As the analysis aims to examine the effects between African countries (individual effects) the most suitable econometric procedure would be to use a fixed effects model or a random effects model. Considering the presence of a time-invariant variable the random effects estimator is more suitable which was justified through the Hausman specification test as well. An option would be to use pooled Ordinary Least Squares (OLS) but it is rare to find in empirical studies as it assumes that the observations are cross-sectional. As the comparative analysis focuses on differences between countries rather than time, 5-year averages for the years 1990-2014 have been employed. The following section presents the econometric baseline models and the estimation strategies that have been considered to establish the choice of method.

4.1 The Model

As the study has two areas of main focus, the relationship between material wellbeing and natural resource abundance, and the relationship between resource abundance and taxation, it makes use of two models to analyze these.

To research the relationship between material wellbeing and natural resource abundance the following the baseline model takes the form of:

$$M\_Wellbeing_{it} = \beta_0 + NR_{it}\beta_1 + X_{it}\beta_2 + Z_i\gamma + \alpha_i + \varepsilon_{it} \quad (1)$$

Where $M\_Wellbeing_{it}$ is the dependent variable that describes material wellbeing, in country i at time t. NR_{it} is the independent variable of interest that represents the measure of natural resource abundance. Several regressions are carried out where this variable is either measured by natural resource revenue or mineral rents, which are time-variant factors. X_{it} includes a set

of relevant independent variables that are related to material wellbeing. This study considers GDP per capita, corruption, government effectiveness, and conflict intensity. $Z_i\gamma$ stands for the time-invariant factor, the Resource Governance Index (RGI) Score. α_i includes the un-observed individual specific effect. ε_{it} is the un-observed random error term.

Following, to research the relationship between natural resource abundance and taxation the model takes the form of:

$$(2) \qquad Tax_{it} = \beta_0 + NR_{it}\beta_1 + X_{it}\beta_2 + Z_i\gamma + \alpha_i + \varepsilon_{it}$$

Where Tax_{it} is the dependent variable that describes Tax share, in country i at time t. A more detailed description of the variables follows.

Dependent Variables: The outcome variables, are 'material wellbeing' and 'tax share'. The former is of main interest as the study aims to study the relationship between natural resource abundance and material wellbeing. This variable is measured as consumption per capita ($ 2011 PPP). Most commonly increases in mean per capita income is used as a measure of a society's economic development as it is easier to measure and it is available for larger samples in the world (Meyer & Sullivan, 2003). This metric has been shown to be insufficient in a discussion of whether growth enhances wellbeing in general or not (Lahoti, Jayadev & Reddy, 2018). Instead, the estimate for consumption has become a standard measurement for material wellbeing in developing countries. This measurement is a more direct measurement of material wellbeing than income is for those with fewer assets and resources (Meyer & Sullivan, 2003). The measurement of consumption provided by the GCD is based on consumption surveys that include the imputed value of various consumptions. Including, in-kind transfers and own-production. Following, the other dependent variable 'tax share' measures total tax revenue, excluding social contributions as a share of GDP. This variable is used to measure the relationship between resource abundance and the overall fiscal capacity of governments. The aim is to see if resource endowed countries perform poorly on overall tax revenue mobilization. This is an outcome that will exacerbate the effect of resource abundance on material wellbeing.

Natural Resource Abundance: Proximate indicators are often used in quantitative studies due to a lack of specific data. Avoiding this can be difficult but mixing up abundance and dependence can be overcome (Basedau, 2005). As this study focuses on resources abundance the independent variables of interest are 'resource revenue' and 'mineral rent'. The former variable is measured as resource revenue as a share of GDP and covers 47 African countries.

Where multiple observations were reported for the same year and country the average has been calculated. This variable gives a more general measurement of resource wealth while 'mineral rent' has been used to give a more specific measurement of mineral wealth. This variable measures the difference between the total cost of production for a stock of minerals at world prices and their value of production. The minerals included in the calculation are gold, tin, zinc, lead, copper, nickel, iron, silver, phosphate and bauxite. The variable covers all African countries but it does not include diamonds in its calculation which is limiting as diamonds are of great importance in many resource-abundant countries.

Institutional Quality: The model includes independent variables measuring economic and governance indicators. The variable 'RGI score' (Resource Governance Index) is a specific index of how natural resources are governed and managed. This is important to consider because research shows that countries with strong institutions with strong state accountability benefit from resource windfalls while countries with weaker institutions may suffer from the resource curse (Robinson, Torvik & Verdier, 2006). The RGI is a measurement of how extractive resources are governed by their countries. The index is a compilation of three components that represent the common aspects of resource governance, value realization, revenue management, and enabling environment. The first component is a measurement of the quality of governance around production, exploration, environmental protection, state-owned enterprises (SOEs) and revenue collection. The second component, revenue management, assess the parts of governments' revenue management that are significant to resource-rich countries. These include subnational resource revenue sharing, national budgeting and sovereign wealth funds. Finally, the third component, enabling environment, is a measurement of the general quality of governance in the given country. This is of importance as depending on the general quality of governance can either enable or disable resource governance. This component has been constructed following the World Governance Indicators (WGI). The 'RGI score' is used in this study is based on data from 2017 and covers 31 African resource-producing countries.

