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RESEARCH ARTICLE

COMPETITIVENESS EVALUATION OF THE ZAMBIAN MINING TAXATION SYSTEM.

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Abstract

Fiscal regime is one of the key features of mineral policy investors assess when considering investing in a specific jurisdiction. A competitive and equitable fiscal regime from an investor's perspective attracts foreign direct investment (FDI) in the extractive industry of a country. This research aimed at examining the competitiveness of the June 2016 Zambian mine tax system in relation to different jurisdictions. The method of study employed quantitative evaluation of the country's mine tax system based on financial modeling of a stylised copper mine to assess the distribution of the tax burden between investors and the Zambian government. Quantitative modeling results of the hypothetical model showed that Zambia has a comparable and competitive effective tax rate (ETR) at 54.5 percent falling within the range of the World Bank's optimal estimates (40-60%) based on the employed assumptions in the copper model. The study further revealed that mine taxation system was regressive with mineral royalty tax, operating costs and commodity price and was fairly neutral with respect to capital expenditure and corporate income tax. The noted low correlation between ETR and the used headline taxes indicated that headline taxes should not be treated discretely as bases for taxation regime design. A combination of elements in the mineral taxation policies is what determines the competitiveness and overall government returns from a project. The study recommended that Zambia needs to strengthen its institutional capacities to enhance tax administration, policy formulation and mining sector monitoring.

Introduction:-

Zambia is still highly dependent on mining as its major productive industry. The country's macroeconomic contribution is high in exports and government revenue but with progressively lower contributions in other areas such as gross domestic product (GDP), investment and employment (ZEITI, 2015). Zambia is richly endowed with mineral resources and is one of the largest producers and exporters of copper in Africa (ZEITI, 2014). The percentage of extractive industry contribution to the economy in 2014 was 78% of export earnings, 1.6% of total FDI, 32% of government revenues, 6% of gross domestic product (GDP) and only 1.7% of direct employment (ZEITI, 2015).

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The principal objective of a mining policy should be to maximise government revenue from the mining sector over time (Manley, 2013). This demands that the taxation policy should be reasonably attractive to investors by being internationally competitive with other mineral producing nations. Ascertaining the clarity in terms of global competitiveness by government policy makers and investing companies is not easy since each mineral fiscal regime in each jurisdiction has different attributes in terms of mineral policies followed. Tordo (2007) noted that mining and petroleum companies operate on a global scale and compare fiscal terms in deciding where to invest.

Zambia being a mineral economy faces some challenges when designing a tax system that meets two fundamental objectives namely to ensure a fair share of rent for itself and all together providing sufficient revenues needed by investors to accomplish investment in the sector. A competitive fiscal regime should be attractive to foreign investment by enabling both parties to achieve their competing needs to some degree. These competing objectives have not been fully achieved because ever since the privatisation of the state-owned mining company - Zambia Consolidated Copper Mines (ZCCM) in 2000, Zambia has revised the mine fiscal regime more than seven times. This followed incessant concerns that benefits from the mining sector have been low.

Objectives of the study:-
The main purpose of this study is to evaluate the attractiveness of Zambia's mineral fiscal regime by using a quantitative financial modeling of a stylised copper mine model.

Specific objectives:-
a) To determine the distribution of rent between government and the investors using economic measures based on headline taxes.
b) To determine the competitiveness of the Zambian mine tax regime using concepts of progressivity, neutrality and regressiveness.

Theoretical background:-
Various policy related discussions aimed at assessing the international competitiveness of the fiscal regimes in the extractive industry have been given (Daniel et al., 2010; Ostensson et al., 2014; Otto et al., 2006). Research in Zambia covering various aspects of mine taxation issues and competitiveness evaluation have also been conducted (Conrad, 2012; Haglund, 2013; Manley, 2012; World Bank, 2015).

Financial modeling using hypothetical copper model:-
Hypothetical mine models are useful to analyse the competitiveness of the taxation system in different taxation jurisdictions. Haglund (2013) recounted that researchers and professional services firms may apply the different fiscal terms of different countries on a hypothetical mining operation and on this basis calculate an 'effective tax rate' (a measure of 'government take'). Standard mine models like FARI models (Luca and Puyo, 2016) and Institute for Global Resources Policy and Management (IGRPM) at the Colorado School of Mines (Otto, 2002) based on government take and profitability measures have been used as an aid to fiscal regime design and evaluation, particularly through international comparative analysis.

