The Effects of Zambia's Economic Growth on Mineral Rent After Economic Liberalization
(Paper ID: CFP/1570/2020)

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ABSTRACT

Objective: The objective of this paper was to ascertain the effects of Zambia's economic growth on mineral rent after the economic liberalization. The research takes a different approach from most researchers who have researched about how the mineral rent affect growth in an economy. This undertaking is the other way around of investigating how growth affects the mineral rent concept in Zambia after the economic liberalization.

The nation Zambia is notable in the region for its social and political stability. Governments since 1991 have enacted comprehensive market liberalization policies. Zambia attained economic liberalization only after the 1996.

A research was conducted to ascertain if Zambia's economy growth after the economic liberalization has effects on the mineral-rent. Secondary data from the World Bank data site from 1996 and 2015 was used to conduct the following tests below using Gratl (statistical data software) were mineral rent was used as a dependent variable.

- ❖ *Dickey Fuller and Augmented Dickey-Fuller Test: to trend of stationarity of series.*
- ❖ *Unit Root Tests: stationarity of series*
- ❖ *Co-integration test: the relationship between variables*
- ❖ *Causality text granger test; the causal relationship between variables*

Finding: The result of ARDL F-statistic bounds tests conclusively revealed lack of existence of co-integrating relationship between variables under consideration namely Mineral rent and economic growth. Accordingly, the study proceeds to estimate the regression model and causality test to verify the existence of short and the long run relationships. Expectedly, the results show that economic growth has a positive and significant long run influence on mineral rent. This result is consistent with the voluminous number of previous studies arguing that economic growth presence spurs mineral rent in developing countries. In the same vein, it challenges the findings brought by a strand of well-established studies rejecting the granger causality of economic growth to mineral rent. Interestingly, the results also show that the growth elasticity of mineral rent is positive in Zambia.

As predicted, improvement in growth, is found to be positively and significantly related to mineral rent. In addition, the results show that economic

growth has long run significant impact on mineral rent. This finding agrees with the new classical growth theory which argues that the contribution of economic growth can be only hold in the short run. With respect to the short run impact of economic growth, the results reveal that growth does not granger cause mineral rent, meaning that growth resources need a maturation period in order to offer its desirable benefits to Zambia mineral rents.

Policy implications: The results obtained by this study have a number of policy implications for both Zambia and other developing countries. Firstly, Zambia as one of the highly natural resource endowed and dependent countries needs to lighten its reliance on mineral reliance as a key promoter for economic growth as indicated by the causality test results. This is because the dependence on such unguaranteed resources has severe negative consequences on the future economic performance of the country. There is need for institutional development for the country to realize much impact in terms of economic growth on the natural endowed resource. Though the country counts on the natural resource for its growth, it is important that policies should be put in place to aid institutional development otherwise the economy may be natural resource cursed country. Zambia would do well to diversify the economy as even the performance of the natural resource counts on the growth of the economy as whole. To realize sustainable development, it is essential that natural resource export policy should be reconsidered. Otherwise there is no co-integration between mineral rent and economic growth in Zambia.

1.0 CHAPTER ONE   BACKGROUND

1.1 INTRODUCTION

Zambia has been a republic since independence from the United Kingdom in 1964 on the 24th of October. It is landlocked nation and shares borders with eight countries namely Tanzania, Democratic republic of Congo, Angola, Namibia, Botswana, Zimbabwe, Mozambique and Malawi. Lusaka is the capital and the other main cities are Ndola and Kitwe in the Copperbelt, and Livingstone in the Southern Province. Copper wealth has made Zambia one of Africa's most highly urbanized countries. Multi-party parliamentary democracy has been in practice since 1991 taking over from the one-party state introduced in 1972, with the legislature consisting of a 150-member National Assembly. The President is elected through direct vote. The country obtains 65% of its export earnings from mining, mainly copper and cobalt. The country is notable in the region for its social and political stability. Governments since 1991 have enacted comprehensive market liberalization policies. Zambia has many attributes to attract foreign direct investment (FDI). It is a mining economy with decades of experience in mining-related activities. The quality of its mineral resources is equivalent, if not better, then those found in many successful mining economies. Recent export trends, mainly spearheaded by FDI, also demonstrate the great potential and scope that exist in Zambia for deepening investment in non-traditional export sectors such as vegetables and flowers and non-copper mining. The prospects for investment in higher value-added activities in mining, services and agriculture are also immense. Zambia has also underutilized rural resources, including unspoiled wilderness areas for tourism, which, if properly exploited, could help attract considerable amounts of FDI. Export potential is also enhanced by regional trading arrangements and privileged market access opportunities granted by developed countries.

For a considerable number of mineral-rich Countries around the world, mineral wealth has provided an opportunity for sustainable development as stated by Page (2008). The opportunity stems from the fact that minerals are a natural capital base that can generate rent, stimulate economic growth and raise the living standards of citizens through appropriate policy choices according to Tilton (2005). when it comes to policy options will depend on a country's stage of development and the economic drawbacks it faces as stated by Venables & Van der Ploeg, (2009). For countries that aspire to utilise rent for development, rent is not automatic. It should be recovered through taxes, failing which, it will accrue as 'windfall' profits to mining companies according to Centre for Applied Research & Department of Environmental Affairs, (2007). Generated rent should then be invested in alternative activities that can provide sources of income and employment according to Abouchakra. et. al., (2008). One efficient channel of converting mineral rent into permanent income in the future is to boost the private sector for economic diversification as stated by Page (2008). That way, in the absence of minerals, or side by side with the mineral industry, a diversified economy will ensure positive economic activity. The principle of re-investing mineral rent into permanent sources of income is known as Hartwick's rule according to Hartwick, (1977).

It is not difficult to see why economic diversification is popular; a diverse economy based on a wide array of profitable sectors and export commodities is self-sustaining according to Page (2008). It is widely held that it reduces the economic volatility associated with any particular industry as the risk is spread evenly among a variety of sectors. In the event that one sector is performing badly, other sectors will ensure that the economy continues to grow on a healthy path by providing opportunities for new technology,

revenue and employment as stated by Abouchakra. et al (2008).

While economic diversification through the use of mineral rent is promoted, it has been evident that the dynamics involved can present challenges to this development path. Challenges are evidenced by the fact that most mineral producing countries are almost totally dependent on minerals for revenue. For over 20 countries around the world, mineral exports account for about three quarters of export earnings according to Collier & Venables, (2009). The devaluing factor for mineral dependence is that they are limited in the context of time and location. Their exhaustible nature results in the industry's inability to retain a steady rate of production according to Hotelling (1931) and Chatterjee (1993). Consequently, mineral rent and the mineral industry related economic activities will seize to exist once minerals run out. This calls for the urgency of economic growth to make the exploitation of minerals economically sustainable, as they themselves are not biologically sustainable according to Van Rensburg & Bambric (1978).

Copper has long been the country's primary export and the health of the Zambian economy as a whole is considered to rest largely on the state of the copper market. Yet, the fortunes of the copper mining industry have not necessarily correlated with the prosperity of Zambians and even the surge in the copper price seen during the mid-2000s, and its relatively fast recovery after the global financial crisis of 2008, have not seen a decline in poverty levels, which remain extremely high. About 85% of people in rural areas and 34% in urban districts live below the poverty line and about 64% of the total population (approx. 13.5 million) live on less than the equivalent of one dollar a day.

Located in south-central Africa, Zambia (ZMB) is a mid-sized, landlocked country with a subtropical climate. When independence was achieved from Britain in 1964, it was already a major producer

and exporter of copper and was considered a middle-income country.20 The main exports then and now are copper and cobalt, with other minerals and tobacco playing secondary roles. Unfortunately, extraction and export of Zambia's extensive natural resources have not translated into improved social or economic conditions. In fact, income levels have deteriorated to low income country status. The GDP per capita (PPP) decreased from 1,865 in 1970 to 1,299in 2009. In addition, child mortality rates remain high, poverty rates have increased Zambia is also one of Africa's biggest recipients of Chinese investment with billions of dollars invested in reinvigorating Zambia's mines, but the money has also brought new problems, with increasing tension within the local population. There are deep misgivings in the community that the nation's mineral wealth is not benefiting Zambia and an overall sense that the country does not get a fair deal with mining and tax policies "over-generous" to companies and tilted towards investors. The industry has also expressed concerns regarding privatization, changing corporate tax regimes with recent increases in royalties from 3-6%, transparency, labour laws/costs, and securing affordable and reliable power with electricity currently comprising 15% of operational costs for mining companies. The balance between resource developments, foreign investment, regulatory regimes as they apply to all investors, and community expectations, clearly remains a major issue in Zambia.

A multi-party democratic system briefly existed in Zambia from independence until 1973 when a new law established a one-party state in which other political parties were banned according to Walker and Boulanger, (2008, p. 8). During this time period the government embarked on a wide-spread program of nationalization and by the 1980s the state was in control of approximately 80 percent of economic and financial activities as stated by Kalyalya (2001, p. 3). Import substitution was a major part of industrial policy and is considered to have increased dependence on foreign technology and shifted import dependence from consumer goods to capital inputs and intermediate goods according to Woldring & Chibaye, (1984, p. 117-118). Zambia's economy was negatively impacted by the oil price increases in the 1970s and the economic recession of the 1980s Structural adjustment programs were introduced in 1989 to liberalize and privatize the economy. Fiscal policy since the 1990s has been focused on debt services rather than social services and this had a negative impact on economic growth and Zambia's ability to alleviate poverty and the HIV/AIDs epidemic (Weeks & McKinley, 2006, p. 5). Since Zambia's return to a democratic electoral process in 1991, power has been dominated by the Movement for Multiparty Democracy as stated by Walker and Boulanger, (2008, p. 7).

The Zambian economy has historically been based on the copper-mining industry. The industrialization of the copper industry is owed partly to Frederick Russell Burnham, the famous American scout who worked for Cecil Rhodes. By 1998, however, output of copper had fallen to a low of 228,000 tones, continuing a 30-year decline in output due to lack of investment, and until recently, low copper prices and uncertainty over privatization. In 2001, the first full year of a privatized industry, Zambia recorded its first year of increased productivity since 1973. The future of the copper industry in Zambia was thrown into doubt in January 2002, when investors in Zambia's largest copper mine announced their intention to withdraw their investment. However, surging copper prices from 2004 to the present day rapidly rekindled international interest in Zambia's copper sector with a new buyer found for KCCM and massive investments in expanding capacity launched. China has become a major investor in the Zambian copper industry, and in February 2007, the two countries announced the creation of a

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Chinese-Zambian economic partnership zone around the Chambishi copper mine.

