CZECH UNIVESRITY OF LIFE SICENCES PRAGUE

Faculty of Economics and Management

Department of Economics

Bachelor Thesis

IMPACTS OF COPPER MINING ON THE ENVIRONMENT AND THE ECONOMY OF ZAMBIA BEFORE AND AFTER PRIVATISATION

Author: Moses Kasolo

Supervisor: Ing. Petr Procházka, MSc, Ph.D.

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BACHELOR THESIS ASSIGNMENT

Kasolo Moses

Economics and Management

Thesis title

Impacts of copper mining on the environment and the economy of Zambia before and after privatisation

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Objectives of thesis

To evaluate the impacts of copper revenue on the environment and the economy of Zambia before and after privatisation.

Methodology

Literature review was done using methods of synthesis, abstraction, deduction and induction. Practical part was based on methods of qualitative and quantitative analysis of cross sectional and time series data.

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The proposed extent of the thesis

40 pages

Keywords

Privatisation, Nationalization, FDI, GDP, sulphur pollution,external debt of import and exports,employment

Recommended information sources

Sikaundi, 2008, Environmental council of Zambia . Copper mining industry in Zambia Environmental challenges, P9 http://unstats.un.org/unsd/environment/envpdf/UNSD_UNEP_ECA%20Workshop/Session%2008-5%20Mining%20in%20Zambia%20(Zambia).pdf

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The Bachelor Thesis Supervisor

Procházka Petr, Ing., MSc, Ph.D.

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prof. Ing. Miroslav Svatoš, CSc.

Head of the Department

Electronic apporoval: March 7. 2014

Ing. Martin Pelikán, Ph.D.

Dean

Prague March 7. 2014

Declaration

I hereby declare that I have worked by myself to complete this bachelor thesis. I declare that I took data from those sources which I listed in the bibliography.

In Prague, 14th March 2014

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MOSES KASOLO

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IMPACTS OF COPPER MINING ON THE ENVIRONMENT AND THE ECONOMY OF ZAMBIA BEFORE AND AFTER PRÍVATISATION

DOPADY TĚŽBY MĚDI NA ŽIVOTNÍ PROSTŘEDÍ A EKONOMIKU ZAMBIE PŘED A PO PRIVATIZACI

Summary

Copper Mining in Zambia since its establishment in 1930 has remained central to Zambias economical, social and political development, providing about 50-80% of annual export income. However, mining is considered the largest source of environmental pollution.

Due to the dramatic fall in copper prices from the early 1980ě, Zambia was forced to borrow money from the International Monetary fund (IMF) and the European investment Bank (EIB). Unable to pay the IMF and the EIB under developmental policies forced the Zambian governement to privatise.

The main objectives of privatisation was to attract more FDI, increase mining efficiency and ensure economic growth. Therefore this thesis examines the effects of mining on the economy and the environment of Zambia

A cross country regression analysis was applied in this thesis in order to achieve the answer to the question whether privatisation has brought more economical growth and better mining environment.

Keywords: Nationalisation, Privatisation, FDI, GDP, Sulphur pollution, External Debt Stock, Consumer Price Index, Real Exchange Rate.

Souhrn

Těžba mědi v Zambii vznikla v roce 1930 a již od jeho založení je stále hlavním přínosem jak v ekonomickém, tak socialním i politickém vývoji státu. Těžba poskytuje 50-80% příjmů ročního vývozu. Na druhou stranu je těžba jedním z největších znečišťovatelů životního prostředí.

Od počátku roku 1980 byl zaznamenán velký pokles ceny mědi, a proto byla Zambie nucena požádat o finanční podporu Mezinárodní měnový fond (IMF) a Investiční evropskou banku (EIB). Na základě nesplnění závazků státu vůči IMF a EIB byla těžba privatizována.

Hlavními cíli privatizace bylo přilákat více přímých zahraničních investic, zvýšení efektivity těžby a zajištění hospodářského růstu. A právě tato bakalářská práce zkoumá dopady těžby na ekonomiku a životní prostředí v Zambii.

Na dosažení odpovědí na otázky, zda byla privatizace přínosná v ekonomickém růstu a zda důlní prostředí bylo lepší, byly v této práci použity regresivní analýzy a kalkulace.

Klíčová slova: znárodnění, Privatizace, FDI, GDP, znečištění oxidem, Zahraniční dluh skladem, index spotřebitelských cen, Reálný směnný kurz.

ABBREVIATIONS

GDP……Gross Domestic Product

FDI:…….Foreign Direct Investment.

CPI……..Consumer Price Index.

RER:……...Real Exchange Rate.

EDS……...External Debt Stock.

IMF……International Monetary Fund

EIB……European Investment Bank

ZCCM……...Zambia Consolidated Copper mines.

MUZ…….Mine Workers Union of Zambia

WB……World Bank

Contents

1. Introduction

Copper mining has remained one of Zambias main source of income since its establishment in 1930 during colonisation error. in 1970 after independence the Zambian government decided to nationalise the copper mines mainly because under the british colonial power all copper produce were shipped to Zimbabwe for trade and infrastructure building. Hence the government decided to nationalize the mines so that the Zambian people can benefit more from their country's natural resources. However, from 1980-2000 there had been a dramantic decline in the global demand of copper as a result, Zambia moved from the 10 riches countries in Africa in the early 80_s with economic growth rate higher than that of Egypt and South africa to top 20 poorest countries the world.

In order to maintain social benefits the government had to borrow money from the International Monetary Fund (IMF) and European Investment Bank (EIB) to pay off the mine workers and. Unable to pay of the debt due to the ever falling copper prices made the IMF and the EIB to force Zambia under strict developmental agreements to privatise the copper mines, promising Zambia that it's the only way the economy would be saved and under privatisation the mine would have a significant impact on the economy.

This thesis examines the impact of revenue on the Zambian economy and the enviroment in accordance to the prognosis made by the IMF that privatisation would result in higher economic growth. Under privatisation there was an unexpected global increase in copper prices from 2002 ownwards copper prices increase 4 times higher, However this sparked debates in Zambia, that there was no tangible evidence on the Zambia economy, as promised by the IMF during privatisation this was mainly due to the 0.6% fiscal revenue as compared to the world average of 10% for most privatised public sectors. This thesis further examines weather there was evidence of economic growth during the first 9 afterprivatisation by comparing 7 years before privatisation.

2.0 OBJECTIVESS, RESEARCH QUESTIONS AND METHODOLOGY

2.1 Objectives

To examine the impact of copper revenue on the environment and the economy of Zambia before and after privatisation.

2.2 Research question

Is there more economic growth under private control of the mines as compared to state control?

Is there less pollution due to increased investment in the mines during private control as compared to state control of the mines.

Knowing the performance of the copper mines was the government robbed of the truth in order to force privatisation

2.3 Methodology

The theoritical framework is based on synthesis, deduction, abstraction and induction of macro-economic indicators literature review and the environmental pollution from 1994-2010. The framework is mostly based on their trend and growth between the stated period of time.

A cross country correlation and regression analysis was applied in this study to examine whether or not privatization of the copper mines has a postive effect on economic growth. The correlation and regression analysis methods are widely used to examine privatisation by using the macro-economic determinants of growth. Studies have identified macro economic indicators that contributes to long run economic growth the following macro economic indicator are used in this study to determine the relationship with copper prices, production and revenue.

Real Exchange Rates

Gross National Product

Foreign Direct Investment

External Debt Stock

Consumer prices

Sulphur dioxide emission was to represent environmental pollution

The following equation was used as model for regression analysis however in this research spurrous regression was not considered

$Y=X1+X2+E$

$Y=X3+E$

Y=Macro-economic and environmental indicator,
X_1=Prices, X_2=Revenue,

However, critiques have criticized that typical cross country growth analysis uses data that are averaged over a significant long period, to permit the coefficient on various variables to be interpreted as elasticities. In turn these coefficient are used to indicate the percentage growth that results fron one percent change in a macro economic indicator variable.

Zervos and Levine 1993 warned that the use of cross country regression analysis should be treated with causion since this type of regression analysis it self does not provide the complete answer to relationships which are casual between explanatory variables and the independent, Inaddition they argued that this type of analysis should be viewed as evaluating the strength in correlation not as actual behavioural relationships, not how much growth will come due to change in 1 unit of the explanatory valuables used.

3.0 . Literature review

3.1. From colonisation to state control

Zambia is one of the worlds largest Copper producer currently producing about 4% of the total copper produced in the world. Copper production is done in the province known as Copperbelt located between the border of Zambia and the democratic Republic of Congo. Copper mining in Zambia has existed commercially since the year 1930, the first commercial mine was opened in the city called Luanshya(then Roan Antelope). During the British colonial rule Zambia (Northern Rhodesia) was principally a source of wealth to support Zimbabwe's (then Southern Rhodesia) economy. The Anglo-American Corporation and the Roan Selection Trust were two companies that mainly operated the mines until 1970.

In 1964 Zambia won its political independence with Dr Keneth Kaunda as the first President, The new government had great hopes for sustainable development. Prior to the hopes was rapid increase in the Copper prices on the world Copper market resulting in rapid growth of the copper industry, Zambia was seen as a shining example of a country moving towards economic independence , political indepedence, industrialsation and end to poverty, With a population of 4 million, Zambia had an urban population 1 million with approximately 800 000 people with waged employment. Zambia was declared a middle-income country with one of Africas highest GDPs.