Criteria for competitiveness evaluation of a tax system:-
A number of authors (Cawood, 2011; Harman and Guj, 2013; Nakhle, 2008; Tordo, 2007) have described the most fundamental criteria against which any tax, if it is to succeed in its basic purpose, should be appraised. These include; neutrality, economic efficiency, stability, equity, risk sharing, transparency, and clarity and simplicity. Cross-country studies have repeatedly shown that a high proportion of fiscal regimes are either neutral or mildly regressive and that very few are clearly progressive (Land, 2009). These three attributes of progressive, regressive and neutrality are evaluated for international competitiveness of the Zambian mine fiscal regime based on the stylised copper mine model using various inputs.

Progressivity:-
Progressivity is a situation where a tax regime will yield a rising present value of government revenue as the pre-tax rate of return on a project increases (Daniel et al., 2010). A progressive fiscal regime - where the percentage due to the government based on tax and other payments increases as the basis increases - can better adjust to changes in prices, volumes, and projects' operating conditions (Alba, 2009). A progressive tax systems include progressive profit taxes, price based windfall taxes and sliding-scale royalties.

Neutrality:-
Neutrality criterion determines whether the tax system interferes with investment and operational decisions in such a way as to cause them deviate from what is the social optimum (Nakhle, 2008). A neutral tax will generate revenues when a company earns profits and nothing when it makes a loss. This concept of neutrality argued that the objective of the taxation system designed to collect economic rents for a government should be to ensure that there is no impact on the exploration and production activities of mining (Herman and Guj, 2013).

Regressiveness:-
Many fiscal regimes for the extractive industries are regressive rather than progressive implying that the government's share falls as profitability improves (Land, 2009). Royalties are an imposition on production, not profits, and constitute a regressive form of taxation. Although excessive reliance on royalties may lead to inefficient operations and the discouragement of investment, many governments prefer an assurance that some revenue can be raised, irrespective of profitability (Land, 2009).

Methodology:-

Collection of data:-
The study involved both primary and secondary data collection. Primary data was collected from government national speeches, electronic mail and discussions with some "experts" in the mining sector. Secondary data was sourced through wide and extensive literature from: various online and printed publications; research reports; textbooks; published and unpublished reports; and global extractive industry reports. In Zambia, secondary information sources include various government ministries and institutions.

Eleven (11) countries were selected for comparison namely; Russia, Ghana, South Africa, Peru, Tanzania, Namibia, Botswana, Chile, Western Australia, Congo DR (DRC), and Canada (Ontario). Six of these countries; Chile, Peru, Australia, Canada, Russia and DRC are ranked among the top 10 copper producing nations with some escaping the 'resource curse' in terms of mineral policies followed. Based on Amundsen (2012), the 'resource blessed' countries include Australia, Canada, Chile and Botswana while others like Zambia and Congo DR are 'resource cursed'. Mineral royalty tax (MRT) and corporate income tax (CIT) rates for the eleven selected countries vary between 2.5 - 14 percent and 15 - 35 percent respectively (Conrad, 2012; IMF, 2015).

Hypothetical copper mine model:-
For this study, the conception of the model is to place the stylised Zambian copper mine project in other jurisdictions and try to measure the returns to the investor and to the government resulting from the differences in the fiscal regimes. The copper mine model was considered at pre-feasibility stage with characteristics that are representative of mining activity based on Zambia's geological features and business environment but does not represent any specific project in the country. Discussions held with "experts" from mining companies on various inputs led to develop a model copper mine project at the pre-feasibility stage. The technical and economic parameters forming the assumptions for this stylised copper mine are as presented in Table 1. These were considered to represent a low-grade copper project with an operating cost profile nearing the working mines employing economies of scale.

The actual rent sharing is very difficult to ascertain between African governments and investors in a standardised manner. This is because the economic data on projects are either not widely available or difficult for researchers to use, which force them to create hypothetical mine projects. Therefore, stylised models are intended to produce results that are indicative of the impact of various fiscal regimes on project economics so that a government can assess in broad terms the international competitiveness of a fiscal regime (Laporte and Quatrebarbes, 2016). The model holds revenues and costs constant for each country and the only variable is the country's tax regime involving MRT and CIT for this study.