'GDP per capita' is measured in constant 2017 international dollars ($) based on purchasing power parity (PPP). The international dollar has the equivalent purchasing power over GDP as the US dollar in the United States. The GDP at purchaser's prices is calculated by the sum of gross value added by all resident producers in the given country minus subsidies excluded in the value of the products plus product taxes. This measure does not make

deductions for the depletion of natural resources or deducing for depreciation of fabricated assets. This is a standard measure of economic performance (Sharma & Pal, 2021). Due to the skewness of the data, a logarithmic transformation of the variable 'GDP per capita' was performed to make the variable closer to a normal distribution.

Following Mamun, Sohag & Hassan (2017), variables have been included to control for the variation over institutional quality across countries. These variables are 'Corruption' and 'Government effectiveness'. 'Corruption' is a measure of to what extent public power is exercised for private gain. This captures both corruption by the state and elites. 'Government effectiveness' is a measure of the perception of the quality of the civil service and its independence of political pressures, the quality of public services, the quality of policy formulation and implementation, and the credibility of the government to commit to those policies. Both 'corruption' and 'government effectiveness' are measured in percentile rank which indicates the country's rank concerning all other countries.

The variable 'conflict intensity' is included to control for conflict as it has been found that natural resource abundant countries are more likely to experience civil war and rent-seeking conflicts (Boschini, Pettersson & Roine, 2007; Collier & Hoeffler, 1993; de Soysa, 2000). 'Conflict intensity' is measured as the intensity of conflicts on a national level. They are classified on a scale from 0 to 3 depending on how many deaths the conflict has caused. However, the data used for this study, including 'corruption' and 'government effectiveness', is retrieved from the GCRI where they have recoded the range to a scale of 0 to10.

Other control variables: Control variables of the geographical region of the countries are included in the model. Regions capture the general difference in countries' geography and climate that can influence the characteristics of countries, as argued by Nunn (2008). The African countries have been designated dummy variables depending on if they are located in the north, south, west, east or central Africa (see appendix A).

To make meaningful statistical control there is a need for a large number of cases, which results in a limited number of variables that are tested. Statistical control is therefore strong in generalization but weaker in explaining the exact mechanism of causation or exception (Basedau, 2005). As a result of this, alternative specifications and variables are used to ensure that the results are robust.

4.2 Estimation Strategies

Most empirical research that has investigated the resource curse have used cross-sectional data. Panel data, which is used in this study, repeat the observations on the same set of cross-section units. By observing changes in the dependent variable over time it is possible to control for omitted variables without observing them directly in panel data. Panel data also allows for control for omitted variables that are constant between cases but vary over time.

There is a wide range of different econometric approaches that can be used to estimate the model. The pooled OLS estimator is a natural starting point due to its simplicity but it has its limitations. This estimator ignores the panel structure and treats the data as if it was cross-sectional where each observation is an observation from different units and not linked to time, as it allows for cross-sectional variation.

The difference between the fixed effects and random effects estimator is whether or not there is a correlation between the individual specific error term and the vector of explanatory variables. The error term is composed of two terms in a panel data set, the time-invariant unobservable effect, or the individual specific and the stochastic error term. The former is constant across time. The fixed effects model assumes that there is a correlation between the unobserved effects and the explanatory variables. This model uses a transformation to remove the unobserved effects as a consistent estimate of the unobservable is not possible. The time-invariant unobserved effect is assumed to be random and thereby uncorrelated with all regressors in the random effects model. This model uses fewer degrees of freedom than other models and it is most efficient. However, the fixed effects estimator still reports consistent estimates of identifiable estimates despite the random effects model being preferred and valid. The Hausman specification test is used to justify whether the fixed effects model or the random effects model is more suitable for the given data. This test compares random and fixed effects models under the null hypothesis that there is no systematic difference between the coefficients estimated with the random effects and fixed effects model. As the fixed effects model is assumed to be sufficient, a high p-value indicates that a random effects model is consistent and efficient (Park, 2011).

5 Empirical Analysis

This section presents the results of the methodology outlined in the previous section. First, the sample is presented and some of its general characteristics are explained. Following, the results of the regressions are presented. The result of the relationship between material wellbeing and resource revenue of 27 African countries over the years 1990-2014 are presented in table 3. Table 4 provides an alternative measure of resource abundance and shows the relationship between material wellbeing and mineral rent of 44 African countries. Table 5 presents the relationship between mineral rent and tax share. Following, table 6 shows the effect minerals compared to oil and gas have on resource revenue, material wellbeing, and tax share. The goal was to look at all 54 African countries but due to data scarcity, some countries were left out when running the regressions.