In the year 1968 concerns which were raised by the president Kaunda that the sole properiotor companies that controled the mines had put in less and less capital into the Zambian economy. when comfronted they claimed that their investment was dissuaded by the royalty system by which thez were under taxation. The government responded by re-negotiating mineral rights/mining licence and announced nationalization in 1969. Through referendum the constitution was amended and all mining mineral rights and property reverted back to the state, Anglo-American corporation and Roan Selection Trust companies were forced to give up 52% of shares in all Zambian mines to the state. The nationalised companies were then merged to form Zambia Consolidated Mines (ZCCM).

3.2. ZCCM economical and social functions.

In 1929 under colonial control the private mines had become more responsble for providing sanitation and houses for their employees, hence copperbelt become the most developed province in Zambia. The mines managed to supply food rations for employees that is maize-meals, rice, beans, Fresh vegetables were provided on a weekly basis. The companies also built hospitals and hired competent medical staff.

When ZCCM was formed in 1970 it was a shinning reflection of the states philosophical development plans Supplying a much wider amenities in scope than those during colonial times, this included subsidised electricit, housing, wate, food, free education for all the mine employees children. The services were not initiated from the top down it was as a result of the Mine Workers Union of Zambia (MUZ) making strong demands to improves the working conditions.

ZCCM also provided services to the whole community. The company implemented on its operations an environmentally friendly approach to reduce pollution. Economic and social growth was encouraged through activities dependent on employees income ie shops and farms to supply food and other industrial activities. The company also formed clubs like the youth development scheme which was aimed at helping youths realize their talents and skills which they could pursue as careers and womens club which focussed on home-craft.

3.3. The crisis led to privatisation

Despite the major progress ZCCM made in the first 10 years of independence. Development rapidly slowed when the copper prices collapsed in 1974 as a result of the oil crisis. Zambia was forced to borrow money from the world bank and the IMF so as Zambias social provisions could be maintained. In 1979 after the second oil crisis, the rapid increase in interests rates left Zambia in severe debt. For 21 years the economy collapsed at an internationally rapid rate because of the continues fall in copper prices as they became relatives equal to the import prices. Zambia become the worlds 25^{th} poorest country between 1974- 1994 with the declined per capita income of 50%. ZCCM during the fall of copper prices remained central to economy as the source of income, as a result the company sufered little investment in drilling and exploration.

4.0 Mining factors: Production, Prices and Revenue(fiscal revenue)

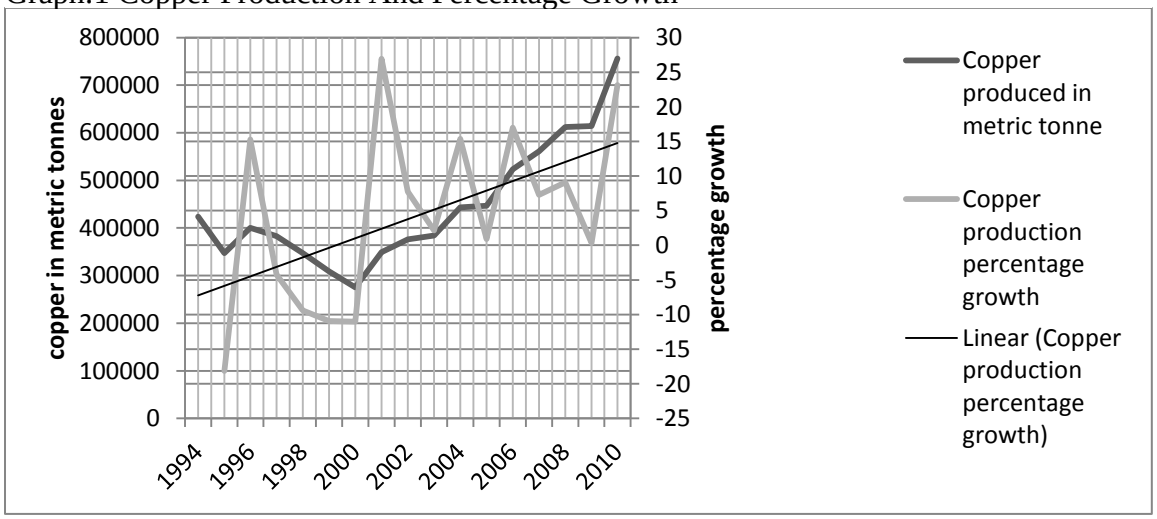
4.1 Production

Copper production under state control between the year 1994 to 2000 was at an average annual decrease rate of 6%, In year 2000 production had reached its lowest amount of 275000 metric tones since the last 60 years of mining in Zambia, however this may be correlated to the prices and other factors which will be analysed in the proceeding chapters.

After privatisation in 2000, by 2006, the copper mining introduced a smelter to increase production which might have led to the conclusion that production increased solely because of privatisation. copper production increased at an average annual rate of 11%, one might argue that the increase in production was as a result of the mining investment in a smelter alone however measuring the strength of correlation of prices and copper enables determine if prices influence production in chart 3.

In 2008-2009 due to the economic global crisis copper decreased by 1%. However production continued increasing at an average annual rate of 10% reaching about 756000 metric tonnes as seen in the graph from the trend below copper production will continue to increase. Below is the chart depicting the total annual production

Graph:1 Copper Production And Percentage Growth

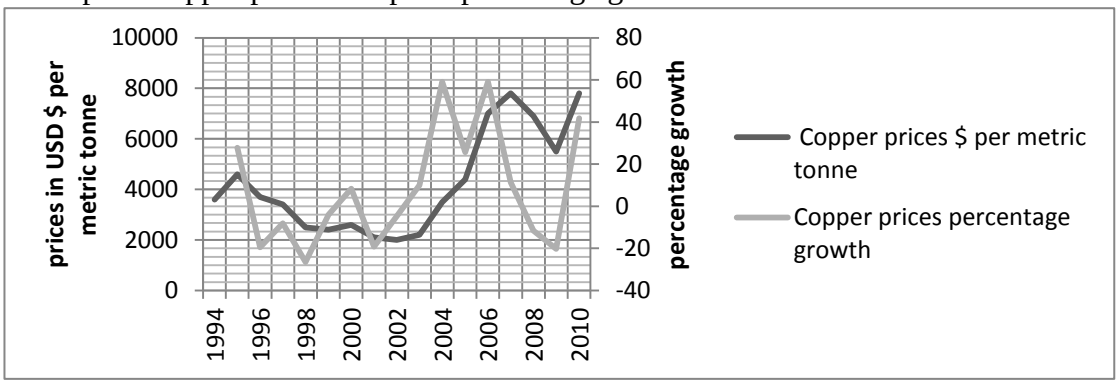


Source: Own work computed from Excel

4.2 Copper prices

One of the most prominent features of the copper industry is the highly unstable, ever fluctuating copper prices on the global market. This is due to lack of balance between demand and supply causing the prices to fluctuate since since the first oil crisis in 1976. In Zambia mining accounts for 80% of total exports prices are very important to all copper related activities in the Zambian economy. In 1994 to 2000 were decreasing at an average annual rate of 3% in 2000 copper prices had reached $ 2600 per metric tonne from 2001 to 2007 copper prices started to increase at an annual average rate of 20% reaching up to $7800 per metric tonne by the end of 2007 from 2008 to 2010 copper prices increased at an average annual rate of 3% and this was primarily due to the economic crisis.

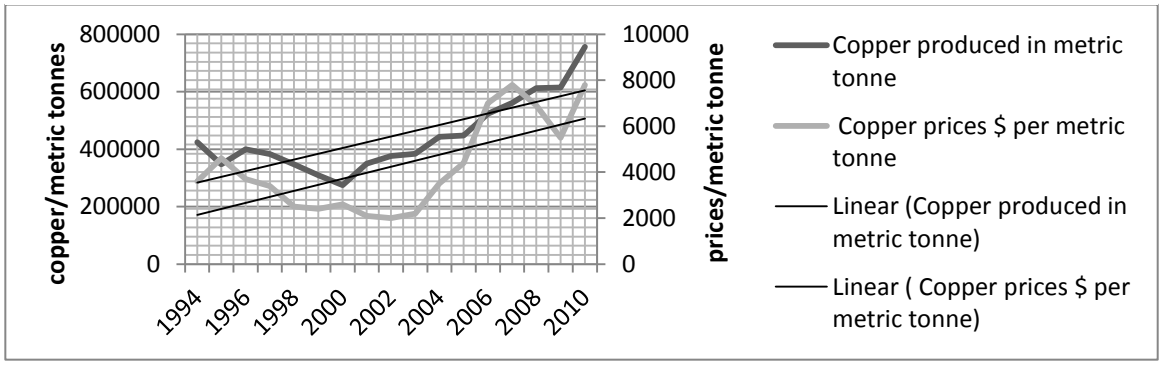
Graph 2: copper prices and price percentage growth



4.3 Impacts of copper prices on production

There following graphy shows annual average copper prices and annual total copper produced from 1994-2010