Table 1:-Stylised copper mine model assumptions

Variable	Value
Mineral reserve base	780,000,000 tonnes
Copper ore production per year	28.0 million tonnes
Developing period	2 years
Mine life	20 years

Capital expenditure base	US$1,300 million
Capital allowance charge	25% per annum
Annual operating cost	US$3,500/tonne
Copper selling price	US$6,640/tonne
Escalation: Commodity price Costs	 0.45 % per annum 2.0% per annum
Average copper grade	0.70%
Combined recovery	80%
Corporate income tax	30%
Mineral royalty rate	3%
Discount rate	12%

Explanation of key variables in the model assumptions:-

Reserves:-

The basis of any mineral development is the existence of an ore reserve (Baurens, 2010). One of the important functions of a feasibility study is the determination of a scale of operations (production rate) to maximise return on investment. The production rate proposed in a feasibility study should be approximately equal to that given by applying Taylor's Law [1] which has proven accurate for both open pit and underground application (De la Vergne, 2003).

$$The\ \ optimum\ \ extraction\ \ rate = \frac{5 \cdot (\text{expected reserves})^{\frac{3}{4}}}{(\text{days per year})} \qquad [1]$$

where "expected reserves" are generally interpreted to mean *proven + probable* reserves. Allen (1986) noted that the production rates for a wide range of mines were within 20% of the 'rule' figure.

Price:-

The model used the copper price assumption for the period 2014 to 2023 (Fig.1) giving an average of $6,640/tonne. Data was drawn from the January 2015 World Bank (2015a) commodity price forecast showing an annual increase of $30/tonne per annum from 2015-2023 resulting in 0.45% average annual growth rate in nominal price terms.

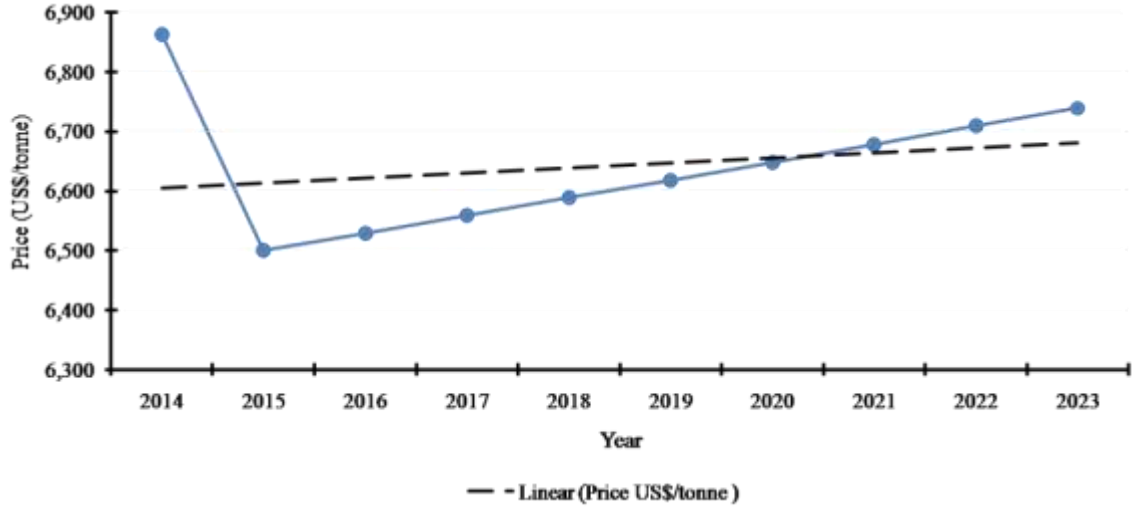

Fig.1:- Copper price forecast (World Bank, 2015a)

Costs:-

The costs associated with a mine will have an effect on that mine's tax liability (Otto, 2002). In Zambia, estimations of C_1 costs in different Zambian copper mines made by World Bank (2015) varied from mine to mine ranging from $1.6 - $2.90/lb. Based on the numerous discussions held with "experts" in Zambia, this hypothetical model used a

base case operating cost of $1.60/lb and provided sensitivity of the tax system to unit total cost changes to cater for a range of production costs in the mines. The model employed the escalated nominal dollars with the (operations, capital and capital allowances) costs escalated.