In general, there is little change between years in the countries but more difference between countries, as shown by the illustrative descriptive statistics in appendix C. Surprisingly there is a strong positive relationship between GDP per capita and resource revenue (see figure A in appendix C), and resource revenue and material wellbeing (see figure C in appendix C). This goes against the theory of the resource curse. Meanwhile, there is a slight negative relationship between GDP per capita and mineral rent (see figure B in appendix C). However, so far mineral rent appears to support the resource curse theory better than resource revenue. The positive relationship between the RGI score and GDP per capita (see figure D in appendix C) and resource revenue (see figure E in appendix C) suggests that the better a country is at managing and governing their natural resources, the less wealth they generate. This is inconsistent with the research that shows that the resource curse can be avoided through good institutions and management. This is, however, supported by the negative relationship between RGI score and mineral rent (see figure F in appendix C). Again, mineral rent appears to confirm the resource curse theory better than resource revenue. However, considering both mineral rent and resource revenue are important as the underlying reason for their differences could be explained by the fact that minerals pose a stronger effect than other natural resources, as suggested by (Boschini, Pettersson & Roine, 2007). These descriptive statistics also confirm that the case of Botswana is an exception as it does not follow the general trend in Africa when considering the

relationship between indicators of natural resource abundance and development (Hillbom & Bolt, 2018).

The Hausman specification test is performed after estimating the model with both fixed effects and random effects method. The results of the test are reported in table 8 in appendix B. The test assumes that the fixed effects estimator is always consistent and compare that to the random effects estimator to see whether the random effect estimator is also valid and can generate consistent results. If the chi-square test statistic is large it implies that the random effects estimator is not consistent because there is a correlation between the error term and the variables. In that case, a fixed effect estimator is preferred. The chi-square reported for the regressions in this study is relatively small which implies that random effects estimation is consistent for all, which is also supported by the p-values.

5.1 Results

The following section outlines the results of the study. The regressions also include interaction terms to estimate the effect of resource abundance on material wellbeing. The interaction terms include the measure for resource abundance and the RGI Score, alternatively resource revenue and government effectiveness, to account for the effect of resource revenue on material wellbeing through the quality of institutions and governance. By including both the interaction terms and the original values, both the effect of the variables on material wellbeing and the effect through institutional quality is accounted for.

The estimated relationship between material wellbeing and resource revenue is reported in table 3. The first column presents the estimated base model, the second shows an augmented model, and the third shows the result of an alternative model. The following two columns distinguish between African low income countries and low-middle income countries to see if the relationship plays out differently depending on their general level of development. This is also done as a result of the high variance between the counties as spotted earlier in table 2. High-middle income and high-income countries were investigated separately due to the limited amount of countries that generated an insufficient amount of observations to run a regression. A list of income classification is found in appendix A. The regression includes the following low-income countries: Burkina Faso, Ethiopia, Guinea, Liberia, Mali, Mozambique, Niger,

Sierra Leone, Chad, Tanzania, and Uganda. The low-middle income countries are Côte d'Ivoire, the Republic of Congo, Ghana, Nigeria, Sudan, Tunisia, and Zambia.

The alternative model includes the variable government effectiveness instead of the RGI score to elaborate on the effect on institutions. Resource revenue seems to have a positive impact on material wellbeing. The RGI score has a slight positive, and even significant effect at the 1 percent significance level in African low-middle income countries. The interaction term of resource revenue and RGI score suggests a slightly negative, and insignificant impact on material wellbeing. Government effectiveness has a negative but significant coefficient on the 5 percent significance level. The interaction term of resource revenue and governance effectiveness suggests the same as the other interaction term, it is negative and lacks significance. The impact of GDP per capita on material wellbeing shows a strong positive and significant trend on the 1 percent significance level. These results indicate that resource revenue does not have a clear impact on material wellbeing, which can then not explain the resource curse theory. However, the RGI score shows a steady positive trend which suggests that stronger resource management has a positive impact on material wellbeing.

TABLE 3
Relationship Between Material Wellbeing and Resource Revenue

	Dependent variable is Material Wellbeing, *ln* Consumption per capita (2011 $ PPP)				
	(1)	(2)	(3)	Low income	Low-middle income
Resource Revenue	-0.148	0.926	1.379	13.54	0.891
	(0.704)	(1.453)	(1.330)	(10.08)	(3.631)
RGI score	0.00846	0.0167		0.00512	0.0425***
	(0.00854)	(0.0145)		(0.00705)	(0.00736)
Resource Revenue x RGI score		-0.0111		-0.451	-0.00200
		(0.0356)		(0.293)	(0.0781)
Government effectiveness			-0.0973**		
			(0.0436)		
Resource Revenue x Government effectiveness			-0.205		
			(0.201)		
ln GDP per capita	0.490***		0.389***	0.429**	0.542*
	(0.0770)		(0.0711)	(0.207)	(0.313)
Constant	0.249	3.969***	2.035***	1.054	-1.609
	(0.578)	(0.591)	(0.706)	(1.532)	(2.557)
Annual Effect	Yes	Yes	Yes	Yes	Yes
Regional Effect	Yes	Yes	Yes	Yes	Yes
Observations	78	78	89	28	37
R-squared	0.837	0.404	0.837	0.811	0.881
Number of Countries	22	22	27	11	8