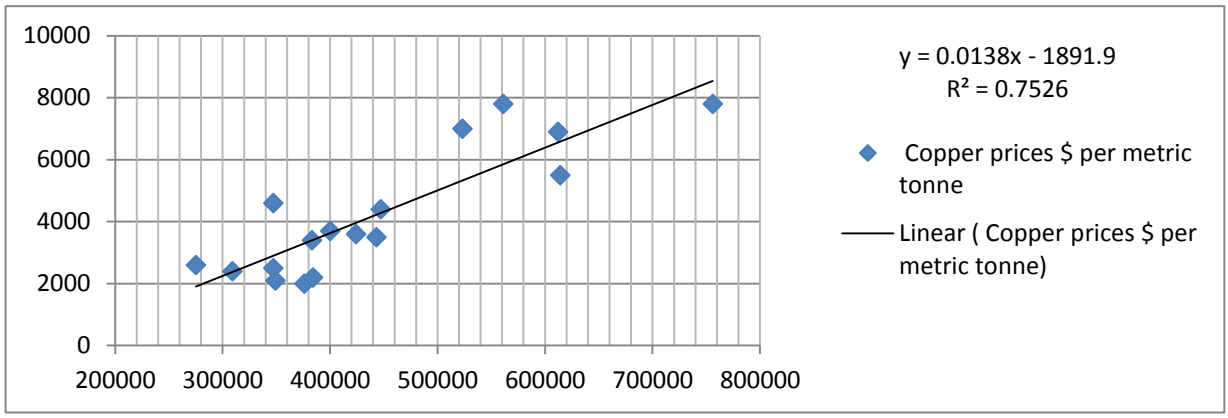
Graph:3 Production and prices



Source: : http://www.copper.org/resources/market_data/pdfs/annual_data.pdf

Observing the trend lines in the graph 3 above they suggest that there is a relationship between prices and production, empirical evidence also have shown to prove the strong relationship between copper production and copper prices. Taking into cosideration only the R2 one may conclude that a strong relationship exists at a goodness of 75%,However, this can only be done if spurrous regression is not considered. The graph below depicts correlationa analysis results of prices against copper production

Graph 4 regression analysis of prices and production



Source: Excel computation

4.3 Serial Correlation

Due to above relationship shown in Graph4 of copper prices and production. The stated variables were not used as explanatory variables because of they are correlation However, Copper revenue was used as the explanatory variable and fro real exchange rate copper prices actual fiscal revenue was not used in the practical part because it no public data has been released.

4.4 Fiscal revenue

Fiscal revenue is the mineral royalty obtained from the the copper revenue. during nationalisation the fiscal revenue obtained from the copper mine was marked with a wave of corruption and secrecy. The data of the actual percentage obtained was never realised for pyblic knowledge. Hence, during Nationalisation the mining sector sufered lack of capital and investment due to the ever changing fiscal policy.

The Zambian copper mines were privatised with very low mineral royalty of 0.6% due the debt the Zambian government owed to the European Investment bank and International Monetary fund (IMF)

the following table depicts the fiscal revenue of Zambia, Australia and Botswana coutries in 2012

Table 1 Known Fiscal policy

	Mineral royalty	Company income tax
Zambia	6%	30%
Australia	18%	30%
Botswana	10%	22%

Source: http://www.undp.org/content/dam/undp/library

Zambia has had three fiscal revenue regime in 2000 after privatisation the government was restricted to privatize the copper mines under the lowest fiscal policy of 0.6%. However in 2008, due to the increase in copper prices mineral were increase to 3% after long term renegotiations. Recent negotiations further increase the mineral royalty to 6%. The mineral revenue however remains significant low as compared to the above more politically stable countries with much less corruption levels as compared to Zambia.

Companies have been taxed relatively the same as the rest of the countries after privatisation there has not been any regime change to the income tax agreed in 2000.

In this section fiscal was not used to estimate the strength of correlation with economic growth mainly because the government did not publicize the actual fiscal revenue obtained during nationalisation. Copper revenue was used to estimate the impact on economic growth and the environement.

5.0 Macro-economy indicators and Environmental Impacts in Zambia

5.1.0COPPER MINING AND THE ENVIRONMENT

The environmental impacts of copper mining include land degradation, surface and ground water pollution, acid rain which intern leads to loss of biodiversity and vegetation due to the unsuitable soil for habitation or plant growth, mining being one of the biggest source of revenue and Zambia's highest employee has brought about a very complex relationship with the environment as reducing pollution might mean reducing production which intern may affect economic growth through reduction Gross national income

5.1.1 Impacts on biodiversity

The World Bank (2002) stated that removing of vegetation disturbs the habitats of hundreds of species and changes the availability of shelter and food for wildlife. Mining during the exploitation stage has high negative impacts wildlife or biodiversity of area due to its excavation of land to extract minerals. Hence, mining has the capacity to alter the structure and composition of species.

5.1.2 Water quality

Mining generally deteriorates the quality of water, caused by the waste or polluted water discharged into surface streams in Zambia.

The following pictures depicts dumping sites for wastes in liquid form from the mining the lickages from these dumping sites end up flowing into nearby streams polluting drinkable water.

Picture 1: Tailngs

Source: Source https://unstats.un.org/.../Session%2008-5%20Mining

Is the waste produced from smelting of metal concetrates, slag is generally discharged in granulate or molten form. In Zambia there are currently 15 slag dumps containing approximately 70 millions tonnes of slags and increasing, the slag dumps are currently covering an approximate area of 9000 ha.

The waste material produced from copper concentrates containing about less than 1% of copper are called tailings and they are discharged into dumps site around the copperbelt, currently they are over 50 dams/dumps containing approximately 950 million tailings and increasing, the tailing cover an approximate area of 13000 ha

Picture 2: water pollution

Picture 3: water pollution near residental areas

Source https://unstats.un.org/.../Session%2008-5%20**Mining**

Mining activities require consumption of enormous amount of water to keep up its operation. Unfortunately, negatively affects the water sites around the mines leading to dried up springs and wells. The waste water which is discharged into streams has major negative impacts on water quality The kafue river provides about 45% of drinking water for cities, in chingola town in mines. The river is also used for commercial business such as fishing by small scale fishing. Most of water pollution is as a result of the slags and tailings which pollute both underground and surface water.

5.1.3 Land degredation

The following picture depicts land degraded as a result of mining

Picture 4 land degredation

Picture 5. Land degredation

Sources: https://unstats.un.org/unsd/environment

The most definite result of mining is large scale land degredation, the removing of top soil creates large pits through the process called excavation. Unfortunately as empirical research by MMSD(2002) has shown that the waste material generated due to mining has long-term effects on the productivity of land. Hence, Land which could have been used for other commercial purposes for economic growth such as agriculture is rendered infertile.

5.1.4 Air quality

Since 2004, Zambia has been considered among the least emission efficient countries in the world (feeney 2004)2 this suggest that there is very strong relationship between copper mining and sulphur pollution, Scientific empirical evidence suggest that here is a strong relationship between sulphur emission and copper extraction.

The mines were privatized under the least environmental responsibilities meaning the new owners wound not be largely responsible to mitigate the caused pollution. EIB, IMF dictated the privatization procedure due to the debt Zambia owed which left the government with little control over self-regulating mining companies since they report and supply emission levels of sulphur dioxide. Companies have been supplied with annual limits of sulphur emission which currently stands at 1000mg/nm3. In the event that the threshold is exceed the mining companies simply have pay extra for their licence. Therefore the emission standards can be dispensed and the mining companies willingly exceeds the limit mainly because a larger sum of money is gained as compared to the money lost payed as a result of exceeding the threshold.

The ambient air monitoring equipment in were once used in 1997 and sulphur emission in ambient air was recorded at 60000 tonnes mg/nm3 annual total reading, while the standard for the mines is about 500mg/nm3 which is higher than the standards set by the world health organization WHO are much less 80mg/nm3.

The public lack necessary data readings to realize how unhealthy the environment they are living in, such knowledge is kept out of the public eye. However, there is very much visible and tangible evidence of pollution in the Copperbelt province which has turned a semi drought under privatisation.

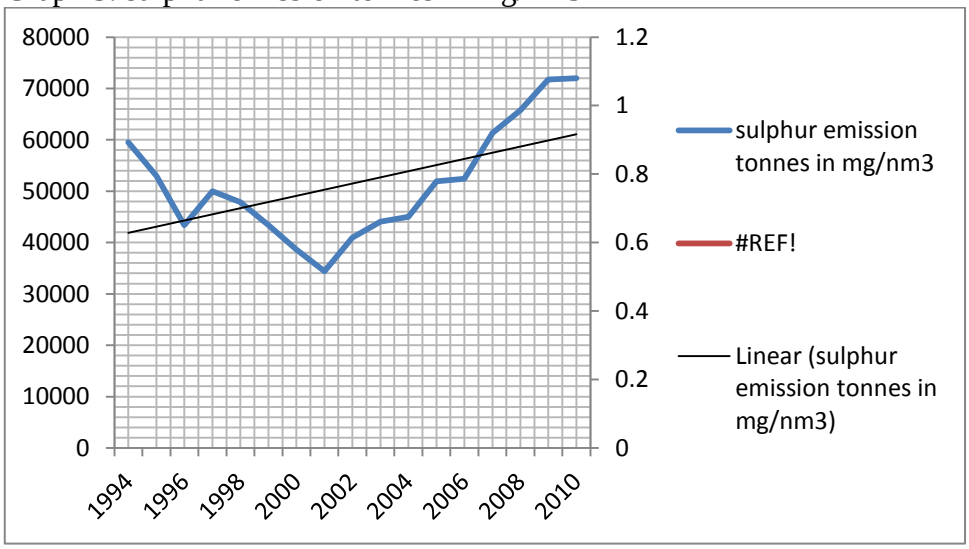
The following picture was taken in Mufurila town Mopani leaching plant. The whitish gas is emitted directly into the atmosphere which contains large and harmful percentages of Sulphur dioxide, Carbon monoxide, Nitrogen oxide

Picture 6 Sulphur emission in Mufurila copper mines

Source: www: http://www.counter-balance.org/counterbalance-eib.org/wp-content/uploads/2011/03/Mopani-

The following Graph shows the annual total sulphur dioxide emission (1994-2010) of the Mopani Copper mines in Mufurila Copperbelt.