Financing:-

Most large-scale mines use a combination of debt and equity capital finance. It is common for exploration costs to be fully financed with equity, while development costs are financed with a combination of debt and equity (Luca and Puyo, 2016). Estimation of project economics by GFMS (2013) showed that a new project in Zambia scheduled to be commissioned in the year 2015 had an estimated capital expenditure of $1,700 million with additional production of 290,000 tonnes of copper concentrate per year.

For this study, the stylised copper project was considered fully integrated, operated from a perspective of foreign investment and non-leveraged or 'ungeared' with 100% equity finance. The model employed a base case for non-leveraged capital expenditure of $1,300 million considered to be injected at the inception of project development. This was done to avoid making variations to discount rates as noted by AusIMM (2012) that financial theory requires the discount rate be adjusted if debt is introduced.

Discount rate:-

The discount rate is that rate used to discount the value of future benefits and costs to its present value. It must reflect geological, political, and economic risks associated with the development of the resource project and can be measured by the investor's cost of capital (Luca and Puyo, 2016). This cost of capital for the company reflects the cost of rewarding the owners (cost of equity) and the lenders (cost of debt) for their investment in the company (Crundwell, 2008). A discount factor figure of 10 - 15 percent is common in the hard rock mining industry (De la Vergne, 2003).

For this hypothetical copper model, a discount rate of 12% was used following consultations made with "experts" from the Zambian mining companies who indicated that in most Zambian mines, discount rates of 10%, 12% and 15% are used. Studies on mine contribution and tax modeling in Zambia by Chileshe (2013) also indicated that the Zambian discount rates range 10 to 20 percent.

Economic measures:-

The determined economic measures based on direct cash flows using the discounting factor (DCF) techniques included; the 'government take' (ETR), investor's measure of profitability (Internal Rate of Return - IRR), investor's indication of tax system neutrality (marginal effective tax rate - METR) and breakeven price. The used direct net cash flow (NCF) was of the form:

$$NCF = RV – MRT– OPC – DEP – CIT + DEP – CE \quad [2]$$

where RV is the annual revenue (Tonnage x Price x Recovery x Grade), MRT is the mineral royalty tax, OPC being the annual total cash costs, DEP is the annual depreciation charge, CIT is the corporate income tax calculated as a percent of the taxable income and CE is the initial capital expenditure.

Effective tax rate (ETR):-

The ETR is a useful measure for understanding the division of net revenues between the government and the investors over the life of the mine. This is calculated either taking the time value of money into account (discounted cash flow analysis) or not (undiscounted) (Otto, 2009). Within the mining industry, levels of 'government take' have typically ranged from lows of some 25 percent to highs of 65 percent in certain cases, reflecting considerable differences in prospectivity and economic circumstances (Land, 2009). It is also reported that nations that have a "fair share" of fiscally derived revenues usually have a total undiscounted ETR of between 40 and 70 percent (World Bank, 2008). Effective tax burden is a better comparative base rather than the individual tax rates. This copper model used the Zambian mine taxation system to assess the 'government take' in three ways dealing with progressivity, neutrality and regressiveness.

Internal rate of return (IRR):-

The IRR for an investment proposal is the discount rate that equates the present value of the expected net cash flow with the initial cash out flow (Van Horne and Wachowicz (2008). This is the value of the discount rate at which net present value (NPV) is zero (Crundwell, 2008). The type and level of taxes that are imposed on mining enterprises have a direct bearing on the rate of return on capital. The minimum return on investment sought by mining project

investors is 15 to 18 percent, depending on country risk and other factors (World Bank, 2004). Investor's discounted IRR is a commonly used measure of profitability. Comparing the before tax and after tax IRRs assists an investor to assess how the various methods of taxation have influenced the measure of profitability. Many investors would find an IRR of 12 percent or more satisfactory (Otto, 2007).