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Because of the low observations and lack of consistency the relationship between resource abundance and material wellbeing was investigated further with the measurement of mineral

rents. Table 4 shows the relationship between material wellbeing and mineral rent and has replicated the structure of table 3 but substitutes the measurement resource revenues with the measure mineral rents. The low-income countries included in this relationship are: Burkina Faso, Ethiopia, Guinea, Liberia, Madagascar, Mali, Mozambique, Niger, Sierra Leone, Chad, Tanzania, and Uganda. The low-middle income countries are: Côte d'Ivoire, Cameroon, the Republic of Congo, Ghana, Nigeria, Sudan, Tunisia, and Zambia. The coefficient of Mineral rent shows a steady, negative and significant effect on material wellbeing. The RGI score mostly shows a positive effect on material wellbeing, especially in the low-middle income countries where the coefficient shows significance on a 1 percent level. Meanwhile, the interaction term of mineral rent and RGI score is positive and significant on the 1 percent significance level. This indicates that the joint effect of mineral rent and RGI score has a positive effect on material wellbeing while as stated above, the sole effect of mineral rent on material wellbeing is negative. Government effectiveness continues to show a negative but significant effect on material wellbeing, as observed in table 3. The interaction term of mineral rent and government effectiveness portrays a different story than the interaction term of mineral rent and RGI score. It shows a negative effect, though not significant. GDP per capita shows a continued positive effect on material wellbeing seen from its positive and highly significant coefficient.

TABLE 4
Relationship Between Material Wellbeing and Mineral Rent

	Dependent variable is Material Wellbeing, *ln* Consumption per capita (2011 $ PPP)				
	(1)	(2)	(3)	Low income	Low-middle income
Mineral Rent	-0.0282**	-0.212***	0.0274	-0.178***	-0.278
	(0.0128)	(0.0492)	(0.0685)	(0.0565)	(0.172)
RGI score	0.00582	0.00352		-0.0103	0.0235***
	(0.00773)	(0.0107)		(0.0106)	(0.00858)
Mineral Rent x RGI score		0.00387***		0.00353**	0.00485
		(0.00111)		(0.00139)	(0.00339)
Government effectiveness			-0.0574**		
			(0.0272)		
Mineral Rent x Government effectiveness			-0.00447		
			(0.00917)		
ln GDP per capita	0.469***		0.434***	0.453**	0.361
	(0.0705)		(0.0520)	(0.201)	(0.238)
Constant	0.533	4.498***	1.421***	1.368	0.695
	(0.606)	(0.473)	(0.539)	(1.614)	(2.190)
Annual Effect	Yes	Yes	Yes	Yes	Yes
Regional Effect	Yes	Yes	Yes	Yes	Yes
Observations	123	123	213	58	50
R-squared	0.825	0.469	0.759	0.401	0.856
Number of Countries	25	25	44	12	9

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results of table 4 suggest that when there is an increase in mineral rent, material wellbeing falls. These findings are consistent with the reasoning of the resource curse theory and are similar to the findings of Sharma and Pal (2021). Contrary to more recent findings on the resource curse and its relationship to institutions, government effectiveness has a continuous negative impact on material wellbeing. The measure of government effectiveness is a measure of the performance of policy and policy formulation and the quality of public services. The effect of its coefficient is contrary to what the literature suggests, as this is linked to institutional quality and should thereby increase the generation of mineral rents. This result could be an indication of increased government effectiveness and what they focus on is not improving material wellbeing. However, the RGI score tells this story more effectively where it shows that better resource management is associated with increased material wellbeing. Evidently, mineral rent joint with the RGI score is associated with increased material wellbeing. This points to the literature that suggests that the resource curse can be overcome through effective institutions (Hermele & Gregow, 2011; Lundgren, Thomas & York, 2013).