Graph 5: sulphur emission tonnes in mg/nm3



Source:own computed based on 1997 emission during state control and 2009 under privatisation.

Under nationalisation sulphur long term emission was decreasing at an average annual emission rate of 6.4 % this maybe due to ever decreasing of copper production between 1994-2000 in 1999 a year before privatisation sulphur emission was estimated at 43375 tonnes. After privatisation emission levels increased at an annual average emission level of 7.3% by 2007 emssion levels was estimated at 61329 tonnes. After the global economic crisis copper production droped by 8% this intern resulted in the drop of

sulphur emission levels to 5%.However, in 2010 sulphur emission levels were recorded at 72000 tonnes

5.2.0 GROSS DOMESTIC PRODUCT,Purchasing Power Parity US$

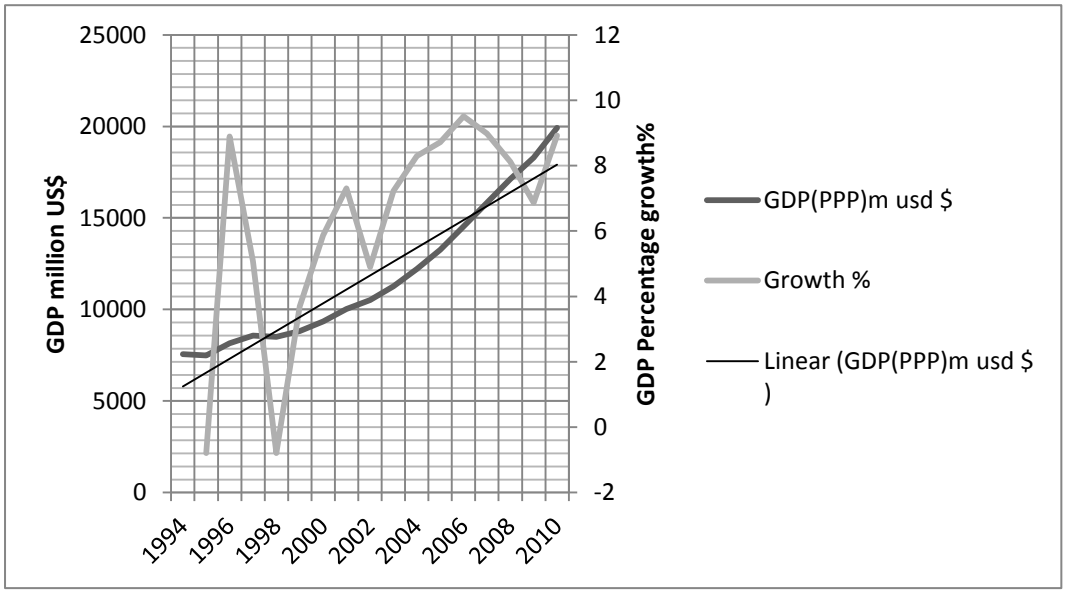
GDP is one of the most prominent ways of measuring economic growth. a general defination given on GDP by the world bank is as follows

''Gross domestic product converted to international dollars using purchasing power parity rates, is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources"i

In this research Revenue, prices and production will be used to measure impacts on GDP by using correlation and regression to estimate the strength in relationship.

In Zambia Copper mining having the biggest share of exports 81% has always remained cetral to GDP growth. under state control of the copper mines between 1994 to 2000, GDP was increasing at an annual average rate 3.6 %. After privatization between 2001 and 2007 there was a dramatic increase with an annual average rate of 8.1 however due to the economic crisis in 2008 there was a decrease GDP growth to 7.8 % annual average to 2010. Below is the graph depicting a time series of GDP,PPP and growth. The trend in growth shows positive increase in GDP with the coming years.

Graph 6: GDP PPP and Growth rate



Source: www.worldbank/data.com

5.3 FOREIGN DIRECT INVESTMENT

Foreign direct investment contributes to economic growth but also to the political and social relationship between countries. The general defination of FDI given by the international Monetary Fund (IMF) and the Organisation for Economic Co-operation and Development (OECD is as follows:

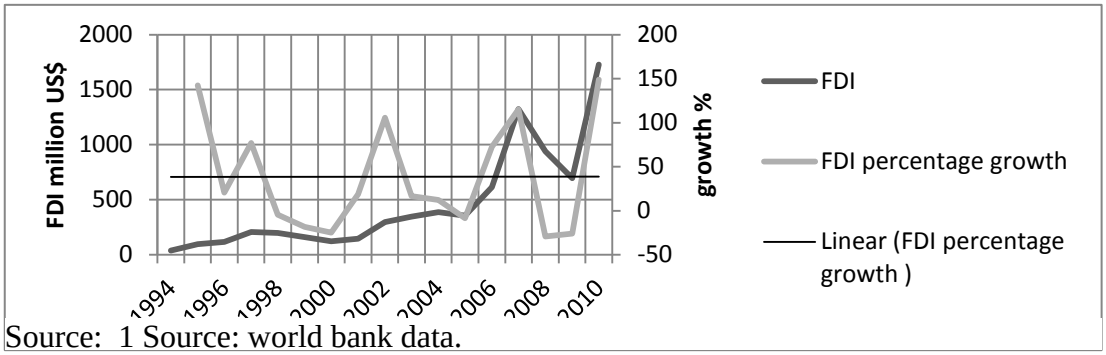
"Foreign direct investment reflects the aim of obtaining a lasting interest by a resident entity of one economy (direct investor) in an enterprise that is resident in another economy (the direct investment enterprise). The 'lasting interest' implies the existence of a long-term relationship between the direct investor and the direct investment enterprise and a significant degree of influence on the management of the latter." (Duce, 2003: 2).ii

he main actors of FDI the multinational corporations MNCs are also the agents of globalization due to do their role in building a global or transnational market (USAID, 2005). MNC stetches economic, social and political activities across borders as a result this competition is increased between countries. There are many types of FDI with initial intentions to make profit but this thesis focuses on the resource seeking FDI flows which is the most common FDI in developing countries, Resource FDI flows are ussually interested in raw materials such as copper, gold, oil, diamonds etc.

Empirical evidence show that an increase in FDI results an inevitable increase in economic growth thats why in this research FDI inflows was used to estimate the correlation and regression of revenue, prices and quantity before and after privatisation, conclusions were made by finding the difference between impacts the variables listed before and after privatisation on attract FDI inflows.

FDI inflows in Zambia has grown at a highly fluactuating rate between the 1994-2000 there was an annual average rate of FDI of 32% in 2000 the year of conclusion of privatsation FDI was at an estimated amount of 122 million US$ as compared to 40 million recorded in 1994. The privatisation of the copper mines might have attracted more FDI inflow. After privatisation between 2001-2007 an annual average of 47% of FDI this maybe as a result of 615 and 1,323 million US$ recorded in 2006 and 2007 respectively. After the economic crisis between 2008-2010 there was an annual average of 31% increase in FDI.

Graph 7: FDI and growth rates



Source: 1 Source: world bank data.