Today copper mining is central to the economic prospects for Zambia and covers 85% of all the country's exports, but concerns remain that the economy is not diversified enough to cope with a collapse in international copper prices.

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Economic systems in Zambia

After independence, Zambia instituted a program of national development plans, under the direction of a National Commission for Development Planning: The Transitional Development Plan (1964–66) was followed by the First National Development Plan (1966–71). These two plans, which provided for major investment in infrastructure and manufacturing, were largely implemented and were generally successful. This was not true for subsequent plans.

A major switch in the structure of Zambia's economy came with the Mulungushi Reforms of April 1968: the government declared its intention to acquire equity holdings (usually 51% or more) in a number of key foreign-owned firms, to be controlled by a parastatal conglomerate named the Industrial Development Corporation (INDECO). By January 1970, Zambia had acquired majority holding in the Zambian operations of the two major foreign mining corporations, the Anglo-American Corporation and the Rhodesia Selection Trust (RST); the two became the Nchanga Consolidated Copper Mines (NCCM) and Roan Consolidated Mines (RCM), respectively. The Zambian government then created a new parastatal body, the Mining Development Corporation (MINDECO). The Finance and Development Corporation (FINDECO) allowed the Zambian government to gain control of insurance companies and building societies. However, foreign-owned banks (such as Barclays, Standard Chartered and Grindlays) successfully resisted takeover. In 1971, INDECO, MINDECO, and FINDECO were brought together under an omnibus parastatal, the Zambia Industrial and Mining Corporation (ZIMCO), to create one of the largest companies in sub-Saharan Africa, with the country's president, Kenneth Kaunda as Chairman of the Board. The management contracts under which day-to-day operations of the mines had been carried out by Anglo American and RST were ended in 1973. In 1982 NCCM and RCM were merged into the giant Zambia Consolidated Copper Mines Ltd (ZCCM).

Unfortunately for Kaunda and Zambia, the programs of nationalization were ill-timed. Events that were beyond their control soon wrecked the country's well-laid plans for economic and national development. In 1973 a massive increase in the price of oil was followed by a slump in copper prices in 1975, resulting in a diminution of export earnings. In 1973 the price of copper accounted for 95% of all export earnings; this halved in value on the world market in 1975. By 1976 Zambia had a balance-of-payments crisis, and rapidly became massively indebted to the International Monetary Fund (IMF). The Third National Development Plan (1978–83) had to be abandoned as crisis management replaced long-term planning. A significant part of the problems encountered by Kaunda were due to the way in which policies of nationalization or as it was more commonly known Africanization was implemented. There was a strong movement to replace managers of European ancestry with those seen to be of native African descent. While this was undoubtedly a desirable long-term goal in bringing equality to the population it repeatedly led to the over promotion of unskilled and/or inexperienced managers, engineers etc. An example of this would be Zambezi Sawmills where the senior managers were

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replaced, and the engineers fired. It quickly transpired that a year's training in managing logging of softwoods in Finland is not good preparation for logging tropical Teak and basic mechanical training does not qualify a person to maintain a 50yr old steam train used to move lumber. This was a prime example of how an understandable desire to achieve "Africanization" could be taken too far, too fast and destroy the assets being nationalized.

By the mid-1980s Zambia was one of the most indebted nations in the world, relative to its gross domestic product (GDP). The IMF was insisting that the Zambian government should introduce programs aimed at stabilizing the economy and restructuring it to reduce dependence on copper. The proposed measures included: the ending of price controls; devaluation of the kwacha (Zambia's currency); cut-backs in government expenditure; cancellation of subsidies on food and fertilizer; and increased prices for farm produce. Kaunda's removal of food subsidies caused massive increases in the prices of basic foodstuffs; the country's urbanized population rioted in protest. In desperation, Kaunda broke with the IMF in May 1987 and introduced a New Economic Recovery Programme in 1988. However, this did not help him and he eventually moved toward a new understanding with the IMF in 1989. In 1990 Kaunda was forced to make a major policy volteface: he announced the intention to partially privatize the parastatals. Time, however, was running out for him. Like many African independence leaders Kaunda tried to hang on to power but unlike many he called multiparty elections and lost them (to the Movement for Multiparty Democracy (MMD) and abided by the results. Kaunda left office with the inauguration of MMD leader Frederick Chiluba as president on 2 November 1991.

Zambia's Economic System of Government is Unitary because of that the Frederick

Chiluba government (1991–2001), which came to power after democratic multi-party elections in November 1991, was committed to extensive economic reform. The government privatized many state industries and maintained positive real interest rates. Exchange controls were eliminated, and free market principles endorsed. It remains to be seen whether the Mwanawasa government will follow a similar path of implementing economic reform and undertaking further privatization. Zambia has yet to address issues such as reducing the size of the public sector, which still represents 44% of total formal employment, and improving Zambia's social sector delivery systems.

After the government privatized the giant parastatal mining company Zambian Consolidated Copper Mines (ZCCM), donors resumed balance-of-payment support. The final transfer of ZCCM's assets occurred on March 31, 2000. Although balance-of-payment payments are not the answer to Zambia's long-term debt problems, it will in the short term provide the government some breathing room to implement further economic reforms. The government has, however, spent much of its foreign exchange reserves to intervene in the exchange rate mechanism. To continue to do so, however, would jeopardize Zambia's debt relief. Zambia qualified for HIPC debt relief in 2000, contingent upon the country meeting certain performance criteria, and this should offer a long-term solution to Zambia's debt situation. In January 2003, the Zambian Government informed the International Monetary Fund and World Bank that it wished to renegotiate some of the agreed performance criteria calling for privatization of the Zambia National Commercial Bank and the national telephone and electricity utilities.

Lack of balance-of-payment support meant the Zambian government did not have resources for capital investment and periodically had to

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issue bonds or otherwise expand the money supply to try to meet its spending and debt obligations. The government continued these activities even after balance-of-payment support resumed. This has kept interest rates at levels that are too high for local business, fueled inflation, burdened the budget with domestic debt payments, while still falling short of meeting the public payroll and other needs, such as infrastructure rehabilitation. The government was forced to draw down foreign exchange reserves sharply in 1998 to meet foreign debt obligations, putting further pressure on the kwacha and inflation. Inflation held at 32% in 2000; consequently, the kwacha lost the same value against the dollar over the same period. In mid- to late 2001, Zambia's fiscal management became more conservative. As a result, 2001 year-end inflation was below 20%, its best result in decades. In 2002 inflation rose to 26.7%. However, in 2007 inflation hit 8%, the first time in 30 years that Zambia had seen single digit inflation. On January 27, 2011, it was reported by the Central Statistical Office that inflation rose to 9%.

1.2 Statement of The Problem

The challenge faced in mineral-led economic is that diversification is structural and involves inefficiencies involved in the use of mineral rent. Firms and individuals seek to increase access to mineral rent by any means possible and in the process misuse it. Unjustified acquiring of mineral rent leads to inefficiencies in markets and results in wide price dispersions according to Asfaha (2008). Unfortunately, economic diversification is often ignored, postponed or mismanaged due to the illusion brought about by temporary mineral wealth. In that regard, mineral wealth is then used to finance current consumption, as well as low return projects, instead of targeted economic initiatives as stated by Salai-i-Martin & Subramanian (2003). This occurrence reinforces the sad reality that even though the mineral industry is lucrative, in most cases it provides fewer connections to the rest of the economy according to Auty & Mikesell (1998). It's against this backdrop that this research aims.

The Zambian economy has historically been based on the copper-mining industry. The discovery of copper is owed partly to Frederick Russell Burnham, the famous American scout who worked for Cecil Rhodes. By 1998, however, output of copper had fallen to a low of 228,000 tonnes, continuing a 30-year decline in output due to lack of investment, and until recently, low copper prices and uncertainty over privatization. In 2001, the first full year of a privatized industry, Zambia recorded its first year of increased productivity since 1973. The future of the copper industry in Zambia was thrown into doubt in January 2002, when investors in Zambia's largest copper mine announced their intention to withdraw their investment. However, surging copper prices from 2004 to the present day rapidly rekindled international interest in Zambia's copper sector with a new buyer found for KCCM and massive investments in expanding capacity launched. China has become a major investor in the Zambian copper industry, and in February 2007, the two countries announced the creation of a Chinese-Zambian economic partnership zone around the Chambishi copper mine.

Today copper mining is central to the economic prospects for Zambia and covers 85% of all the country's exports, but concerns remain that the economy is not diversified enough to cope with a collapse in international copper prices.

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Zambia had one of the world's fastest growing economies for the ten years up to 2014,

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with real GDP growth averaging roughly 6.7% per annum, though growth slowed during the period 2015 to 2017, due to falling copper prices, reduced power generation, and depreciation of the kwacha according to CIA World Factbook (2019). Despite all the mining activities Zambia has not fully benefited from her mineral wealth. Chingola district which used to be the cleanest town in Zambia and also having the largest open pit mine in Africa only second to Chile's in the world and with good infrastructure development is now a ramshackle of a town. All this started happening after the economic liberalization that started during in 1996.

African nations are resource-rich with huge potential for undiscovered mineral resources, but they often remain poor, unstable and therefore suffer from the so-called 'resource-curse' disease. Institutional development has been identified as affecting the extent to which the relationship between natural resources and growth differs between Sub-Sahara Africa and the rest of the world.

The 'resource curse' phenomena in Africa exist where low levels of institutional development exist, and as institutions improve, resources turn from a 'curse' into an advantage. It is against this backdrop that this research is aimed at investigating the impact of Zambia's economy Economic growth on mineral rent after economic liberalization. This study is very important in ascertaining the effect of Growth on the mineral rent after the economic liberalization.

1.3 Research Objectives

The research is aimed at investigating the effects of Zambia's economic growth on mineral rent after economic liberalization.

1.3.1 Specific objectives

The study will be guided by the following specific objectives:

To investigate the impact of Zambia's economic growth on mineral rent

To provide an overview of Zambia's economy and development

To examine the generation and utilization of mineral rent in Zambia.

To Offer some policy recommendations to achieving economic diversification in Zambia.

1.4 Research Questions

Does the Zambia's economic growth have any effect on the mineral-rent?

Does Zambia have institutions in place to fully utilize the mineral rents concept and attain economic diversifications?

How are mineral rents utilized in Zambia?