To see if resource abundance affects the amount of taxes a country collects the relationship between tax share and mineral rent was estimated. The results are reported in Table 5 where the structure of the table is as follows: the first column reports the base model, the second column reports the augmented model which includes an interaction term as well, the model in the third column is included for the sake of checking robustness where more control variables are included and governance effectiveness is included instead of the RGI score, the fourth column estimates the impact on low-income countries, and the fifth column does the same but for lower-middle-income countries. The coefficient of mineral rent shows an overall negative effect on tax share, but not significant. The RGI score on the other hand shows a significant and positive trend. These two results are consistent with the literature on resource curse theory as mineral abundance is likely to affect the general fiscal capacity of governments negatively. The higher RGI score indicates stronger governance which then also reflects a stronger ability to collect taxes. The interaction term of mineral rent and the RGI score shows an inconsistent trend with a lack of statistical significance. Government effectiveness has a negative but insignificant effect on tax share. The interaction term of mineral rent and government effectiveness shows a positive effect on tax share, though insignificant. The trend of the coefficient of GDP per capita shows to be positive, indicating that GDP per capita is associated with an increase in tax share. Conflict intensity shows a negative and insignificant effect on tax share. This can be explained through the decreased ability to collect taxes when there is an ongoing conflict or has recently

been one.

TABLE 5
Relationship Between Tax Share and Mineral Rent

	Dependent variable is Tax Share (% of GDP)				
	(1)	(2)	(3)	Low income	Low-middle income
Mineral Rent	-0.0691	0.183	-0.975	-0.243	-6.736
	(0.223)	(0.885)	(0.861)	(0.662)	(5.369)
RGI score	0.225**	0.224**		0.0499	0.164
	(0.101)	(0.0973)		(0.0571)	(0.332)
Mineral Rent x RGI score		-0.00529		0.00945	0.121
		(0.0193)		(0.0171)	(0.105)
Government effectiveness			-0.288		
			(0.484)		
Mineral Rent x Government effectiveness			0.135		
			(0.120)		
ln GDP per capita	0.00501		0.507	1.321	19.18
	(1.452)		(1.361)	(2.234)	(12.18)
Conflict Intensity			-0.239		
			(0.163)		
Constant	5.630	5.781	11.11	-4.375	-147.3
	(13.25)	(4.225)	(12.59)	(16.38)	(106.4)
Annual Effect	Yes	Yes	Yes	Yes	Yes
Regional Effect	Yes	Yes	Yes	Yes	Yes
Observations	127	128	212	58	49
R-squared	0.411	0.415	0.397	0.595	0.595
Number of Countries	27	27	45	12	10

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The types of natural resources a country possess matter for their development. Certain natural resources are more prone to cause problems due to economic and technical reasons, such as rent-seeking and conflicts. Precious metals have a generally larger effect on the economy, both positive and negative. The quality of institutions matters and can counter these issues (Boschini, Pettersson & Roine, 2007). Table 6 distinguishes between the effect of minerals and oil and gas where the first two columns show the relationship to material wellbeing and the second two show the relationship to tax shares. These regressions also include more control variables, such as corruption. The variable resource revenue is used as a proxy for resource abundance since it captures oil and gas as well, which mineral rent does not do.

In the first two columns of table 6, resource revenue has a positive effect on 'material wellbeing' when controlling for minerals but not through oil and gas, though not statistically significant. Again, this points to no significant relationship between material wellbeing and resource revenue. Government effectiveness shows a negative effect on material wellbeing in both mineral abundant countries and oil and gas abundant ones, though only significant in mineral abundant ones. Corruption has a positive effect on material wellbeing in mineral abundant countries but a negative effect on oil and gas abundant ones. Both, coefficients being

statistically insignificant. Conflict intensity is negatively associated with material wellbeing when minerals are controlled for but a positive relationship when oil and gas are controlled for, the former coefficient being significant on a 1 percent significance level. This implies that a higher intensity of conflict is associated with lower levels of material wellbeing in mineral abundant countries. This also points to the findings of Boschini, Pettersson and Roine (2007) who argue that minerals are more prone to be related to problems and conflicts than other natural resources.

TABLE 6
The effect of Minerals vs. Oil & Gas

	Dependent Variable			
	Material Wellbeing		Tax Share	
	Mineral	Oil & gas	Mineral	Oil & gas
Resource Revenue	0.233	-0.506	-3.097	11.38
	(0.284)	(0.716)	(13.21)	(26.44)
Government Effectiveness	-0.193***	-0.0216	0.323	-7.270*
	(0.0667)	(0.167)	(1.433)	(3.769)
Corruption	0.0780	-0.144	-0.539	3.111
	(0.0560)	(0.0990)	(0.835)	(2.222)
Conflict intensity	-0.0262***	0.0366	0.487	0.582*
	(0.00982)	(0.0255)	(0.303)	(0.336)
ln GDP per capita	0.542***	0.469***	3.786	-0.431
	(0.0845)	(0.0905)	(2.432)	(2.672)
Constant	0.465	1.925*	-20.45	42.34
	(1.013)	(1.070)	(25.70)	(32.06)
Annual Effect	Yes	Yes	Yes	Yes
Regional Effect	Yes	Yes	Yes	Yes
Observations	45	50	44	55
R-squared	0.961	0.809	0.875	0.415
Number of Countries	14	12	14	14