Source: www.worldbank/data.com

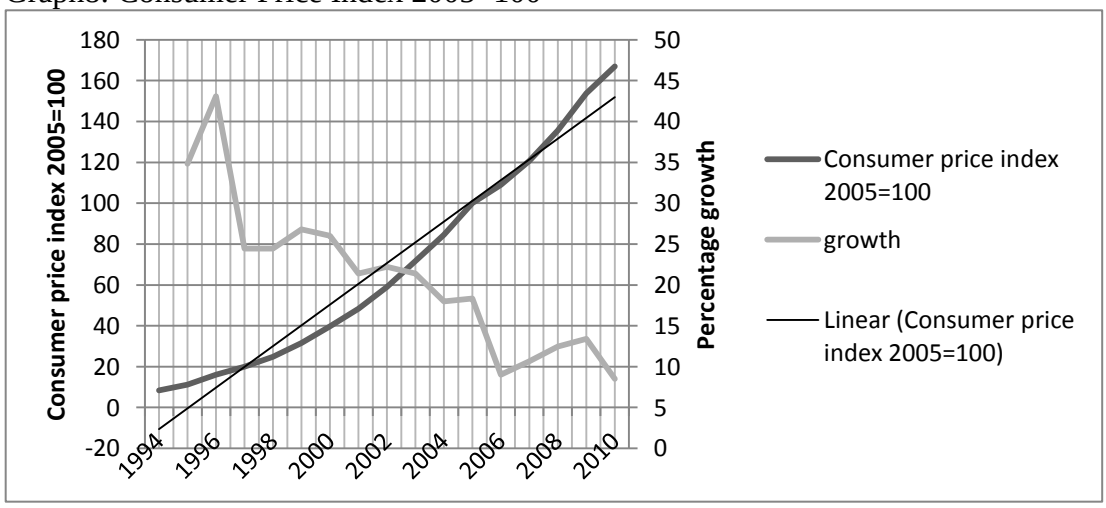
5.4 CONSUMER PRICE INDEX

If the economy develops in normal conditions, the increase in CPI can lead to an increase in basic interest rates. This, in turn, leads to an increase in the attractiveness of a currency, CPI isne of the most important indicators of inflation, as defined by the world bank:

" CPI represents the level of change in the retail prices for a simple consumer basket. due to the influence of the cpi on the strength of a currency"iii

Between 1994-2000 CPI increased from 8 to 40 (2005=100) an annual average rate of 30%. After privatisation CPI rate of increase dropped to an annual average of 17% from 2001- 2007. In 2007 CPI was recorded at 120. After the economic crisis CPI rate of growth increase further dropped ot 11% in 2010 CPI was recorded at 167. As depicted in the graph below it shows the negative trend in percentage growth of the CPI based on 2005.

Graph8: Consumer Price Index 2005=100



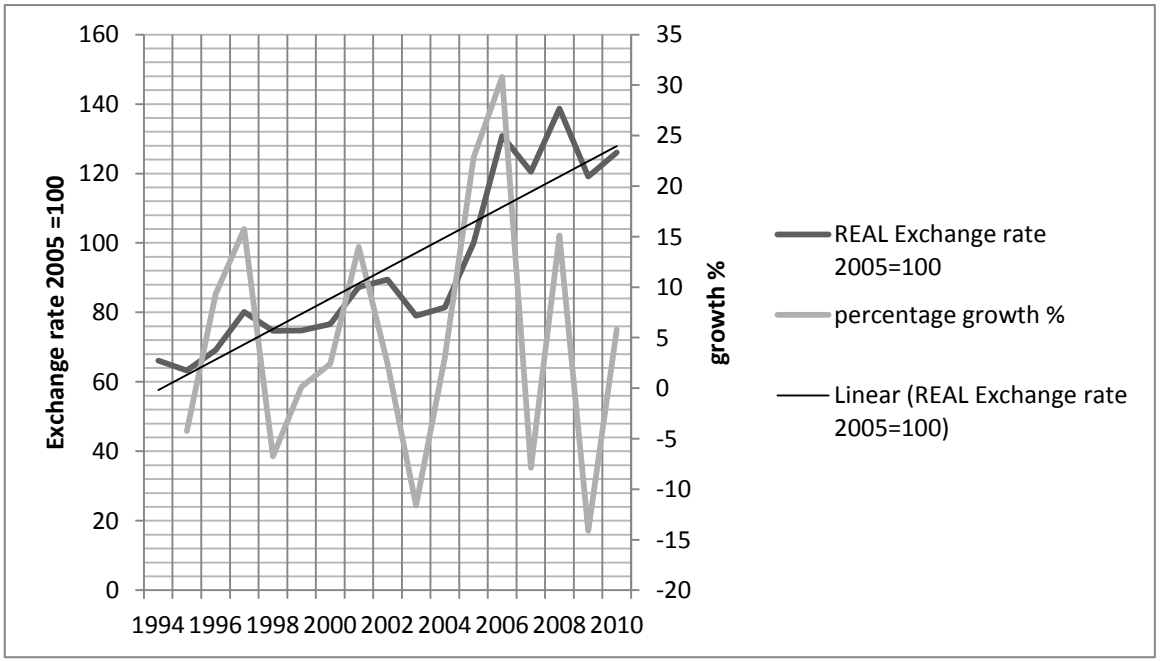
Source: world bank data.

The increase in real exchange results in higher attractivness of a currency which intern results in economic growth , a very general defination of real exchange rate given by IMF is as follows

“Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costsiv”.

Real exchange rate before privatisation increased at the average annuall rate of 2.8% from the year 1994 to 2000 by the end of 2000 the exchange rate was recorded at 2.4 (2005=100) . After privatisation real exchange rate percentage growth increased to an average annual rate of 6%. However from 2008 to 2010 annual average percentage growth dropped by 2.3 % due to the global economic crisis. Below is the chart depicting real exchange rate 2005=100 and average percentage growth. in the upcoming years according to the trend there will be a positive increase in percentage growth.

Graph 9 Real Exchange Rate 2005=100 1994-2010



Source: World bank data,

5.6 EXTERNAL DEBT STOCK

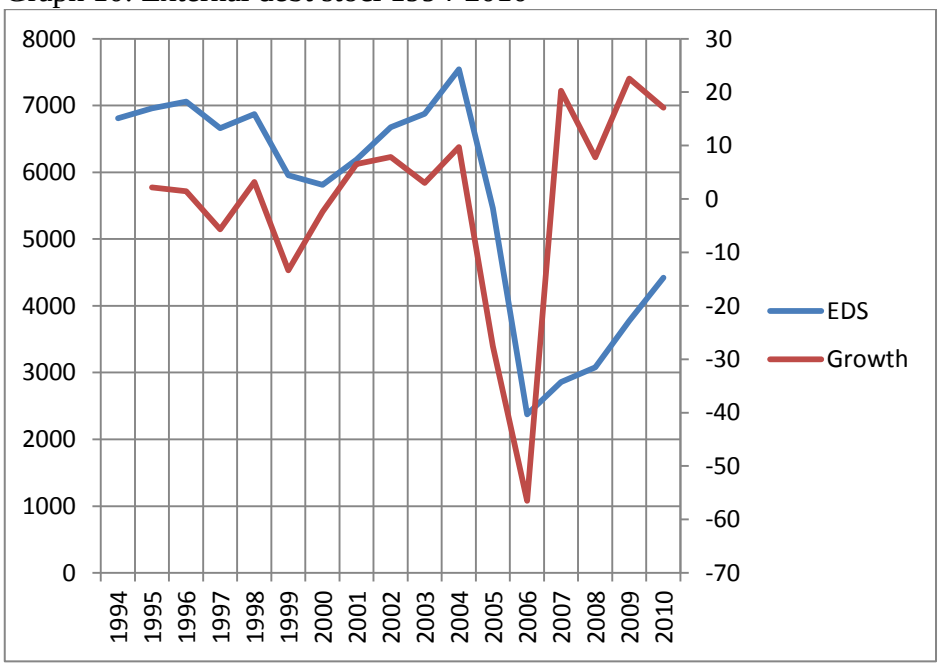
EDS is mildly used as a macro-economic indicator its is generally defined by the world bank as:

“Total external debt is debt owed to nonresidents repayable in foreign currency, goods, or services. Total external debt is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt. Data are in current U.S. dollars.”

In Zambias from the year 1994 to 2000 EDS was droping at annual average rate of 2.5% in 2000 EDS was recorded at 5.8 billion US$. After privatisation EDS continued decreasing at an annual average rate of 9% by 2007 EDS was recorded at 2.9 billion US$. During privatisation from the year 2007 t0 2010 EDS increased at an annual average rate of 2.3% in 2010 it was recorded at 4.4 billion US$. However, during the period 1994-2010 EDS was decreasing at an annual average rate of 0.24% with the estimated average rate of 5.7 billion US$.

The following graph shows Zambia external debt from the year 1994-2010

Graph 10: External debt stocl 1994-2010



Source: world bank data

6.0 REGRESSION ANALYSIS OF THE ENVIROMENT (air) AND MACRO-ECONOMIC VARIABLES IMPACT OF COPPER REVENUE

6.1.0 ENVIRONMENTAL POLLUTION (SULPHUR DIOXIDE EMISSIONS)

In this section sulphur dioxide long term emissions based on 1997 results was used to estimate the relationship of environmental pollution with copper revenue, the following table depicts the regression analysis results from 1994-2000.

Equation y= x1 + C | Y=Sulphur emissions, X=Copper revenue, C=constant

Table 2: Regression result of Sulphur emission during nationalization 1994-2000

Model 1: OLS, using observations 1994-2000 (T = 7)

Dependent variable: sulphur_emission_tonnes_in_mg_n

	Coefficient	Std. Error	t-ratio	p-value	
const	31260.1	6657.72	4.6953	0.00536	***
copper_revenue____M	11.8108	5.4167	2.1804	0.08107	*

Mean dependent var	45142.86	S.D. dependent var	6564.985
Sum squared resid	1.33e+08	S.E. of regression	5148.856
R-squared	c	Adjusted R-squared	0.384888
F(1, 5)	4.754327	P-value(F)	0.081068
Log-likelihood	-68.58063	Akaike criterion	141.1613
Schwarz criterion	141.0531	Hannan-Quinn	139.8242
rho	-0.011508	Durbin-Watson	1.595968

Source: Gretl computation

Obtained equation

Y=11.8108X1 + 31260.1

6.1.1 Interpretation

Under state control of the mines there was a low statistically significant level between sulphur emission and copper production, as shown in the equation for every increase in 1unit of copper prudution resulted in 11.8108 unit increase in sulphur emission as a goodness of fit of 48.87%. spurrous regression was not considered.