What are the policy recommendations to achieving economic growth?

1.5 Significance of The Research

The study will help the Nation to know how much Zambia's growth affects the Mineral-rent concept, How much efforts the nation has put in place to running always from the mineral cursed nations phenomenal, Diversifications and help in regulating the usage in order to perverse some minerals for the for future generations.

1.6 limitations

Some of the limitation of this study is mainly of choice for the sources of data as this data is only available from only one source, namely the world bank data website. This information can't be accessed from the local institutions such as the central statistics office and the Bank of Zambia both on the blog and at the physical office. The other limitation is the availability of information since most researchers have researched on the relationship of how growth is affected by mineral rent but my research is based on how growth affects the mineral-rent after the economic liberalization on the Zambian case study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The purpose of this Chapter is to undertake a review of mineral rents in Zambia. It addresses a myriad of mineral economy, mineral utilization and history of Zambia's economic activities that adds up its growth domestic products.

2.1.1 Empirical theory

The are a lot of researches that different researchers have conducted in relation to mineral rent on economic growth in different countries and different results have been obtained. My take is a different approach. What differentiates my research from most of the researchers is that I have used mineral rent has the independent variable investigating how economic growth can affect it in regard to Zambia's economy. This research is aimed at finding the effects of economy growth on the mineral-rent

Empirical approaches: resource rent sharing and available sources of information is sharing of mineral resource rent between governments and investors is often criticised for being unfavourable to African governments. However, few studies put figures on this phenomenon. After a description of the two dominant methods of valuing rent, the main indicators used to assess tax systems are presented. Shafiee et al. (2009) propose a literature review of empirical studies that use these two methods, but do not address resource rent sharing. Smith (2013) proposes a review of literature focusing on the sharing of mineral resource rent and highlights the importance of modelling choices on the result.

Few empirical studies quantify the sharing of rent between investors and governments in the natural resources sector. Oil is the sector that has been studied the Blackest and Roberts, (2006); Daniel et al., 2008; Tordo, (2007), followed by gold (Brewer et al., 1989; Otto et al., 2006; inter alia). In the great majority of cases, studies are carried out on hypothetical mining projects and the authors apply different tax systems to the project (Black and Roberts, 2006; Brewer et al., 1989) or only change the base for one tax in order to determine the impact on investment indicators or the capturing of rent by the government. Special attention has been paid to different types of royalties (Otto et al., 2006; Daniel et al., 2010). It is rare for simulations to analyse the overall framework of a mining tax system for a single country. Charges and fees are often dealt with secondarily to tax instruments (Black and Roberts, 2006), which makes the calculation of resource rent sharing incomplete. The aforementioned indicators are commonly used by the authors to combine the operation of a tax with an objective of neutrality of taxation or government revenue. The discounted cash flow method combined with ad hoc sensitivity analyses is the commonest method. Few studies take into account the effects of interaction between the mining sector and the rest of the economy (Thomas, 2001). Finally, it is important to note that there has been very little analysis of the tax systems in developing countries, more specifically, in African countries.

Ramzan Mehar conducted a research on total Natural resources rent relation with Economic Growth on Pakistan and India. In his conclusion he stated that the relationship between total natural resources rent and economic growth in case of Pakistan and India has captured a mind of researchers to investigate the effect of total natural resources rent and GDP on Pakistan, and India. The purpose of this study verifies and find out effect of total natural resources rent on economy of selected two countries Pakistan and India. After that the stationary test use to check the stationary or not stationary of variables in at level, and first difference. Analysis of stationary shows all variables stationary at first difference. Co-integration test result shows that there are three co integration equations exits in Pakistan, and India.

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Then next test used Regression to check the comprehend the connection between autonomous factors and a needy variables and result shows that total natural resources rent has positive effect on Pakistan and India GDP and also demonstrate result has positive effect on Pakistan and India economy. The next test used vector correction error model (VCEM) check the significant of the data. And our data is insignificant in Pakistan and significant in India. The overall this study concluded that all the null hypotheses reject in favor of alternative hypotheses.

Ascertaining how rent is shared between governments and investors requires the capacity to calculate the net present value (NPV) that should be generated for each project. Whichever method is used, the following must be known: the annual production of the mineral, the capital costs and operating costs for each stage of the project, its lifetime, the sale price and the associated discount rate. The fact that few empirical studies have been carried out on mining projects clearly illustrates the difficulty of obtaining and processing this information. Economic data on industrial mining companies (feasibility studies, financial statements and technical reports) are available online for companies listed on stock exchanges in Canada, the USA, Australia and the United Kingdom. Data in feasibility studies (forecasts) can be compared with information held in activity reports (implementation). It may therefore be difficult, but not impossible, to create the economic part of the database.

Another study was conducted by Pamela Ormonde (2011) on The Relationship between Mineral Rents and Poverty: Evidence from Sub-Saharan Africa and South America Mineral rents are income that accrues from the extraction, production, and export of a country's natural resource base. It is widely accepted that these natural resources are the property of all the citizens of the country and therefore that these citizens also have a claim on a portion of any available mineral rents (Weber-Fahr, 2002; Cawood & Minnitt, 2002). There are a number of important stakeholders involved in mineral production including foreign and domestic firms, host governments, citizens, and indigenous peoples living on the land. Yet, countries that are dependent on income from an extensive mineral resource base confront a number of challenges when trying to promote economic and social development. The exhaustible nature of the resource combines with a highly volatile export price to increase the risk of large external shocks to the economy. These increase the difficulty for developing countries in implementing prudent, stable and transparent government policies. Mineral rents also create conflict, corruption, and possibly an inequitable distribution of resources which can be damaging to economic growth and social prosperity. This thesis discussed four main mechanisms through which the availability of mineral rents can affect poverty. These are the redistribution of resources across sectors of the economy, the distribution of rents between the domestic country with the natural resources and foreign extraction firms, the allocation of resources among citizens, and the reallocation of resources over time for precautionary saving. These mechanisms are examined within the context of six emerging economies, Botswana, Nigeria, Zambia, Bolivia, Chile, and Venezuela. These countries have extensive resource bases and a large average proportion of mineral rents to GDP. If one were only considering the existence of an extensive mineral base, large resource rents, and economic development, then Botswana is indeed a success story. Botswana has the strongest growth rate of GDP per capita among the comparison countries by far and has been able to not only mitigate the natural resource curse but to thrive. When one considers social indicators measuring the wellbeing of the overall population the picture is considerably different.

In this regard, Chile emerges as the star performer of the case-study countries. Chile has managed to combine large mineral rents and initially high levels of inequality and poverty with economic growth and improvements in socioeconomic indicators. The contribution of the main four sectors of the economy to GDP is not overly skewed and exhibits relatively low volatility in growth, and a mix of public and private involvement in the mining industry has guaranteed the country a large portion of a healthy flow of mineral rents. Inequality has been a persistent problem over the years but in recent years policies which have redistributed resources towards the poor have been implemented. Furthermore, Chile has taken advantage of strong economic growth and mineral income to comprehensively redistribute a portion of copper rents over time for precautionary saving. These factors have strongly contributed to the improved wellbeing of the most vulnerable members of society: 2009 levels of poverty, infant mortality, and low birthweight babies are the lowest of the countries and the percentage of poverty decreased by a significant 90 percent since 1986. Botswana also emerges as relatively successful in utilizing mineral rents to propel economic growth and alleviate poverty. Unfortunately, absolute levels of poverty are still quite high, and the country is plagued with persistently high inequality and unemployment. In general, government policies regarding the negotiation of a fair share of mineral rents from foreign firms and the utilization of these rents in prudent investments in the domestic economy and across time for savings have been much more successful than those attempting to diversify the economy. Moving forward, diversification away from the capital-intensive diamond industry is essential if the country hopes to reduce both unemployment and poverty in the long-run.

In starkest contrast, Zambia and Nigeria have emerged as the worst performers in this study.

Neither country has been able to utilize their considerable mineral resources and flow of rents to propel economic growth or improve living conditions for the many people who live in poverty. Poverty rates are over 80 percent and have been exacerbated by corruption, wasteful investment, and rent seeking behaviour by elite groups which seek to improve their own wellbeing over that of the broader society. Rents in Nigeria have been cycled towards military, business, and political elites to reduce ethnic conflict and maintain political control. This has increased corruption and conflict while prudent investments in human capital and infrastructure have been neglected. Rents in Zambia have also tended to favour an elite minority – although the government did attempt to provide important social services and jobs to the poor through unsuccessful statist policies. Neither country has so far effectively transferred resources across time to guard against volatile income and unforeseen contingencies. Bolivia and Venezuela have both experienced difficulties with utilizing large mineral resources to propel economic growth and social development. Venezuela has experienced the most volatile levels of poverty and has had some recent remarkable improvement.46 While not quite as dramatic, Bolivia has also experienced decreasing poverty levels over the 2000s. Both economies have a historically unstable relationship and flow of resources between themselves and foreign firms and have made recent moves towards increased control over the mining industry. This has redistributed rents towards the state and the Chavez and Morales governments have committed to policies that promote improved wellbeing of the poor. Time will tell whether these policies ensure efficiency and high resource rents for these countries.

Thapelo Tebogo Moribane (2011) also conducted a research on Utilization of Mineral Rent and the Diversified Growth of the Botswana Economy and his findings where that Botswana faces problems of

high transportation costs, a small landlocked economy, transitional constraints and declining economic returns to its mineral rent. Most of these constraints can be addressed by developing a regional trade strategy, as the regional market provides more economic and infrastructural linkages. The country should also refrain from utilising its revenue for economic diversification initiatives that are coordinated and informed. Botswana should re-define economic diversification in the context of what is feasible taking into consideration the fact that producing raw materials and finished goods involves different skills sets (Charalambides, 2010). Attention should also be paid to the market that consumes such goods as being rich in diamonds does not necessarily make the country the best jewellery maker in the world. Dimensions of jewellery consumers involve a great deal of interest on brand names. On this basis, Botswana will have to diagnostically evaluate economic diversification on what it really means for Botswana and spend less revenue on manufacturing endeavours that are doomed to fail.