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The second two columns in table 6 show the results on the relationship to tax share. Resource revenue has a rather different effect on tax share depending on if mineral or oil and gas countries are considered. The coefficient is negative when controlling for minerals but positive when controlling for oil and gas. This suggests that increased resource revenues are related to a fall in tax collection when controlling for minerals but the opposite when controlling for oil and gas, though not statistically significant. The coefficients of government effectiveness show that an increase in government effectiveness leads to increased tax shares in mineral abundant countries but not in oil and gas countries, this one is significant at the 10 percent significance level. This is an expected result as the mining industry has the potentials for economic spillover which can then boost the tax shares. The negative coefficient of government effectiveness is

also relevant as oil countries tend to suffer from low fiscal capacity and oil revenues are easier to collect, of which Nigeria is a good example. Corruption is associated with a decrease in tax shares when controlling for minerals but the opposite when controlling for oil and gas, these estimates being statistically insignificant. Conflict intensity is associated with an increase in tax shares. An explanation could be that when there is more conflict the government is also in need of more income. GDP per capita is positively related to tax share when controlling for minerals but the opposite when controlling for oil and gas. This implies that increased income is associated with an increase in tax shares in mineral abundant countries but a fall in oil and gas producing countries. Moreover, the magnitude of impact does not seem to be larger for minerals as proposed by Boschini, Pettersson & Roine (2007).

5.2 Discussion

The discussion presents the general messages of the analysis and positions the findings in the existing literature of the resource curse. The study aims to investigate the relationship between material wellbeing and resource abundance. The main finding of the study is that it finds some evidence for a resource curse through a negative relationship between natural resource abundance and material wellbeing. The second aim is to measure the relationship between the overall fiscal capacity of governments and resource abundance. The study finds that the overall fiscal capacity of governments is reduced as resource abundance increases.

There is no significant relationship between material wellbeing and resource revenues but an increase in mineral rent is associated with a fall in material wellbeing. The latter relationship reflects the resource curse theory, and similar to the findings of Sharma and Pal (2021). This suggests that the resource curse theory is not only evident when investigating the general economic growth levels of resource-rich countries but it also harms other aspects of development, such as material wellbeing. Hermele and Gregow (2011) argue that the resource curse can be considered as policy failures which indicates that a higher score in the RGI should enhance material wellbeing. The joint effect of mineral rent and the RGI score has a positive effect on material wellbeing which is in line with Hermele and Gregow's (2011) point, the results show that the resource curse can be avoided with quality institutions.

The overall fiscal capacity of governments is decreased as mineral rents have a negative effect on tax shares. This is consistent with the findings of Paredes and Rivera (2017), who argue that

resource wealth tends to crowd out taxation. This is also explained by the *rentier effect* introduced by Ross (2001) which explains that the government does not feel the same need to collect taxes when they receive natural resource rents. In return, the general demand for accountability and representation is weakened. Another interesting finding is that the RGI score has a positive effect on tax share which indicates the importance of institutions and governance. A higher RGI score indicates stronger governance which then also reflects a stronger ability to collect taxes. The fact that RGI has a positive effect on tax share, is consistent with the literature which argues that well-designed fiscal regimes are key to revenue collection (Hermele & Gregow, 2011; Lundgren, Thomas & York, 2013).

The results showed some other valuable findings. Government effectiveness did not show to improve material wellbeing. This is contrary to what the general literature on institutional quality and development, in terms of resource abundance, suggests (Davis & Tilton, 2005; Hermele & Gregow, 2011). Instead, Davis and Tilton (2005) and Hermele and Gregow (2011) argue that natural resources are of advantage to the development and wellbeing of a country if the government and other institutions manage the generated wealth efficiently (Davis & Tilton, 2005). At a closer look, government effectiveness has a negative effect on material wellbeing and tax shares in oil and gas abundant countries. This is emphasized by Ross (2001), who found that oil has a detrimental effect on democracy and governance. This is also reflected in the finding that increased income leads to an increase in tax shares in mineral abundant countries but not in oil and gas abundant ones. This also links back to the importance of governance.

Boschini, Pettersson and Roine (2007) found that minerals have a larger effect on the economy, both positive and negative. This explains why higher conflict intensity is associated with lower levels of material wellbeing in mineral abundant countries.

The alternative measure used for resource abundance, resource revenue does not articulate the resource curse theory as well as the measure mineral rent does. Mineral rent supports the resource curse but not as articulate as natural resource exports to GDP has shown. The study has contributed to a more nuanced understanding of the resource curse by the use of alternative measures of resource abundance and examining their relationship to material wellbeing.