The following table depicts the results of regression analysis of sulphur long term emission based on 2009 results with copper revenue obtained during privatisation from 2001-2010

Table 3: Regression results of sulphur long term emission during privatisation 2001-2010

Model 2: OLS, using observations 2001-2010 (T = 10)					
Dependent variable: sulphur_emission_tonnes_in_mg_n					
	Coefficient	Std. Error	t-ratio	p-value	
const	35710.6	3972.94	8.9884	0.00002	***
copper_revenue____M	6.65357	1.22809	5.4178	0.00063	***

Mean dependent var	53929.41	S.D. dependent var	13629.94
Sum squared resid	3.58e+08	S.E. of regression	6690.424
R-squared	0.785826	Adjusted R-squared	0.759054
F(1, 8)	29.35281	P-value(F)	0.000632
Log-likelihood	-101.1580	Akaike criterion	206.3160
Schwarz criterion	206.9212	Hannan-Quinn	205.6521
rho	-0.061953	Durbin-Watson	1.911467

Source: Gretl computation

Equation obtained

Y=6.65357X2+35710.6

6.1.2 Interpretation

From the results above there is a statistically high signifance level of the relationship between sulphur long term emission and copper revenue, for every 1unit increase in revenue results in 6.65357 unit increase of sulphur emissions at a goodness of fit of 78.58%

6.1.3 Privatisation vs Nationalisation

In this section to compare the impact of revenue on enviromental pollution the coeffience and R2 of the regression analysis were used to estimate the difference in copper revenue relationship with environmental polluton the following table shows the results

Table 4: Impact on environment

	Privatisation	Nationalization	Differece P-N
Coefficient	6.65357	11.8108	-5.16
R2	0.786	0.487	0.298
Significance	High***	Low*	Average**

Source: Gretl and own computation

According to the results above there is more goodness of fit and significance level under privatisation 29.8 higher and (**) respectively. Under nationalisation sulphur emission may have higher coefficient impact of 5.16 however due to the low significance level and lower that 50% goodness of fit emissions during nationalisation may not havent been entirely related to copper activities hence under privatisation there is more sulphur emission which is 78.6% related to copper mining.

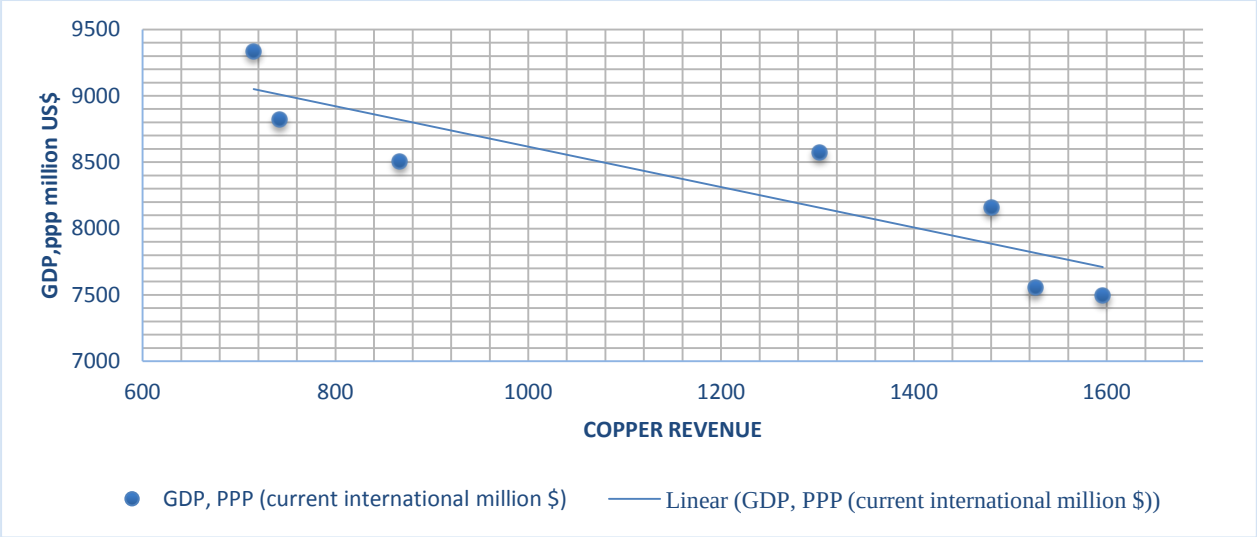
6.2 GROSS DOMESTIC PRODUCT,PPP

To analyse the impacts of privatisation in this chapter GDP was used to estimate its correlation strength, trend and coefficient impacts with copper revenue from the year 1994-2010 using the following function:

Equation:

y= ax+e. Y=GDP,ppp, X_1=copper revenue,

Graph 12: Regression analysis of GDP PPP and Copper revenue 1994-2000



Source: Excel computation.

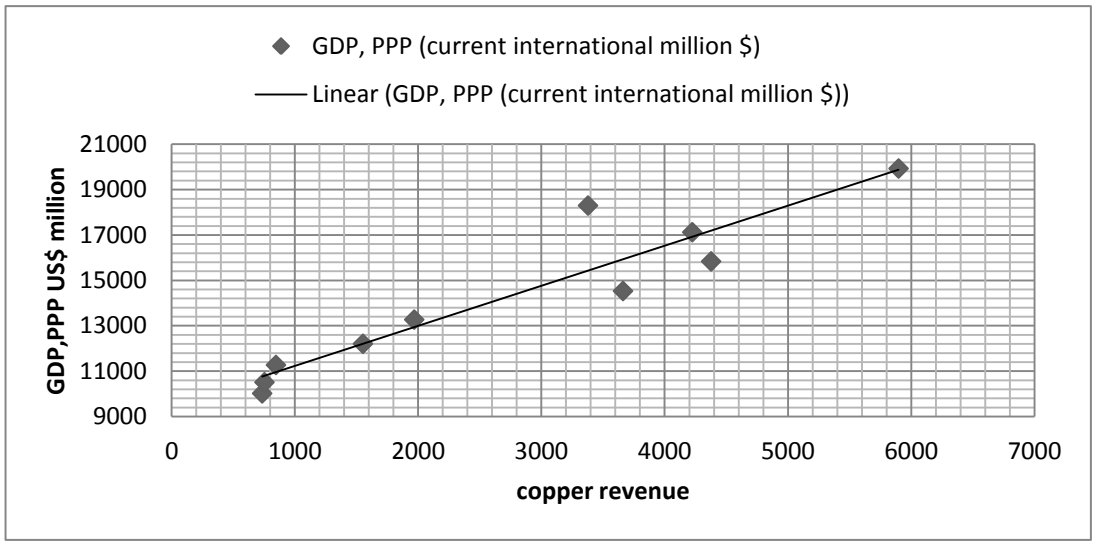
Equation y = -1.5216x + 10138	R^2 = 0.7829
Numer of observations:7	Significance level: ***

6.2.1 Interpretation of nationalisation results

The results of the correlation analysis above depicts a statistically highly significant relationship between GDP and Copper revenue. However, as seen from the slope there is negative relationship between copper revenue and GDP , according to the equation for every 1unit increase in revenue at the goodness of fit of 78.29% results in a decrease of revenue 1.25 units.

The following graph shows the results of the correlation analysis of GDP and Copper revenue after privatisation from the year 2001-2010

Graph 12 Regression analysis of GDP and copper revenue 2001-2010



Source: Excel computation

Equations y = 1.765x + 9465.8	R^2 = 0.8775
N_O obersavtions: 10	Significance level:***

6.2.2 Interpretation of privatisation results

The results above show a statistically high relationship between GDP and Copper revenue during privatisation. As depicted above there is a positive relationship at a goodness of fit of 87.75%, according to the equation for every increase in 1 unit of copper revenue there is an increase of GDP by 1.765.

6.2.3 Nationalisation vs Privatisation

The following table depicts the difference in R2 and coeffience impacts of revenue on GDP between privatisation and nationalisation

Table 5: Effect on GDP

	Privatisation	Nationalisation	Differece P-N
Coefficient	1.765x	-1.5216x	+3.286
R2	0.8775	0.7829	0.094
Significance	High***	Low*	Average**

Source: own computation

6.2.4 Interpretation

From the results shown in the above table under privatisation copper revenue has a goodness of fit of 9.4% higher than nationalisation. Futhermore, under privatisation for every change of 1 copper revenue results in an increaase of 3.286 units of GDP at a goodness of fit of 9%. Hence, safe to conclude that under privatisation there is a postive effect of copper on the Zambian economy

6.3 FOREIGN DIRECT INVESTMENT

The following graph shows a regression analysis of FDI and Copper revenue under nationalization from the year 1994-2000.