Marginal effective tax rate (METR):-

The METR measures the difference between the pre- and post-tax rate of return at the margin, where the return on the last dollar invested just covers its cost of capital (IMF, 2015). Computation of METR (Luca and Puyo, 2016) is given:

$$METR = (\text{Pre-tax IRR} - \text{Post-tax IRR})/\text{Pre} - \text{tax IRR} \quad [3]$$

METR may be regarded as an indicator of tax system neutrality (Laporte and Quatrebarbes, 2016). This gives the extent to which the tax system reduces the rate of return on capital. The higher the METR, the lower the investment, and vice versa, making METR a good indicator of how taxes affect investment (Mintz, 2015). METR in the model was determined to get a fair picture of how alternative tax instruments affect the decision to invest in specific jurisdictions.

Breakeven price:-

The breakeven price is a resource price at which a particular project will generate a post-tax IRR that will just induce investment (Daniel et al., 2010) or required to achieve a target rate of return. This is determined in the model through iterations and then compared with the initial user price assumption. A breakeven price above the user price implies that the project is economically unviable post-tax (Luca and Puyo, 2016).

Data Analysis:-

Variations in the headline taxes - CIT and MRT were made using the application of fiscal system in different jurisdictions. The parameters forming model assumptions were incorporated in a Microsoft Excel spreadsheet to compute the economic measures by using the direct cash flow.

Study Limitations:-

- This study used only two fiscal tools - CIT and MRT for computing the 'government take' in different jurisdictions. Despite being the two major and common contributors to tax revenues in most jurisdictions, there is a potential to underestimate the effective tax burden if a total tax package is not applied.
- While the procedures for global comparisons of the competitiveness of the country's fiscal regimes are divergent, this study only used the hypothetical copper mine model for financial evaluation.
- Hypothetical models using DCF techniques though widely used are arithmetical and non-behavioural, which could limit the scope of the results. These also fail to take into account managerial risk i.e. the possibility that the mine may be abandoned before the end of its life cycle, or that work may be suspended temporarily (Laporte and Quatrebarbes, 2016).

Results and Discussions:-

The stylised copper mine project was used to analyse the competitiveness of the taxation system in comparison to different taxation jurisdictions. The results are discussed with regard to; international comparative analysis, 'government take' (ETR) and its relations to taxation tools, and the tax system sensitivity to inputs (price, costs and fiscal tools) meant to determine the progressivity, neutrality and regressiveness of the fiscal regime.

Comparative analysis:-

Rates of headline fiscal tools (CIT and MRT) were varied using the fiscal systems in different jurisdictions under study. These fiscal tools constitute the largest components of the proceeds forming the 'government take' influencing the profitability (IRR) of the mineral project. The results (Table 2) showed that the government share of undiscounted pre-tax project cash flow ranged from 28.7 to 55.9 percent, depending on the country where the project could be located - on average, 44.5 percent. The discounted effective tax rate (DETR) also varied between 38.6 and 79.3 percent.

Table 2:- Regime comparison based on ETR and post-tax IRR

Country	Undiscounted ETR	DETR (10%)	Post-tax IRR

Canada	28.7	38.6	18.9
Western Australia	38.7	47.5	18.0
Congo DR	38.7	47.5	18.0
Botswana	40.7	50.5	17.8
Namibia	42.7	52.9	17.6
Chile	40.4	56.0	17.7
Tanzania	44.9	57.0	17.4
South Africa	47.5	61.9	17.2
Peru	46.8	62.1	17.0
Ghana	54.4	70.3	16.4
Zambia (2016 Regime)	54.5	72.4	16.6
Russia	55.9	79.3	16.7
Average	***44.5***	***58.0***	***17.4***

These results show that Ghana, Zambia, and Russia are countries in the third taxing quartile with above 50 percent ETR values. At 30 percent CIT rate and 6 percent for MRT (maximum threshold for the 4-6 percent sliding-scale royalty), ETR for Zambia yielded 54.5 percent for a copper price of $6,640/tonne. Except for Canada, all countries reviewed given the used model assumptions have undiscounted ETR values which are close and in line with the optimal ETR indications for World Bank (2008) falling between 40 and 60 percent for base metal mines. This indicates that Zambia's fiscal regime can be considered internationally competitive from foreign investor's perception when compared to studied jurisdictions that it must compete with for foreign investment.

Relationship of 'government take' to headline taxation tools:-

The results from the model were used to analyse the relationship between the rates of fiscal tools and the equitable nature of the fiscal regimes. Results showed that there is no significant correlation existing between overall ETRs for the life of mine project and headline CIT (Fig.2), or the vital MRT (Fig.3) for different jurisdictions.