The study has several limitations, where the most evident one is the lack of data availability. Most research conducted on the existence of a resource curse has been done on a global sample, which has increased the available data. As this study is limited to the region of Africa data

becomes significantly more scarce. This also means that fewer variables can be controlled for. Limitations are also spotted in the scope of the variables included in the analysis. The outcome variable, material wellbeing, is limited as it only captures consumption, even though this is an indicator of many other aspects of material wellbeing. There are also other dimensions of wellbeing that could be considered in future research, such as relational wellbeing and subjectional wellbeing. The variables of interest, mineral rent and resource revenue are limited in different aspects. Mineral rent covered most African countries over a large period but did not include diamonds in its measurement. Diamonds are a common natural resource that some African countries are endowed with, especially Botswana. As seen in appendix C, Botswana does not follow the general trend in Africa and therefore this limitation does not bias the general results of the study to a large extent. The variable resource revenue has a broader measurement and includes revenues from all natural resources but it only has data for 30 African countries. This limits the results from being generalizable to the whole region of Africa. The independent variable, the RGI score, is a very detailed measure of how well natural resources are governed by governments. The data on the RGI score only covered 31 African countries, if it would have included more the results would have been more robust and more control variables could have been added. Various indicators of quality of life were retrieved from the AfDB Socio Economic Database, but due to the unbalanced data coverage, they were excluded from the models in the end. These would have been valuable as control variables since they are likely to have an impact on material wellbeing.

As a result of the spotted shortcomings and findings of this study considerations for future research have arisen. In general, as more data becomes available the relationship between resource abundance and material wellbeing in Africa could be investigated further. This could also facilitate a cross-regional study. With the availability of more data more variables of relevance could be included. To extend the scope of analysis even further indicators of relational and subjective wellbeing could be included to get a more comprehensive understanding of how resource abundance affects wellbeing. More variables could also be included as the already existing literature on the resource curse have suggested there are other variables that are of importance to evaluate its impact on wellbeing and development. Some variables, such as education and life expectancy, was not included due to a lack of available data. This would also enable a panel data study that compares regions to investigate if the resource curse is articulated differently in Africa than in other regions. The findings of resource abundance having an impact on material wellbeing also provide incentives for more in-depth

qualitative case studies of the resource curse. Investigating the impacts of resource extraction on the general wellbeing of mining communities would facilitate a deeper understanding of how the resource curse is expressed on a local, or national level.

In summary, the main findings of the analysis are threefold; an increase in mineral rent is associated with a decrease in material wellbeing, and an increase in mineral rent is associated with a fall in tax shares. Hence, this points to the existence of a resource curse in Africa. The joint effect of resource abundance and quality of governance has a positive impact on material wellbeing. This points to that the resource curse can be overcome with good resource management and policies. The results also support the notion that the effect the resource has on the economy also depends on its kind. Consequently, the practical implication of the result is to incentivize policymakers to consider what resources they are endowed with and how they are managed.

6 Conclusion

The poor economic performance in Africa coupled with its high endowment in natural resources makes opens up for discussion on the natural resource curse. The research has presented a variety of findings on the resource curse which points to that the debate is not settled. Most studies on the resource curse have investigated the relationship between economic growth and resource dependence. To capture the effect of resource abundance measures of resource wealth has been employed instead. As the resource curse is argued to have a negative impact on development in general the main aim of the study was to create a deeper understanding of the resource curse and how resource abundance impacts material wellbeing in Africa. To facilitate that a second aim was to see if resource endowed countries perform poorly on overall revenue mobilization. This analysis was conducted through the use of panel data with the use of a random effects model. This allowed for both material wellbeing and resource abundance to vary over time and between countries to estimate their relationship.

The main findings of the thesis support the existence of a resource curse in Africa through various aspects. The study finds a negative relationship between resource abundance and material wellbeing as minerals rents showed to have a negative effect on material wellbeing. It also finds evidence for a negative relationship between resource abundance and taxation through the negative relationship between mineral rent and tax shares. The joint effect of resource abundance and quality of governance showed to have a positive impact on material wellbeing. This justifies the importance of good resource management and policies and that they can be used to avoid the resource curse. These findings show that the resource curse is not only evident in terms of the impact of resource abundance on economic growth, but also on other indicators of development, such as material wellbeing.

The results also support the notion that the effect the resource has on the economy also depends on its kind. Oil and Gas abundant countries showed stronger negative effects on material wellbeing and taxation, as discovered by Ross (2001). Consequently, the practical implication of this result is to incentivize policymakers to consider what resources they are endowed with and how they are managed.

The findings support the resource curse but they also open up for discussion on how the curse can be evident on multiple levels of societies. The resource curse is evident, however, the scope of it still needs to be settled.

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Appendix A

Countries included in the sample: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo. Dem. Rep., Congo. Rep., Cote d'Ivoire, Djibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia. The, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe.