The following equation was used to y=ax+e | Y=FDI, X=Copper revenue e=error

Table 6: regression analysis of FDI with copper revenue

Model 2: OLS, using observations 1994-2000 (T = 7)					
Dependent variable: Foreign_Direct_Investment					
	Coefficient	Std. Error	t-ratio	p-value	
const	226.822	71.5167	3.1716	0.02477	**
copper_revenue____M	-0.0783613	0.0581858	-1.3467	0.23588	

Mean dependent var	134.7143	S.D. dependent var	58.93984
Sum squared resid	15295.20	S.E. of regression	55.30860
R-squared	0.266186	Adjusted R-squared	0.119423
F(1, 5)	1.813714	P-value(F)	0.235884
Log-likelihood	-36.84542	Akaike criterion	77.69083
Schwarz criterion	77.58265	Hannan-Quinn	76.35375
rho	0.315664	Durbin-Watson	1.015661

Source: Getl computation

Equation: y = -0.0784x + 226.82

6.3.1 Interpretation of results of nationalisation

Under state control mining activities had a negative relationship with FDI as shown from the negative slope at a goodness of fit of 26%. The equation states that for every increase in 1 unit of Copper revenue resulted in a decrease FDI by -0.0784. However, the results of the above analysis were statistically insignificant. One can conclude that Copper mining under state management attracted less and less FDI.

The following table depicts a regression analysis of FDI and copper revenue during private control of the the Zambian mines . the following equation was used to estimate correlation strength and trend

Equation: Y=X1+X2+E | Y=FDI, X_1= X_2= E=constant

Table 7: Regression analysis results of FDI with copper revenue 2001-2010

Model 1: OLS, using observations 2001-2010 (T = 10)					
Dependent variable: Foreign_Direct_Investment_milli					
	Coefficient	Std. Error	t-ratio	p-value	
const	32.1729	113.051	-0.2846	0.78319	
copper_revenue____M	0.261403	0.0349455	7.4803	0.00007	***

Mean dependent var	683.6000	S.D. dependent var	507.4934
Sum squared resid	289947.6	S.E. of regression	190.3771
R-squared	0.874912	Adjusted R-squared	0.859276
F(1, 8)	55.95491	P-value(F)	0.000071
Log-likelihood	-65.56374	Akaike criterion	135.1275
Schwarz criterion	135.7326	Hannan-Quinn	134.4636
rho	-0.199689	Durbin-Watson	2.165742

Source: Gletl computation.

Equation: y=0.261403x -32.1729. significance level low:* average:** high:***

6.3.2 Interpretation of Privatisation

We estimated that if there is no correlation R2 would be low and parameter b would be insificant. However, there is a positive relationship between FDI and copper revenue under privatisation that is for every increase in 1 unit of copper revenue resulted in 0.26 unit increase in FDI at a high statistically significant level at a goodness of fit of 87.49 %

6.3.3 Nationalisation vs Privatisation

The following table summaries the difference between nationalisation and privatisation impacts Impact on FDI using R2 and coefficient differences in 1 unit of change.

Table 8: Effects on FDI

	Privatisation	Nationalisation	Differece P-N
Coefficient	0.261403	-0.0783613	0.3397643
R2	0.874912	0.266186	0.608726
Significance	High***		High***

Source: getl results and own computation

6.3.4 Interpretation

One may conclude that under privatisation copper mining has attracted more FDI than uder state control, due to the higher goodness of fit of 60.87% and the statistically significance impact of copper revenue on FDI. As evidence show from the above table that a change in 1 unit of copper revenue under privatisation resulted to an increase of 0.3398 FDI units higher than nationalization.

6.4. CONSUMER PRICE INDEX (2005=100)

In this capter consumer price index was used to analyse the impact of copper mining before and after privatisation on the Zambian economy. Data of Zambian consumer price index was obtained from IMF and World bank while copper revenue was calculated copper prices data obtained from LME and total copper from copper fact.

The following table provides empirical regression results of copper revenue and consumer prices index regression analysis from 1994-2001

Table 9: Regression results of CPI with Copper revenue

Model 1: OLS, using observations 1994-2000 (T = 7)					
Dependent variable: Consumer_price_index_2005_100					
	Coefficient	Std. Error	t-ratio	p-value	
const	53.6923	5.40121	9.9408	0.00018	***
copper_revenue____M	-0.0272237	0.00439441	-6.1951	0.00160	***

Mean dependent var	21.69286	S.D. dependent var	11.23154
Sum squared resid	87.24113	S.E. of regression	4.177107
R-squared	0.884737	Adjusted R-squared	0.861684
F(1, 5)	38.37891	P-value(F)	0.001599
Log-likelihood	-18.76225	Akaike criterion	41.52450
Schwarz criterion	41.41632	Hannan-Quinn	40.18742
rho	-0.110299	Durbin-Watson	1.623607

Source: Getl computation.

Generated equation

Y=-0.027X+53.69	Y=Consumer price index,X=copper revenue e=error term

significance level low:* average:** high:***

6.4.1 Interpretation of results of nationalisation

The results above show a statistically high significant correlation strength at a goodness of fit of R2 88.47%. However, there is a negative relationship between consumer princes and copper revenue as empirical evidence show that for every increase in 1 unit of copper revenue resulted in a decrease by 0.027 units of consumer prices index.

The following table shows empirical results of copper revenue and consumer price index, the regression analysis was done on privatisation from 2001-2010 using the following equation

Equation y=ax-e

Y= Consumer price index , X= copper revenue,E=error term

It was expected that the parameter a would be statistically insignificant if there is no relationship between the valuables.

Table 10: Regression analysis of CPI with copper revenue

Model 1: OLS, using observations 2001-2010 (T = 10)

Dependent variable: Consumer_price_index_2005_100

	Coefficient	Std. Error	t-ratio	p-value	
const	49.7778	9.97484	4.9903	0.00107	***
copper_revenue___M	0.020148	0.00308335	6.5344	0.00018	***

Mean dependent var	104.9470	S.D. dependent var	39.86803
Sum squared resid	2257.274	S.E. of regression	16.79760
R-squared	0.842205	Adjusted R-squared	0.822481
F(1, 8)	42.69879	P-value(F)	0.000181
Log-likelihood	-41.28603	Akaike criterion	86.57205
Schwarz criterion	87.17722	Hannan-Quinn	85.90818
rho	0.076619	Durbin-Watson	1.728472

Source Getl computation

6.4.2 results interpretation of privatisation

The regression results above depicts a positive relationship between copper revenue and consumer price index at a statistically high significance level and a good with a goodness of fit of 84.23%. the coefficient results show that for every increase in 1 unit of copper revenue resulted into an increase of 0.02 units of consumer price index

6.4.3 Privatisation vs Nationalisation

Table 11: Effect on CPI

	Privatisation	Nationalization	Differece P-N
Coefficient	0.0201	-0.0272	0.0473
R2	0.8422	0.8847	-0.0425
Significance leve	High	High	

Source:Getl and own coputation

6.4.4 Summary of copper mininng impact on consumer prices

Under privatisation there is a positive relationship between CPI and Copper revenue with the difference of 0.0473 increase in CPI for every change in 1 unit of copper revenue However there is a lower goodness of fit (R2) than nationalisation of 4.25% this may have been as a result of the diversification of the Zambian economy to ensure sustainable growth. by comparing the results in the above table one may conclude that under privatisation consumer prices have increased as rather than under nationalisation that had a negative relationship.

6.5 REAL EXCHANGE RATE

In this section instead of copper revenue, copper prices and quantity were used to determine their impact on real exchange rate in order to prove the hypothesis of the dutch disease "states that increase in prices results in increase in real exchange rate"

the following table shows the empirical regression result of prices, quantity correlation to real exchange rate.

The following equation was used to estimate the correlation impacts

Y=X1+X2+E | Y=Real exchange rate, X_1 =Copper prices E=constant

Table 12: Regression analysis of RER with Copper Prices

Model 1: OLS, using observations 1994-2000 (T = 7)					
Dependent variable: RER_2005_100					
	Coefficient	Std. Error	t-ratio	p-value	
const	89.971	7.7244	11.6476	0.00008	***
Prices_US__Mtonne	-0.00548231	0.00231194	-2.3713	0.06385	*

Mean dependent var	72.11429	S.D. dependent var	6.057345
Sum squared resid	103.6181	S.E. of regression	4.552320
R-squared	0.529327	Adjusted R-squared	0.435192
F(1, 5)	5.623078	P-value(F)	0.063849
Log-likelihood	-19.36438	Akaike criterion	42.72875
Schwarz criterion	42.62057	Hannan-Quinn	41.39167
rho	-0.096321	Durbin-Watson	2.018684

Source:Getl computation

The following equation was obtained in the above analysis

Equation y= -1.3486X1-0.0054X2+90.2969

6.5.1 Interpretation of nationalisation results

The impact of the both copper prices and quantity had insignificant impact on real exchange rates under privatisation further more the low R squired of 52.94 % comfirms the hypothesis that the explanatory variables before 2000 had insignificant impact on real exchange rates. The coefficient of the explanatory variables show relationship that for every increase in 1 unit of either quantity or prices there is a decrease in real exchange rate by -1.34856e and -0.00543539 respectively.