Most empirical work on sources of economic growth for different countries lack country-specific empirical evidence to guide policy choices in individual developing countries and previous studies of factor productivity tend to focus on the entire economy or a single sector. This provides fewer insights about a country's structural evolution. Unlike previous studies, our study builds on this by taking a more comprehensive approach in estimating Zambia's sources of economic growth by sectors—agriculture, industry, and service—in a systematic manner that yields insights into the country's sources of structural transformation. We use recently developed growth accounting tools to explicitly determine sources of economic growth at both national and sectoral levels in Zambia between 1970 and 2013. We use data from World Development Indicators and

Zambia's Central Statistical Office. Results indicate that, on average, total factor productivity (TFP) contributes about 5.7% to economic growth. Sectoral analysis shows that agriculture contributes the least to GDP and that, within each sector, factors that contribute to growth differ. Structural transformation has been slow and contributed to the observed inefficiency. We outline the implications of the observed growth and provide recommendations.

Empirical studies have shown that economic growth rates differ among countries due to technology adoption (Romer 1986; Aghion and Howitt 1992), varying determinants of efficiency of savings and investment (World Bank 1990) and differing rates of accumulation of physical and human capital resources (Solow 1956; Mankiw et al. 1992). For least-developed countries (LDCs) in Sub-Saharan Africa (SSA), availability of natural resources, poor economic policies, access to the sea, tropical climate, volume of exports, a longer life expectancy and increased investment rates are some of the factors that drive economic growth (Sachs and Warner 1997; Upreti 2015). Though the amount of empirical papers investigating the sources of economic growth for different countries has expanded significantly, country-specific empirical evidence to guide policy choices in individual developing countries remains arcane (Chirwa and Odhiambo 2016). Policy makers and political economists in LDCs strive to tackle the enigma of slow economic growth rates (or lack of it) recorded by their economies. For example, the empirical evidence of slow economic growth rate for African economies is generally sourced from cross-country regressions, which fail to take into account of individual country diversity of experiences (Altug et al. 2008; Anyanwu 2014; Chirwa and Odhiambo 2016). Such studies could be of vast importance at regional level, but not at individual country level. In addition, little empirical work has closely examined determinants

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of economic growth for most developing countries and Zambia is no exception. For example, we are aware only of Chirwa and Odhiambo (2016) that empirically determine Zambia's macroeconomic determinants of economic growth. Their study does not reveal factor productivity of the Zambian economy or any of the broad economic sectors i.e. agriculture, industry and service. Determining factor productivity could be crucial to helping policy makers and government design evidence-based sectoral policy that requires data from both physical and social sciences. Further, previous studies of factor productivity tend to focus on the entire economy or a single sector of the economy. As Herrendorf et al. (2013) and Johnston (1970) have pointed out, a fundamental feature of growth is a decline in the agriculture sector and labor share in total value-added, an increase in the service sector in value-added and labor, while industry's share may rise or fall depending on a number of factors. Thus, this study aims to take a more comprehensive approach by estimating Zambia's sources of economic growth by sectors—agriculture, industry, and service—in a systematic manner that yields insights into the country's sources of structural transformation. Our integrated approach to measuring factor productivity provides insights into the sources of structural transformation not otherwise obtainable from just an economy-wide or a single sector approach. We do so by employing a sectoral analysis mainly separated into two time periods—before the structural adjustment programs (1970–1991) and post-reforms (1992–2013). This distinction allows us to capture underlying differences in sectoral contributions to economic growth, which is extremely important as pre- and post-reform periods have had important implications on Zambia's economic growth (Ndulo and Mudenda 2010). Zambia is an LDC located in SSA and agriculture is the mainstay of about 70% of the population (United Nations Development Programme 2015). Approximately the same

fraction of people whose primary economic activity is agriculture live in the rural areas and about 77% of them are poor (Central Statistical Office 2016). Agriculture, further, contributes, on average, about 18% to GDP. For the industry sector, it has varied in magnitude since Zambia's independence in 1964. Ndulo and Mudenda (2010) showed that industry sector contributed 6% to Gross Domestic Product (GDP) but its contribution rose significantly between 1964 and 1975. Its contribution to the share of exports is mainly concentrated in total non-traditional exports though it was quite volatile over the years (Ndulo and Mudenda 2010). The service sector is Zambia's largest formal employment sector and its growth between 1965 and 2002 stood at 3% per annum and strong performance in the tourism, transport, and telecommunications sectors have contributed to the continued rise in the services sector (Central Statistical Office 2016). Taken together, these facts briefly reflect the importance of the three sectors to Zambia's economy. The achievement of the Zambian government's goal of food security and efficiency in both industry and service sectors may have to rely on improved productivity in all three sectors. It follows that measurement and therefore a comparison of TFP in all the sectors is crucial for providing insightful answers to questions such as where has resource efficiency been concentrated among agriculture, industry, and the service-producing sectors? To the best of our knowledge, no empirical studies exist that provide TFP estimates in both industry and services sectors for Zambia, perhaps due in part to unavailability or considerable doubt of the how reliable existing data are. Some researchers have recently made considerable efforts to estimating productive efficiency in agriculture but none of them have explicitly incorporated estimates of agricultural TFP in Zambia. They have instead used partial measures such as technical efficiency in crop production in a selected region in Zambia.

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Though these measures are useful for providing sub-sectoral perspectives, they do not provide a broad outlook of general productivity growth of the agricultural sector. Thus, the second objective of this study is to determine the sources of growth within each sector. Unlike some studies that consider only capital and labor, we include land in our analysis, which is a key resource for agriculture's sectoral growth. Our major contribution is the use of economic theory to guide estimation of sectoral resource stocks using secondary data sources, which in turn allows estimation of TFP. Unlike previous studies, this study mainly uses the recently developed growth accounting methods by Roe et al. (2014) to estimate total factor productivity underpinned by neoclassical growth theory. We use Roe et al. (2014)'s methodology because it facilitates the use of more easily available time series data than reliance on micro-level data that is seldom available across sectors of the economy. In the following sections, we first present a brief background of the three sectors, the methodology and the data sources. We proceed to the results and discussion section and then the last section highlights the conclusions and policy implications.

Overview of Zambia's mining sector

Zambia, like many African countries, is richly endowed with vast amount of mineral resources. It is the second largest producer of copper in Africa after the Democratic Republic of the Congo (DRC) as stated in Copper investing news (2015). Significant deposits of iron, coal and gold also exist within its geographical confines. In addition, a number of industrial minerals, including talc, limestone and gravel sands are produced in commercial quantities. Zambia's endowment of mineral resources can be attributed to its unique geographical positioning. Although Zambia has a wide range of mineral deposits, the mineral sector has been dominated by copper mining which has dwarfed the exploitation of other mineral resources. The copper resource is traditionally hosted in the Neoproterozoic rocks of the Katanga region, some amount of this resource has also been found in the thrust zone of North Western Zambia.

Zambia is Africa's largest producer of Copper and Cobalt. Although copper production was affected by low copper prices in the late 1990s, Copper production has been increased since 2000. It increased to 572,793 tunes in 2007 from a low of 256,884 tons in 2000, representing an increase of over 100%. The rise in copper production over the years is attributed to investment in rehabilitation of infrastructure and technological innovations in existing mines, the coming on board of new mines and the increase in existing mines, the coming on board of new mines and the increase in small-scale copper mining activities. Copper production has been increasing over the recent past from 575,000 metric tons in 2008 to 665,000 metric tons in 2009 and to about 700,000 metric tons in 2010. This has been due to increased capacity utilisation facilitated by the continued increase in metal prices on the international markets.

The Zambia Development Agency Act provides for incentives for companies investing substantial amounts in the mining sector in the country. The Act provides for the investment thresholds that investors have to meet in order to qualify for fiscal and non-fiscal incentives. Currently the threshold is; investments of US$ 500,000 and above qualify for the incentives.

The general investment incentives applicable to the mining sector are;

- Guaranteed input tax claim for five years on pre-production expenditure for exploration companies in the mining sector.
- Any mining company holding a large-scale mining license carrying on the mining of base metals is taxed at 30%. Other mining companies are taxed at 35%

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- Dividend paid by a mining company holding a large-scale mining license and carrying on the mining of base metals is taxed at 0%
- Income earned by companies in the first year of listing on the Lusaka stock exchange qualifies for a 2% discount on the applicable company tax rate, however companies with more than 1/3 of their shareholding in the hands of Zambians qualify for a 7% discount
- Duty free importation of most capital equipment for the mining sectors.
- 100% mining deduction on capital expenditure on buildings, railway lines, equipment, shaft sinking or any similar works.

The debt to equity ratio reduced from 2:1 to 3:1 to encourage further investment in the sector

Copper has long been the country's primary export and the health of the Zambian economy as a whole is considered to rest largely on the state of the copper market. Yet, the fortunes of the copper mining industry have not necessarily correlated with the prosperity of Zambians and even the surge in the copper price seen during the mid-2000s, and its relatively fast recovery after the global financial crisis of 2008, have not seen a decline in poverty levels, which remain extremely high. About 85% of people in rural areas and 34% in urban districts live below the poverty line and about 64% of the total population (approx. 13.5 million) live on less than the equivalent of one dollar a day4.

Located in south-central Africa, Zambia (ZMB) is a mid-sized, landlocked country with a subtropical climate. When independence was achieved from Britain in 1964, it was already a major

producer and exporter of copper and was considered a middle-income country.20 The main exports then and now are copper and cobalt, with other minerals and tobacco playing secondary roles. Unfortunately, extraction and export of Zambia's extensive natural resources have not

translated into improved social or economic conditions. In fact, income levels have deteriorated to low income country status. The GDP per capita (PPP) decreased from 1,865 in 1970 to 1,299 cin 2009. In addition, child mortality rates remain high, poverty rates have increased

Zambia is also one of Africa's biggest recipients of Chinese investment with billions of dollars invested in reinvigorating Zambia's mines, but the money has also brought new problems, with increasing tension within the local population. There are deep misgivings in the community that the nation's mineral wealth is not benefiting Zambia and an overall sense that the country does not get a fair deal with mining and tax policies "over-generous" to companies and tilted towards investors. The industry has also expressed concerns regarding privatization, changing corporate tax regimes with recent increases in royalties from 3-6%, transparency, labour laws/costs, and securing affordable and reliable power with electricity currently comprising 15% of operational costs for mining companies. The balance between resource developments, foreign investment, regulatory regimes as they apply to all investors, and community expectations, clearly remains a major issue in Zambia. A multi-party democratic system briefly existed in Zambia from independence until 1973 when a new law established a one-party state in which other political parties were banned as stated by Walker and Boulanger (2008, p. 8). During this time period the government embarked on a wide-spread program of nationalization and by the 1980s the state was in control of approximately 80 percent of economic and financial activities according to Kalyalya, (2001, p. 3). Import substitution was a major part of industrial policy and is considered to have increased dependence on foreign technology and shifted import dependence from consumer goods to capital inputs and intermediate goods according to Woldring &Chibaye, (1984, p. 117-118). Zambia's economy

was negatively impacted by the oil price increases in the 1970s and the economic recession of the 1980s Structural adjustment programs were introduced in 1989 to liberalize and privatize the economy. Fiscal policy since the 1990s has been focused on debt services rather than social services and this had a negative impact on economic growth and Zambia's ability to alleviate poverty and the HIV/AIDs epidemic (Weeks & McKinley, 2006, p. 5). Since Zambia's return to a democratic electoral process in 1991, power has been dominated by the Movement for Multiparty Democracy according to Walker and Boulanger, (2008, p. 7).