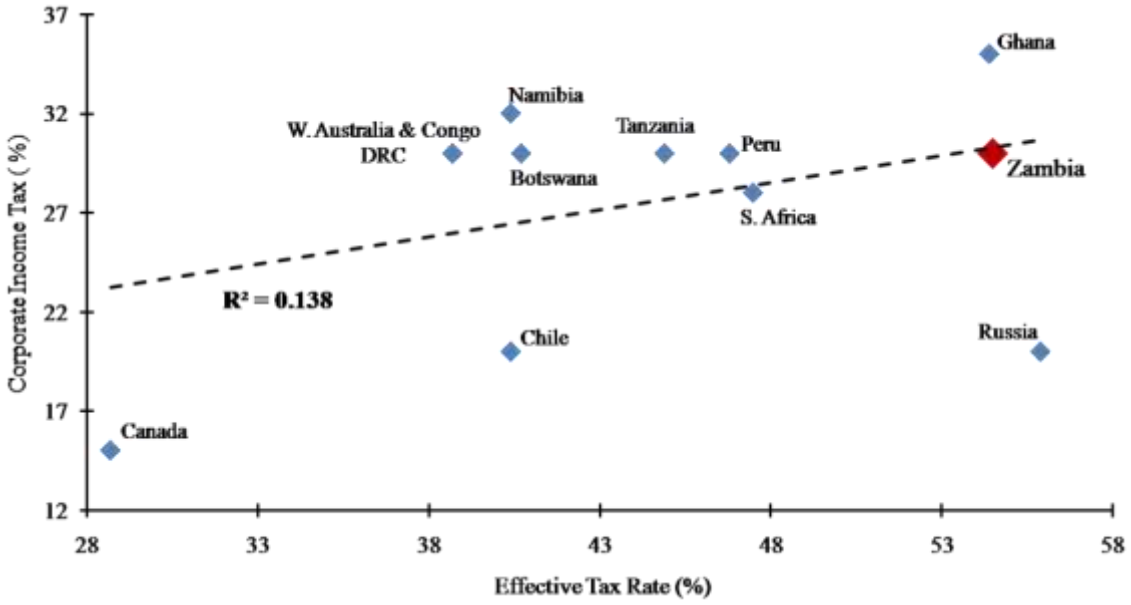

Fig.2:- Plot of ETR for each country against equivalent CIT

These results imply that, even though taxation tools are important criteria that overseas investors evaluate when considering the competitiveness of the destinations for investment, other various combinations of parameters making up the mineral taxation policies in different countries will influence the overall 'government take' from the mineral project than just rates of key fiscal tools used. Ostensson et al. (2014) equally noted that the overall 'tax

package' of a country is more important than individual taxes as together these determine the internal rate of return (IRR) faced by investors.