The following table shows the results of regression analysis of copper prices and quantity impacts on real exchange rate during privatisation. Using the same equation as before privatisation

Y=X+E

Y=Real exchange rate, X= revenue E=constant

Table 13: Regression analysis result of REL with revenue

Model 1: OLS, using observations 2001-2010 (T = 10)					
Dependent variable: RER_2005_100					
	Coefficient	Std. Error	t-ratio	p-value	
const	77.4984	6.47101	11.9762	<0.00001	***
revenue_million_US_	0.0108544	0.00200027	5.4265	0.00063	***

Mean dependent var	107.2200	S.D. dependent var	22.22790
Sum squared resid	949.9831	S.E. of regression	10.89715
R-squared	0.786363	Adjusted R-squared	0.759658
F(1, 8)	29.44670	P-value(F)	0.000626
Log-likelihood	-36.95868	Akaike criterion	77.91736
Schwarz criterion	78.52253	Hannan-Quinn	77.25349
rho	-0.074214	Durbin-Watson	1.854145

Source: Getl Computation

Equation obtained Y=0.0078X1+1.4091X2+61.6212

6.5.2 Interpretation of privatisation results

For every 1 unit increase in copper produced results in 1.4091 increase real exchange rate. However the impact of copper produced remains statistically insignificant, one the other hand for every 1 unit increase in copper prices results in 0.0078 unit increase in real exchange rate at a statistically high significance as denoted by ***

6.5.3 Dutch disease

In this section we proved the hypothesis the "dutch disease" true that higher copper prices result in higher exchange rate. The following table shows summary on regression analysis.

Table 14: Effect on RER

	Privatisation of prices	Nationalization of prices	Differece P-N
Coefficient	0.0078	-0.0054	0.0132
R2	0.834	0.529	0.305
Significance	High***	Low*	Average**

Source: Gretl and own calculations

According to the results in the above table there in a statistically significant impact on real exchange rate primarily by copper prices. Under privatisation from 2001-2010 there is an increase in coefficient and goodness of it as shown from the table in the difference P-N column that during privatisation for every increase in 1 Unit of copper resulted in 0.0132 unit increase in Real Exchange Rate at a 30.5% goodness of fit higher than real exchange rate under state control of the mines. The result given above prove the dutch theory true due to higher correlation.

6.6 EXTERNAL DEBT STOCK (EDS)

In this section to examine copper activities impacts on Zambian economy before and after privatisation, External debt stock was used as a depedent macro economic indicator (variable) while production and prices were used as explanatory variables

The following equation was used to estimate copper prices and production quantiy impact on EDS during nationalisation

Y=X1+X2+E | Y=EDS, X= copper revenue E= constant

The following table shows the regression analysis results of copper prices and production with external debt stock.

Table 15: Regression results of EDS 1994-2000 nationalisation period

Model 1: OLS, using observations 1994-2000 (T = 7)

Dependent variable: EDS___million_US__

	Coefficient	Std. Error	t-ratio	p-value	
const	5376.73	424.563	12.6641	0.00005	***
revenue_millon_US_	1.03098	0.345423	2.9847	0.03063	**

Mean dependent var	6588.571	S.D. dependent var	499.9076
Sum squared resid	539043.6	S.E. of regression	328.3424
R-squared	0.640505	Adjusted R-squared	0.568606
F(1, 5)	8.908391	P-value(F)	0.030634
Log-likelihood	-49.31332	Akaike criterion	102.6266
Schwarz criterion	102.5185	Hannan-Quinn	101.2895
rho	-0.227432	Durbin-Watson	2.170389

Source: Gretl computation

Equation y=1.03098X+ 5376.73

6.6.1 Interpretation of nationalisation results

Under nationalisation from 1994-2000 mining revenue was statistically insignificant on external debt stock, according to the equation obtained above at a goodness of fit of 64% for every increase in 1 unit of copper revenue there was an increase of 1.03098 units in external debt stock.

The following table shows regression results of copper prices and production quantity during privatisation from 2001-2010

Table 16: Regression results of EDS during privatisation 2001-2010

Model 2: OLS, using observations 2001-2010 (T = 10)

Dependent variable: EDS_million_US_

	Coefficient	Std. Error	t-ratio	p-value	
const	7118.81	725.687	9.8098	<0.00001	***
revenue_million_US_	-0.804254	0.224319	-3.5853	0.00713	***

Mean dependent var	4916.600	S.D. dependent var	1860.238
Sum squared resid	11947326	S.E. of regression	1222.054
R-squared	0.816389	Adjusted R-squared	0.568437
F(1, 8)	12.85445	P-value(F)	0.007133
Log-likelihood	-84.15655	Akaike criterion	172.3131
Schwarz criterion	172.9183	Hannan-Quinn	171.6492
rho	0.214883	Durbin-Watson	1.356258

Source:Gretl computation

Equation

Y= -0.804254+7118.81

6.6.2 Interpretation of privatisation results

According to the results, during privatisation there was a negative relationship between copper revenue and external debt stock at a statistically high significant level. The equation above states that for every increase in revenue by 1 unit external debt stock decreases by 0.804254.at a goodness of fit of 81.64%

6.6.3 Privatisation vs Nationalisation

The following table compares the difference in regression results of copper prices relationship with external debt stock before and after privatisation. In this section only the difference in R2 and the coefficient results of copper prices due its significance were considered to estimate the impact.

Table 17: effect on EDS

	Privatisation	Nationalization	Differece P-N
Coefficient	-0.978	0.216	-1.194
R2	0.813794	0.724868	0.0791
Significance	High***	Average**	Low*

Source: Gretl and own calculations

6.6.4 Interpretation

Under privatisation there is a higher significant relationship of copper prices and external debt stock. looking at the correlation difference for every increase in 1 unit of prices there is a decrease in debt stock of 1.194 due to privatisation. The goodness of fit under privatisation is higher by 7.91% and statistically significant while under nationalization the relationship of both prices and production of copper with external debt stock remained statistically insignificant.

7. CONCLUSION

Under state control, the mining industry was making annual losses estimated at 1 million dollar per day. Hence, due to the overly poor performance of the mining sector and the tight debt control of the IMF and the European Investment Bank, the government was forced to privatize. during the when 1990s privatisation was considered has an important structural reform ingredient The main aim of privatisation was to revive the mining sector by increasing its impact on the economy hence establishing an attractive environment for foreign direct Investment aswell.

The aim of this thesis was to examine the copper mining impact on economic growth and the environment, Under state control of the mines the time period 1994- 2000 was used to compare with the time period 2001-2010 under private control of the mines.

When it comes to determining economic growth in developing countries Privatisation was considered in the 90s as an important ingredient that ensures structural refroms and economic growth, in was proven true in the case of Zambia.

Although, under privatisation the sector produced copper more efficiently than under national control, Privatisation did not have significant impact on the economic growth due to he low mineral royalty in this section only two mineral regime have been considered 2001-2008 regime of 0.6% mineral royalty and 2010 at 3% mineral royalty, recent development in mineral royalty resulting increament up to 6% mineral royalty have not been taken into consideration. Hence, its safe to conclude that the fiscal regime change in 2008 has played an important role in this thesis research, The change in fiscal policy was very evident when the increase from 0.6-3 % mineral royalty resulted in higher GDP growth.

Under state control the effective opperations of the mines caused environmental pollution due to the lack of capital and mitigation measures. Zambian till this day 2014 has remained one of the least emission efficient countries in the world, Environmental pollution has continued regardless of privatisation. However, under private control there was much less cofficient impact but higher goodness of fit and significant relationship with environmental pollution. Due to the latter stated reasons under private control there is stronger relationship of copper revenue and environmental pollution.

Finally, the empirical evidence presented in this thesis suggests that the prognosis made by the IMF and EIB was due to the 30 years of ever falling copper prices that led them to conclude that copper prices would not go up atleast for another 20 year, new markets like China were not taken into consideration, that’s why the people of Zambia feel robbed.

8. RECOMMENDATION

Government during state control kept the people without information on the status of the environment which they called home, mainly due to the much needed revenue the mines brought in. However, there was free health care for whole formal mine workers with their registered relatives having approximately 20% payment of the actual fee. Under privatisation free health care privalledges have been cut, However, formal mine workers pay about 15%

To ensure a better enviroment For both mining and the local people, the following activities need to be made transparent or implemented

Transparency on environmental pollution (publicizing pollution levels), actual monitoring have been put in place but the lack of public data, causes the people to slightly overlook the very much visible pollution also passes the attention from organisations such as World Health Organisation that can help put an end to the disregard of Human life and rights on in the name o profit.

Increase the cost of pollution, The mines were privatised with the least environmental responsibility as a result the cost of pollution is very low quite insignificant as no mitigation measures were taken to counter the pollution between 2006-2010. However, due to the introduction of the leaching extraction process more cases of air and water pollution had been reported.

The after 5 year of privatisation, the increased copper prices and quantity brought a investigations why there was hardly an tangible benefits on the economy as assumed during privatisation in 2000. The investigation brought the former president Fredrick Chilluba to justice who personaly benefit from privatisation.

To ensure futher economic benefit from mining the following need to be made transparent or implemented:

Make all information on developmental agreements during privatisation public

To reduce further possible corruption activities such payments through corporate income tax, mineral royalty, dividents and price participation should be made public knowlodge.

Monitoring if the companies are observing labour laws, due to the complaints that have been put forward concerning over walking workers.

The government should renegotiate further fiscal regime change that allows Zambia to benefit more from the much needed copper revenue.

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