According to Mining sector key to economy (July 10,2018) ZAMBIA has a history of mining and has a large known resource base of copper, emeralds and other mineral deposits. The country also has a good potential for further discoveries. Mining accounts for 12 percent of the gross domestic product (GDP), which is a monetary measure of the market value of all final goods and services produced in a period [quarterly or yearly] of time while total export value stood at 70 percent in May. Latest data from Central Statistical Office (CSO) shows that in the traditional export earnings increased by 42.6 percent from about K5.13 billion in April 2018 to over K7.30 billion in May 2018. The share of traditional exports recorded an average of 77.2 percent in revenue earnings between May 2018 and April 2018. During the period under review, the volume of copper exports decreased by 0.7 percentage point from 80,081.2 metric tons in April 2018 to 79,514.6 metric tons in May 2018. Currently, copper prices on the London Metal Exchange (LME), is trading at almost US$7,000 per ton. The mining sector is also a significant source of government revenue and formal employment, both directly and indirectly. Therefore, it is important to continue to attract investment in the sector for the country's growth, particularly because it constitutes 62 percent of foreign direct investment. One such effort is the

recently held 8th Zambia International Mining and Energy Conference and Exhibition (ZIMEC), where stakeholders, including investors, government agencies and civil society organisations, have continued to meet to find ways of making the minerals fully contribute in revenue and the national industrial agenda. While, the mining sector players understand Government's drive of industrialisation, Chibuluma Mines chairman Jackson Sikamo warned the new focus on value-addition must be built on the firm foundation of a growing the extractive sector. Mr Sikamo, who is also the country manager, wants Government to put in place attractive investment policies to encourage the kind of high-cost, high-risk exploration programmes, which eventually lead to greenfield mining ventures. "In the absence of a pipeline of exploration programmes, our production at some point will start tapering off," he said in his contribution to the theme: Invest in Zambia – Generating Value, Diversity and Growth through Collaboration. Undoubtedly, when mining investment declines, it is not just the mining sector that is affected but also the entire economy.

In his address during the gathering, First Quantum Minerals (FQM) head of government affairs John Gladston advised Zambia to strive to remain competitive while maintaining policy stability. Like any business environment, the mining sector's growth hinges on policy stability to ultimately, attract investment – Zambia can further regain its reputation as Africa's largest copper producer. Importantly, Zambia needs a competitive cost-reflective electricity tariff structure to reflect the true cost of power production and raising the bar for alternative energy sources to expand mining operations by various companies, which have invested in the country. Mr Gladston also notes a cost-reflective tariff structure is key to allowing businesses to plan in long term. "FQM, through our subsidiaries, has invested over US$100 million in uprating power [600

megawatts] from Lusaka to north western of Zambia to reduce surges on its Kalumbila-Trident-Kansanshi mine operations," he said. knowing that mining requires huge investment, Mr Gladston is of the view that long-term private partnerships between relevant partners to assure investors of a sustained and durable investment. With assurance on the security of tenure, the sector is surely expected to grow and remain the mainstay of the economy that benefits all Zambia and Chamber of Mines president Nathan Chishimba commends the continued investments by various member companies. "We welcome the ramping up of FQM's Sentinel Mine to full production, and the progress of Mopani's US$1.1billion modernisation program and said that these are green shoots. "Those green shoots should encourage the government to do more to make sure they grow into big branches and forests going forward,". Anchored on theme Zambia's attractiveness as a mining destination cannot be over emphasized as delegates heard how the country is endowed with incredible mineral wealth, yet international investors were not "beating down the door" to develop these resources. But Government is not sitting idle to harness the opportunities that lay in the mining sector, as the Chamber of Mines president observed. "Some policies made in recent past such as power tariff reviews, statutory instrument 7 of 2018 which compels mining companies and other producers to move cargo by rail, and policy changes that needed the input of sector players as being a recipe for misunderstanding with other partners willing to assist grow the economy," he says. In response, Ministry of Energy Permanent Secretary Emelda Chola noted that the cost of service study, aimed at determining the real cost of production of electricity in relation to its cost in Zambia will be unveiled in August this year. Brigadier-General Chola said stakeholders tasked with refining the report have made tremendous progress in finalising the study and by end of August it will be ready for

consideration by various interest groups. "The report is almost ready, the team is working round the clock to ensure that it is finalised by August," Brig. Gen Chola said.

Recently, mining companies had their tariffs reviewed to US$0.9 cents a kilowatt hour from an average US$0.6 cents a kilowatt hour after the country revised tariffs by 75 percent, done in two phases May 15 and September 1, 2017. The mining sector in Zambia for the past 100 years shows a clear historical link between levels of mining investment and wider economic development.

Facilitating Factors and Obstacles to Zambia's Development Macroeconomic Fundamentals: After completing a reform program as a Heavily Indebted Poor Country (HIPC) and qualifying for the Multilateral Debt Relief Initiative (MDRI) in 2005 and 2006, respectively, Zambia turned around its image from a poor performing country to a country with good economic indicators and several years of strong economic growth.5 Macroeconomic performance, coupled with consistent, rapid growth in mining, construction, telecommunications, and tourism, helped spur GDP growth of over five percent per year for the decade ending in 2010.6 Macroeconomic indicators are punctuated by a marked improvement in the World Bank's Doing Business Report, which placed Zambia among the top ten reformers in 2010.7 Stability: After 47 years of independence, and with over 40 ethno-linguistic groups, Zambia has experienced relative stability that sets it apart from its neighbors, most notably Angola, the Democratic Republic of Congo, and Zimbabwe. Under continuous civilian rule since independence, Zambia has enjoyed the succession of political power through voting since multi-party democracy was introduced in 1991, though not without controversy. Mining: Natural resources figure prominently in Zambia's development planning. Mining remains Zambia's greatest source of earnings, and attracts high levels of investment

from China, Switzerland, the United Kingdom, Canada, Australia and other countries. Unfortunately, Zambia's dependence on mining, without pursuing previous plans to diversify the economic base, means most Zambians are not benefited by mining-led economic growth and are vulnerable to volatile commodity price swings. Nonetheless, regulatory and policy changes envisioned under the SNDP offer the promise of considerable resources to drive broad-based economic growth. Arable Land: In addition to minerals, Zambia possesses vast tracks of arable land along with significant groundwater and surface water resources. According to the Zambia National Agricultural Policy (2004 – 2015), Zambia's vast resources give it the potential to expand agricultural production. Of Zambia's total land area, 58% is classified as medium to high potential for agricultural production. In addition, average rainfall in Zambia is suitable for a wide range of crops, fish, and livestock. However, only about 14% of agricultural land is currently used. Zambia has the best surface and underground water resources in Africa and its underground water aquifers are excellent prospects for irrigation programs. However, Zambia's water resources are largely unexploited; "Zambia possesses between 423,000–523,000 hectares of irrigable land, of which between 100,000–150,000 hectares are actually irrigated."

Because most of Zambia's poor are dependent on rain-fed subsistence agriculture, programs that target agriculture development can potentially lift the most Zambians out of poverty. Zambia's renewed participation in regional development dialogue through the Comprehensive Africa Agriculture Development Program (CAADP) demonstrates positive GRZ engagement in agriculture-led development. The GRZ signed its CAADP Compact in January 2011, setting the stage for additional GRZ investments and policy change.

Governance: Governance is regarded as a binding constraint to Zambia's development. The World Banks cites "weak governance and in particular poor government effectiveness [as] factors behind the coordination failures observed in Zambia, and are … major obstacles to inclusive growth."9 Zambia's own SNDP links governance to development outcomes: "Good governance remains the cornerstone for prudent management of public affairs and ensuring that development outcomes benefit the people of Zambia." Role and Status of Women: Even though women constitute 51% of the Zambian population, they are underrepresented in many areas of socio-economic activities. Women in Zambia have lower levels of education, limited access and control over production resources, face a high maternal mortality rate compared to other countries, and are most affected by poverty and HIV/AIDS. Zambian women are on average poorer than men with 70% of the female-headed households being poor, compared to 63% of the male-headed households. In education, there are gender imbalances. Despite gender parity at primary level, there is a higher drop-out rate for girls from grade 5, when girls are 12-14 years old. In the health sector, the maternal mortality ratio, though improving, remains high at a rate of 591 deaths per 100,000 live births.10 Women's vulnerability to HIV/AIDS is a consequence of cultural practices such as polygamy and sexual cleansing. The dual legal system, of customary and statutory law, also contributes to these inequities and to a high incidence of gender-based violence. As a result, Zambia ranks 150th of 169 countries on the United Nations Development Program (UNDP) Gender Inequality Index, revealing large discrepancies in conditions for women and men.11 Climate Change: Climate change is one of the most serious threats to Zambia's environment, agriculture, human health, and its overall social and economic development. Deforestation, arid conditions, recurrent droughts, and floods have contributed to make Zambia one of

the country's most vulnerable to the effects of climate change. Specifically, agriculture, which is second only to the mining sector, contributes 20% to the GDP and consists of about 60% of the total labor force in Zambia, is one of the most threatened sectors in the wake of climate change. Zambia's heavy dependence on rain-fed agriculture, coupled with limited technical and financial resources, potentially makes climate change one of the most critical and costly issues affecting national development processes in Zambia. The climate of Zambia generally follows a pronounced gradient characterized by semi-arid conditions in the south and increasing precipitation in the north. Thus, water becomes one of the most important factors influencing agricultural decisions for the smallholder farmers in southern Zambia. Notable among the climate change related effects haunting rural farming communities in Zambia are unfavorable climatic conditions (shortened rainy season, recurrent and prolonged droughts and frequent floods), outbreaks of livestock and crop disease, and pests (specifically quelea birds and insects). Unfavorable environmental and climatic episodes often lead to loss of life and assets, and food insecurity thus exacerbating rural poverty. The Zambia FAA 118-119 Analysis identifies key threats to Zambia's environment. These are primarily human-caused and include agriculture, charcoal production, illegal off-takes, mining operations, and poor governance. The 2010 Zambia Environmental Threats and Opportunities Assessment (ETOA) points out that climate change is a threat magnifier, making Zambia's natural resources more vulnerable.