TABLE 7
Regional Categorization in Africa

North	South	West	East	Central
Algeria	Botswana	Benin	Burundi	Angola
Egypt	Lesotho	Burkina Faso	Comoros	Central African Republic
Libya	Mozambique	Cote d'Ivoire	Djibouti	Cameroon
Morocco	Malawi	Gambia. The	Ethiopia	Congo. Rep.
Tunisia	Namibia	Cabo Verde	Kenya	Gabon
	Eswatini	Ghana	Madagascar	Equatorial Guinea
	South Africa	Guinea	Mauritius	Sao Tome and Principe
	Zambia	Guinea-Bissau	Rwanda	Chad
	Botswana	Liberia	Sudan	
		Mali	Seychelles	
		Mauritania	Tanzania	
		Niger	Uganda	
		Nigeria		
		Senegal		
		Sierra Leone		
		Togo		

TABLE 8
Income Groups

Low income	Low-middle income	High-middle income	High-income
Burundi	Angola	Botswana	Seychelles
Benin	Cote d'Ivoire	Algeria	
Burkina Faso	Cameroon	Gabon	
Central African Republic	Congo. Rep.	Equatorial Guinea	
Ethiopia	Comoros	Libya	
Guinea	Cabo Verde	Mauritius	
Gambia. The	Djibouti	Namibia	
Guinea-Bissau	Egypt	South Africa	
Liberia	Ghana		
Madagascar	Kenya		
Mali	Lesotho		
Mozambique	Morocco		
Malawi	Mauritania		
Niger	Nigeria		
Rwanda	Sudan		
Sierra Leone	Senegal		
Somalia	Sao Tome and Principe		
Chad	Eswatini		
Togo	Tunisia		
Tanzania	Zambia		
Uganda	Zimbabwe		

Appendix B

TABLE 9
Hausman Specification Test Results

Outcome variable	Chi-square	P-value	Result
Material Wellbeing (ln)			
Mineral Rent	.846	.974	Accept H0, RE model is consistent and efficient.
Resource Revenue	2.397	.663	Accept H0, RE model is consistent and efficient.
Tax share	6.578	.254	Accept H0, RE model is consistent and efficient.

Appendix C

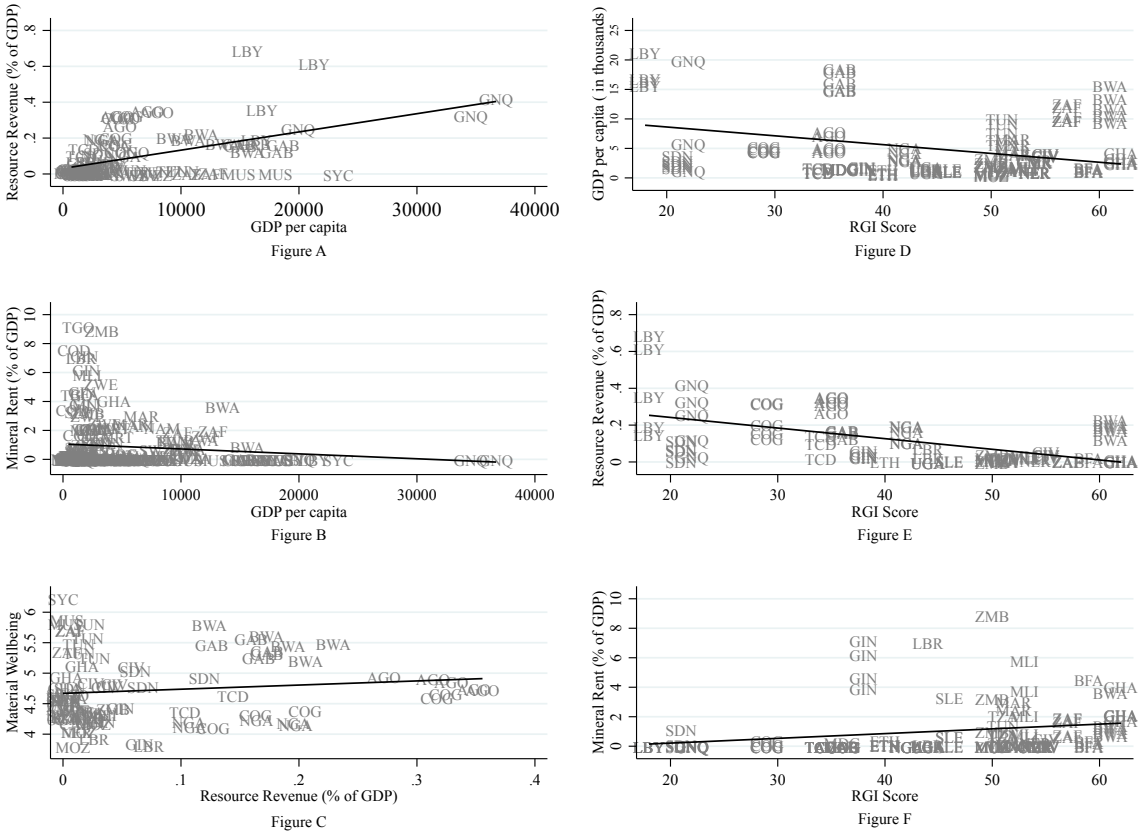

Figure 1A-F. Compilation of various relationships between indicators

Source: Author's computation