CHAPTER THREE: METHODOLOGY AND THE CONCEPTUAL FRAMEWORK

3. Introduction

This chapter aimed at highlighting the need to know the effects of Zambia's economy growth on the mineral rent after the economic liberalization and the techniques that were used in order to see the relationship between the two variables.

3. 1 Research Design

This research is a mixed methods design and in a more specific way using an embedded mixed method design. A mixed methods research design is a procedure for collecting, analysing, and "mixing" both quantitative and qualitative methods in a single study or a series of studies to understand a research problem (Creswell & Clark, 2011). The purpose of the embedded design is to collect quantitative and qualitative data simultaneously or sequentially, but to have one form of data play a supportive role to the other form of data. An embedded design therefore is where the quantitative methods of data collection and procedures as well qualitative methods are employed either at the same time or one after another in answering the research problem. Creswell (2012), the basic assumption is that, the uses of both quantitative and qualitative methods, in combination, provide a better understanding of the research problem and question than either method by itself. In so doing, this research will be focused on both the quantitative as the primary data and qualitative methods as the supportive data. In as such a set of questionnaires will be used in form of closed ended

3.2 Target Population

The target population for this research is from year 1996 to 2015. The study runs from 1996 because that is the period Zambia fully attained economic liberalization and it is ending at 2015 because the information available from the world bank date

website ended at 2015 as the research was being conducted. Therefore only 17 years were sampled out of the population of 44 years that starts from 1970 as obtained from the World Development Indicators (WDI) online data set.

3.3 Sample Size and Sampling Procedure

The relevant data was obtained from the World Development Indicators (WDI) online data set. The stated data is purposively sampled because there is a direct link with Mineral rent and economic growth.

The documents were reviewed from 1970 to 2015 and a sample of 17 years that rans from 1996-2015 was also reviewed. The study period was chosen on the basis that it has now been recognized that FDI has been responsive to Zambia's liberalization policies since the 1990s and to recent trends in world commodity prices.

3.4 Data collection methods and procedures

The study adopts Time series data of Zambia covering the period 1996-2016 which is secondary data. The data for Mineral rents, exports and gross domestic product was collected from the World Bank Indicators and while the other data which was considered was through literature review. In this regard secondary data was used. Secondary data comprises of literature that has to be collected from scholarly works based on this proposed study. In the analysis according to Sleeper (2001), secondary data is information that has already been collected and is usually available in published or electronic form. Secondary data has often been collected, analysed, and organized with a specific purpose in mind. The research therefore relied on such data as a part of the secondary sources namely the World Development Indicators (WDI) online data set

3.5 Data analysis

The quantitative data was the major data source which was complimented by the qualitative data embedded within the quantitative data. The use of the two methods was to provide the research a rich approach in understanding the problem. Data in this research was collected and in excel spreadsheet and analysed using Gratl statistical data analysis software.

3.5.1 Tools for data analysis

The following test were conducted using the same secondary data obtained from the World bank data website using a data analysis software GRATL; Dickey Fuller and Augmented Dickey- Fuller Test: to trend of stationarity of series, Co-integration test, The Causality text granger test; the causal relationship between variables, and the Unit Root Tests: stationarity of series

Unit Root Tests: Unit root tests imply finding the order of integration of the time series variables. This has become fashionable in applied econometric work as there are a number of motives behind unit root tests. In this study, the main motive of unit root tests is the classification of the variables at hand according to the order of integration. This has an implication on the choice of the model to use to analyse the data. Since integrated variables lead to non-standard distributions and perhaps spurious regression result, it is important to classify the variables as integrated, stationary or perhaps deterministic trend stationary. In this case, long-run and short-run effects are able to be sorted out in the model, thus setting up a model where statistical inference is meaningful the DF test estimates the following equation:

$$\Delta yt = \delta + \beta t + \alpha yt{-}1 + \varepsilon t$$

Dickey Fuller and Augmented Dickey- Fuller Test: This study will adopt, Dickey-Fuller (DF, 1979), Augmented Dickey- Fuller (ADF, 1981). The general form of ADF test is estimated by the following regression:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{i=1}^{n} \alpha_1 \Delta Y_{t-i} + \delta t + \varepsilon$$

Y is a time series, t is a linear time trend, and it is the first difference operator, $\alpha 0$ is a constant, n is the optimum number of lags in the dependent variable and e_t is the random error time. The difference between the DF and ADF is that whereas ADF accounts for autocorrelation in the observed series, DF assumes that there is no autocorrelation. Therefore, in DF, the term $\sum_{i=1}^{n} \alpha_1 \Delta Y_{t-i}$ reduces to zero. We use one sided test is for determining Ho: $\alpha 1 = 0$ (meaning that the series is not stationary) against Ha: $\alpha 1 < 0$ (meaning that the series are stationary).

Co-integration test: Once the variables are classified according to the order of integration, we can set up models to analyze meaningful relationships. If the variables considered in a model are integrated of the same order, there is a possibility that they have a stable long run relationship. If they have different trends processes, they cannot stay in fixed long-run relation to each other, implying that you cannot model the long-run, and there is usually no valid base for inference based on standard distributions. If you do no not find cointegration, it is necessary to continue to work with variables in differences instead. In this study, we test for cointegration in a SEECM as opposed to two-stage Engle Granger or Johansen cointegration test. This is because; the Johansen test suits well for large samples, hence may distort the information given the small size of our sample but many variables. On the other hand, the EG two stage is preferred only for two variables.

Estimation Procedure: The study will employ the Autoregressive Distributed Lag (ARDL) bounds testing approach to co integration developed by Pesaran and Shin (1999) and later extended by Pesaran (2001) to examine the key macroeconomic determinants of growth in Zambia. The two-stage ARDL modelling framework has five distinct advantages. First, the two-stage ARDL approach effectively corrects for any possible endogeneity in the explanatory variables (Pesaran and Shin, 1999; Acikgoz and Mert, 2014). The ARDL approach provides robust results in studies affected by small sample sizes where the parameter estimates have desirable small sample properties (Narayan, 2005).

The ARDL model can take up a sufficient number of lags that captures the data generating process in a general-to-specific modelling framework (Hirnissa 2009).And finally, the bounds test based on the unrestricted error correction model is applied, even when the study variables are integrated of order zero or one. Lastly, the ARDL model includes lags of both the dependent and explanatory variables and it is a powerful tool in investigating short- and long-run cointegrating relationships between variables of interest.

Quantitative Data Analysis: This study will analyse data using the embedded mixed method design in which qualitative data will be subject to a narrative analysis and quantitative data to GRETL.

Chapter Summary

This chapter has explored the methodological procedures to be used in this proposed study. The chapter has discussed the embedded design of mixed method and has given the procedure to its application. The chapter has also given detailed steps to be taken from the research design through to data collection, and analysis.

CHAPTER FOUR: DATA ANALYSIS

4.1 INTRODUCTION

This chapter presented the survey results starting with background parameters then descriptive statistics for the survey. Furthermore, this chapter presented the descriptive statistics and results of ordinary least squares regression results. The quality of data was ascertained by the use of diagnostic tests discussed in the previous chapter.

4.2 Findings and analysis

Data presentation, estimates and results are presented, the long run relationship between Zambia's economic growth and mineral rent after the economic liberalization is using the following tests:

Autoregressive Distributed Log (ARDL) / OLS model

Dickey Fuller and Augmented Dickey- Fuller Test: to trend of stationarity of series.

tests the null hypothesis that a unit root is present in an autoregressive model. The alternative hypothesis is different depending on which version of the test is used but is usually stationarity or trend-stationarity. It is named after the statisticians David Dickey and Wayne Fuller, who developed the test in 1979.

Unit Root Tests: stationarity of series

A unit root test tests whether a time series variable is non-stationary and possesses a unit root. The null hypothesis is generally defined as the presence of a unit root and the alternative hypothesis is either stationarity, trend stationarity or explosive root depending on the test used.

Co-integration test: the relationship between variables

For there to be a long run relationship between the variables they must be cointegrated. The data source was mainly the World Development Indicators (WDI) online data set. As expected, prior to testing for cointegration, we investigated the integration properties of the variables

Co integration is nothing but correlation between two variables. But one need to use the simple regression analysis to find the covariance between the two variables using coefficient of Co-integration. Cointegration is the existence of long-run relationship between two or more variables

Causality text granger test; the causal relationship between variables

The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another, first proposed in 1969.

The following were the data processed using Gratl a cross-platform software package for econometric analysis, written in the C programming language.

Table 2

Table 5.1 Summary of ADF and PP unit roots tests		
VARIABLE	Augmented Dickey Fuller (ADF) Level	
	With intercept but without trend	With intercept and trend
Economic Growth	--3.137263	-1.297955
Mineral-Rent	-1.046580	--0.973176
The first difference		
Economic Growth	-7.103646[a]	--5.342842[a]
Mineral − Rent	--2.855028[a]	-6.6345(3)[a]

At 1%, the two variables became stationary after differencing.

The table above showed the relationship between the variables that were under review before the adding of logs and graph 3 below was obtained after the use of logs (differentiating)

Graph 2

TIME SERIES GRAPH BEFORE DIFFERENCING
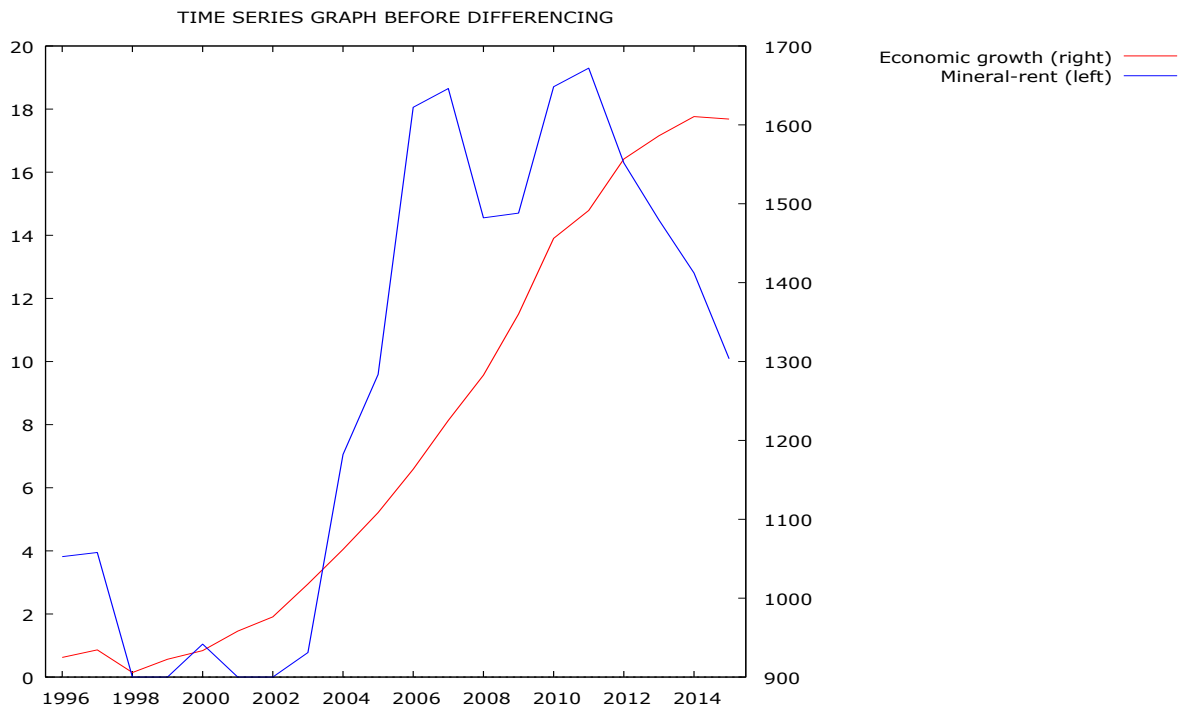
ARDL Long Run Form and Bounds Test
Dependent Variable: D(MR)
Selected Model: ARDL (3, 3)
Case 2: Restricted Constant and No Trend
Date: 04/12/19   Time: 11:06
Sample: 1996 2015
Included observations: 17

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-14.18146	10.17398	-1.393895	0.1968
MR (-1) *	-0.717068	0.307710	-2.330333	0.0447
EG (-1)	0.014170	0.010129	1.398961	0.1953
D (MR (-1))	0.443574	0.287819	1.541158	0.1577
D (MR (-2))	0.289891	0.313753	0.923946	0.3796
D(EG)	0.103432	0.053411	1.936532	0.0848
D (EG (-1))	0.037765	0.040657	0.928864	0.3772
D (EG (-2))	-0.040903	0.055502	-0.736955	0.4799

 * p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EG	0.019761	0.009038	2.186396	0.0566
C	-19.77702	9.264724	-2.134658	0.0616

EC = MR - (0.0198*EG -19.7770)

F-Bounds Test   Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I (0)	I (1)

Asymptotic:
n=1000

F-statistic	2.003266	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
		Finite Sample: n=35		
Actual Sample Size	17			
		10%	3.223	3.757
		5%	3.957	4.53
		1%	5.763	6.48
		Finite Sample: n=30		
		10%	3.303	3.797
		5%	4.09	4.663
		1%	6.027	6.76
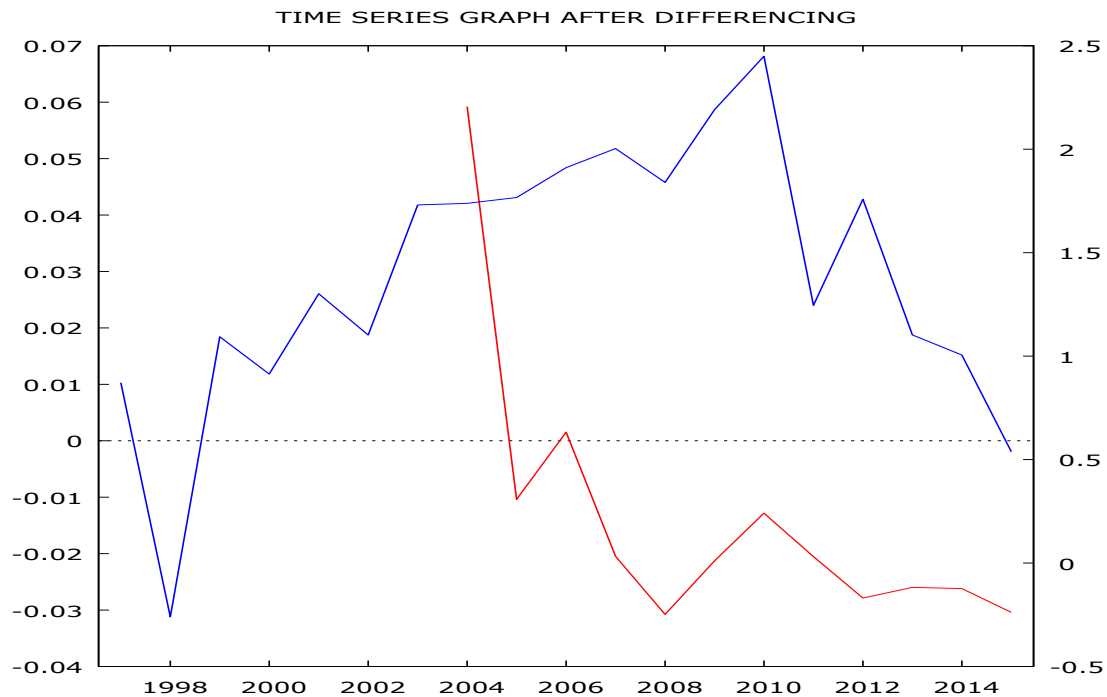
Graph3

Before proceeding with estimating the Co-integration, the paper examined the Stationarity characteristics of the variables included in the model under consideration. As the results from the table above indicate both variables become stationary after differencing them.

A trend was also noticed from the immediate graph above in terms of movements of the mineral rent and economic growth in Zambia, what comes out from these preliminary indicated that there was no co-relation between the variables under study.

Having confirmed that the variables satisfy the stationarity conditions required to execute ARDL estimation, the next step is to run the bounds test to determine the levels of Co-integration. The results reported in Table below show that the calculated value of F-statistic is 2.003 which is less than the upper level of bounds critical values of 3.51, 4.16, 4.79 and 5.58 at the 1%, 2.5%, 5%, and 10% levels of significance. Obviously, this outcome implies that the null hypothesis of no Co-integration cannot be rejected and there exists no Co-integration relationship between the set of variables namely mineral rent and economic growth. Thus, the ARDL model can be further expanded by estimating the long and the short run in order to ratify this result. This confirms what the graph was trying to allude to.

Table   **3**

The results of estimated long-run ARDL Co-integration model which selected automatically based on Akaike Information Criterion, are presented in Table above. However, as the reported results indicated, the long run coefficient of economic growth variable is positive and statistically significant indicating that economic growth boosts mineral rent in Zambia during the period under consideration. Specifically, the findings indicate that a one percent increase in economic growth disbursement pushes mineral rent to grow by, approximately, 3.50percent. In light of these finding, some theoretical aspects on the relationship between mineral rent and economic growth need to be affirmed. Precisely, as argued by many scholars, growth has a potentiality to contribute directly and indirectly to mineral rent.

However, from the table below results, it is clear that neither mineral rent nor economic growth granger cause each. From the table, at 10% economic growth does not granger cause mineral rents, neither is it at 1% nor 5%. Unfortunately, even mineral rent does not granger cause economic growth in Zambia.

Table 4

Pairwise Granger Causality Tests
Date: 04/12/19   Time: 11:04
Sample: 1996 2015
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
MR does not Granger Cause EG	18	0.83043	0.4577
EG does not Granger Cause MR		2.45830	0.1243

The results indicate that mineral rent has a positive effect with respect to the expansion in economic growth from the regression model. As the coefficient in front of economic growth variable indicates an increase in economic growth by a one percent, decreases mineral rent growth rates by 3.50percent.

However, it has to be stated here that the coefficient of determination is just 51% and the adjusted one is 48% which is theoretically a good model meeting the recommended threshold. As if that is not enough the coefficient is very significance.

Table 5: Model 1: OLS, using observations 1996-2015 (T = 16)

Missing or incomplete observations dropped: 4

Dependent variable: l_mr

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−22.8383	6.49181	−3.518	0.0034	***
l_e.g.	3.50366	0.910514	3.848	0.0018	***

|			
Mean dependent var	2.132348	S.D. dependent var	1.012367
Sum squared resid	7.471278	S.E. of regression	0.730522
R-squared	0.514010	Adjusted R-squared	0.479296
F (1, 14)	14.80717	P-value(F)	0.001774
Log-likelihood	−16.61084	Akaike criterion	37.22167
Schwarz criterion	38.76685	Hannan-Quinn	37.30080

Tests

Graph 4

CUSUM plot with 95% confidence band
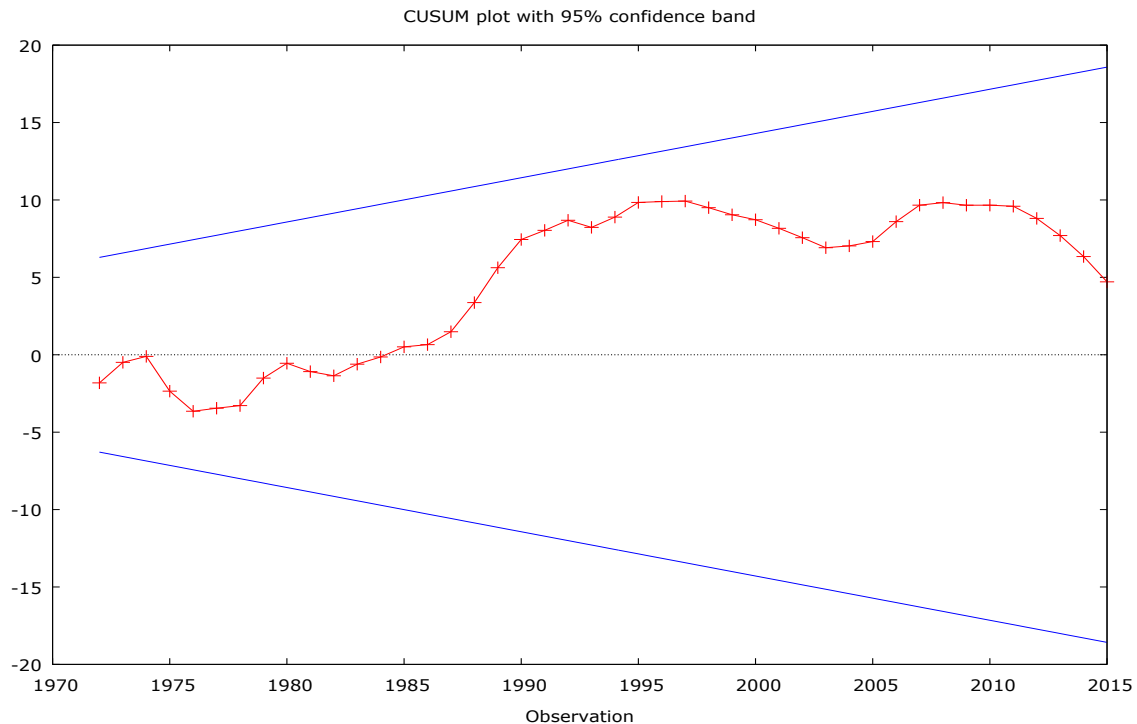
As suggested by Brown et al. (1975), we investigate the stability of the model by using Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) tests. As can be read from the figure below, the straight lines plots of both Cumulative Sum of Recursive Residuals and Cumulative Sum of Squares of Recursive Residuals are situated between the two dashed

lines. Since these two dashed lines signify that both tests stay within 5% levels of significance it can be inferred that the relationship between the variables concerned is stable and the model is correctly specified.

Graph 5

CUSUMSQ plot with 95% confidence band
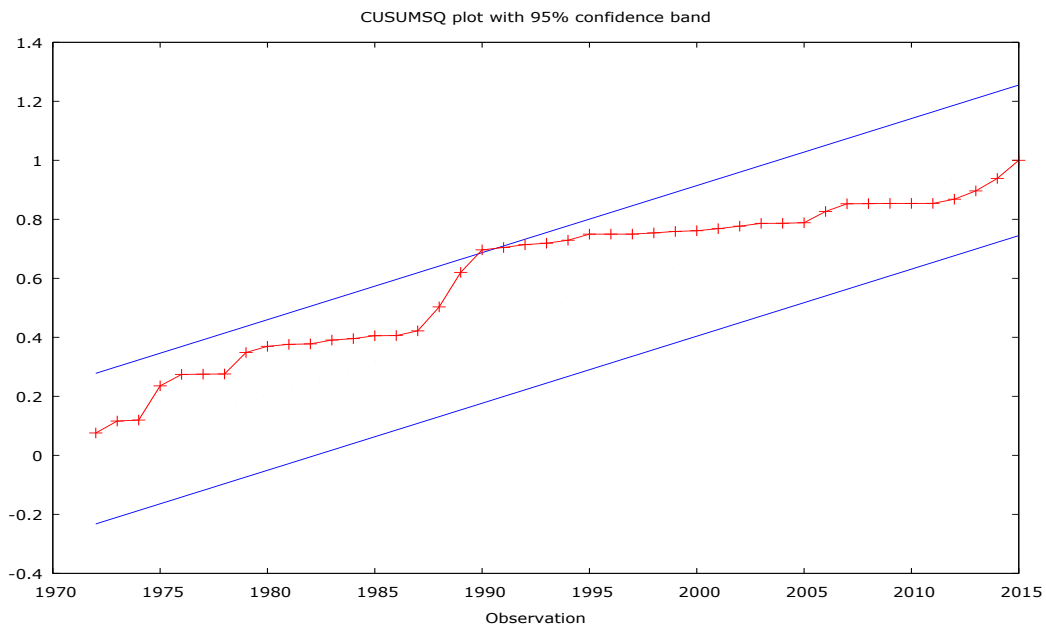
Table 6

Residuals diagnostic tests		
Diagnostic test	**Estimated Value**	**P-value**
Normality Test (Jarque-Bera)	4.878	0.087237
Breusch-Godfrey Serial Correlation LM Test	7.519407	0.0016
ARCH heteroskedasticity test	1.15479	0.282549
Residuals stability test (Ramsey RESET Test)	0.048903	0.8260
CUSUM test for stability of parameters	0.710005	0.4815

To give the results obtained more robustness additional diagnostic tests on the residuals are carried out. Interestingly, as Table indicates, the model under consideration passes all these diagnostic tests. Specifically, the model passes the residuals Normality test (Jarque-Bera), autoregressive conditional heteroscedasticity (ARCH and White heteroskedasticity tests), serial correlation (Breusch-Godfrey Serial Correlation LM Test) and Residuals stability test (Ramsey RESET test).

CHAPTER FIVE: CONCLUSION AND POLICY IMPLICATIONS
5.1 INTRODUCTION

Driven by the current emphasis on the effectiveness of sustainable development in mitigating economic and social illnesses in developing countries, this study aims at investigating the effect of economic growth on mineral rent in Zambia. To make this aim reachable, the intended study applies the ARDL Co-integration technique to a time series data set pertain to Zambia and spans over the period from 1996 to 2015.

5.1.1 Summary findings

The result of ARDL F-statistic bounds tests conclusively reveals lack of existence of co-integrating relationship between variables under consideration namely Mineral rent and economic growth. Accordingly, the study proceeds to estimate the regression model and causality test to verify the existence of short and the long run relationships. Expectedly, the results show that economic growth has a positive and significant long run influence on mineral rent. This result is consistent with the voluminous number of previous studies arguing that economic growth

presence spurs mineral rent in developing countries. In the same vein, it challenges the findings brought by a strand of well-established studies rejecting the granger causality of economic growth to mineral rent. Interestingly, the results also show that the growth elasticity of mineral rent is positive in Zambia.

As predicted, improvement in growth, is found to be positively and significantly related to mineral rent. In addition, the results show that economic growth has long run significant impact on mineral rent. This finding agrees with the new classical growth theory which argues that the contribution of economic growth can be only hold in the short run. With respect to the short run impact of economic

growth, the results reveal that growth does not granger cause mineral rent, meaning that growth resources need a maturation period in order to offer its desirable benefits to Zambia mineral rents.

5.1.2 Recommendations

The results obtained by this study have a number of policy implications for both Zambia and other developing countries. Firstly, Zambia as one of the highly natural resource endowed and dependent countries needs to lighten its reliance on mineral reliance as a key promoter for economic growth as indicated by the causality test results. This is because the dependence on such unguaranteed resources has severe negative consequences on the future economic performance of the country. There is need for institutional development for the country to realize much impact in terms of economic growth on the natural endowed resource. Though the country counts on the natural resource for its growth, it is important that policies should be put in place to aid institutional development otherwise the economy may be natural resource cursed country. Zambia would do well to diversify the economy as even the performance of the natural resource counts on the growth of the economy as whole. To realize sustainable development, it is essential that natural resource export policy should be reconsidered. Otherwise there is no co-integration between mineral rent and economic growth in Zambia.

Due to the difficulties in obtaining all of the information necessary to calculate mineral resource rent, governments are increasing the number of tax instrument, charges and fees in order to capture a share of resource rent that they deem „fair" but which ultimately depends strictly on the objectives that they have set for themselves. This is why different indicators are used in the literature to assess tax systems in the natural resources sector according to the objectives of governments and investors. A review of empirical studies shows that

few studies are conducted in developing countries and African countries in particular, and that they are based mainly on hypothetical projects. Knowledge of the actual distribution of rent between investors and governments is scant, and knowledge of its determining factors is even more so. The distribution of mineral resource rent in Africa cannot be analysed without access to figures and transparent, standardised information. The creation of a rent-sharing database will be to conduct in-depth research into the value of the sector's tax potential, the tax optimisation practices of multinationals and the knock-on effects that the mining sector has on the rest of the economy, which cannot be possible considering the actual knowledge of rent sharing in Africa.

5.1.3 Suggestions for further research
Further researches should consider the path of finding the effects of Zambia's economic growth on mineral rent before the economic liberalization and see if there may be something they can discover.

5.5 Conclusion
The purpose of this paper was to examine the causality issue between economic growth in Zambia after the economic liberalization on the mineral rent. Growth was examined as an independent variable while mineral rent examined as a dependant variable which depended on growth. To this effect it was discovered that growth doesn't affect mineral rent. The conclusion of this research is that Zambia's economic growth after the economic liberalization has no effect on the mineral rent. This can mean that it may be that the nation has not done much with regard to institutions to fully utilise the gains or the nation has not done much in terms of economic diversifications, therefore, the mineral curse phenomenal continues. However, much remains to be done, for instance by properly sequencing and completing the reform process, Zambia could benefit more from the efficient pulling and allocation of resources. In view of this, the government needs to look at having institutions that have to look at specifically how mineral rent can be allocated across all sectors.

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DATA SET FROM WORLD BANK

year	GDP	Mineral-rents
1970	3.17E+10	35.20562
1971	3.17E+10	22.3101
1972	3.46E+10	19.19034
1973	3.42E+10	36.84994
1974	3.64E+10	30.17067
1975	3.56E+10	9.900789
1976	3.78E+10	13.6831
1977	3.61E+10	9.569781
1978	3.63E+10	6.073882
1979	3.52E+10	13.67443
1980	3.63E+10	13.1833
1981	3.85E+10	5.945893
1982	3.74E+10	2.235449
1983	3.67E+10	5.679448
1984	3.66E+10	2.815495
1985	3.72E+10	4.155355
1986	3.74E+10	0.094167
1987	3.84E+10	5.103745
1988	4.09E+10	15.02534
1989	4.04E+10	17.69106
1990	4.02E+10	15.60054
1991	4.02E+10	7.74239
1992	3.95E+10	7.43389
1993	4.22E+10	1.450039
1994	3.86E+10	5.705704
1995	3.97E+10	8.425933
1996	4.22E+10	3.81741
1997	4.38E+10	3.94826
1999	4.56E+10	0
2000	4.74E+10	1.044321
2003	5.58E+10	0.776693
2004	5.97E+10	7.053162
2005	6.4E+10	9.591534
2006	6.91E+10	18.05765
2007	7.49E+10	18.65101
2008	8.07E+10	14.553
2009	8.81E+10	14.70357
2010	9.72E+10	18.70895
2011	1.03E+11	19.29794
2012	1.1E+11	16.29463
2013	1.16E+11	14.48695
2014	1.21E+11	12.80536
2015	1.25E+11	10.08855