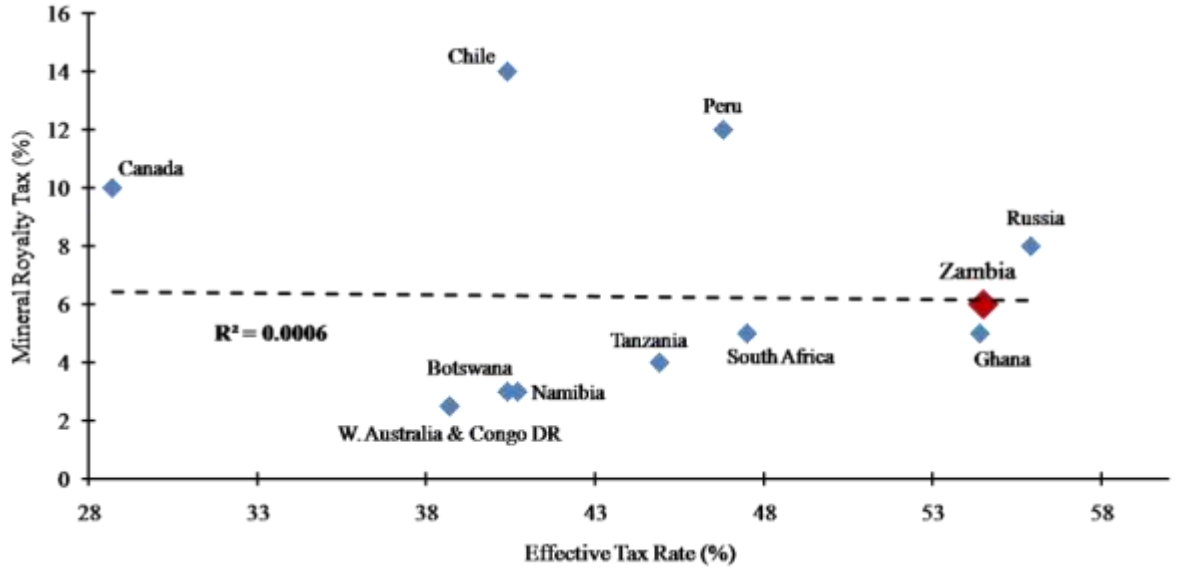

Fig.3:- Plot of ETR for each country against equivalent MRT

Variable input sensitivity:-

Sensitivity analysis was used to assess the impact tax system has on investment viability (NPV), 'government take' and profitability (IRR) based on variations to commodity prices, costs and rates for fiscal tools (CIT and MRT). These input variations resulted in changes to the measure of pre-tax NPV and post-tax IRR for the project yielding an assessment for 'government take' in terms of progressivity, neutrality and regressiveness.

Commodity price:-

Variations in copper price in the model were used to test the progressivity of the mine fiscal regime. Results revealed that the tax system is regressive with respect to price movements and equally not progressive relative to profitability (Fig.4). An increase in the price of copper is accompanied by a reduction in the ETR and an increase in pre-tax NPV for the firm. This indicates that for Zambia's 2016 fiscal regime, the more profitable the project, the smaller the government's share measured by ETR because there is no excess profit tax embedded in the taxation regime.

Based on this, it is suggested that the Zambian government adopts progressive taxation mechanisms by reintroducing the *excess profits* tax indexed to price movements to make the current regressive fiscal regime progressive.

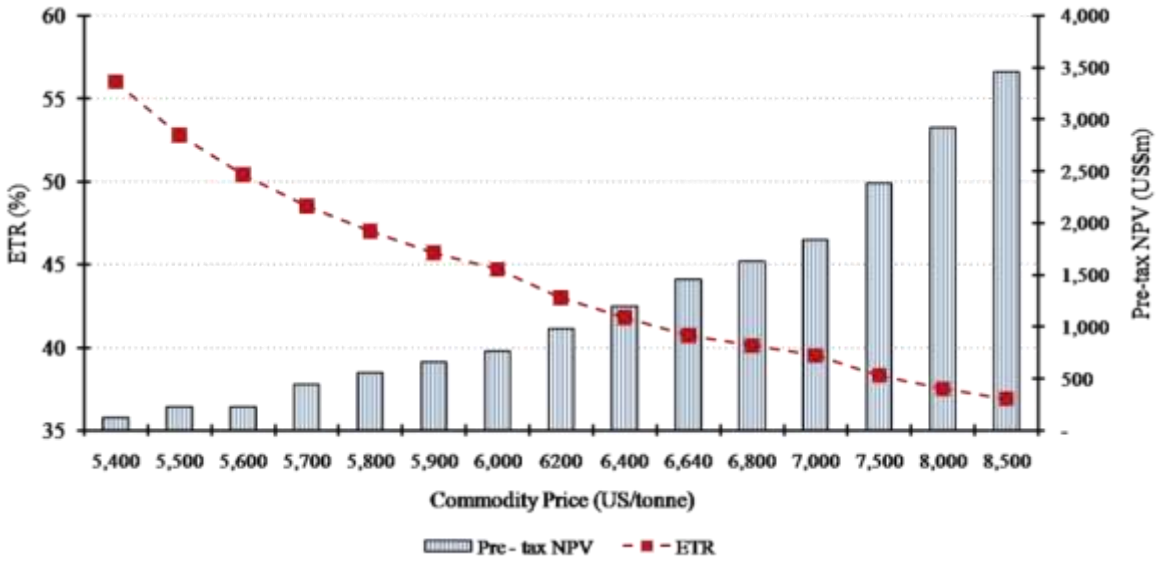

Fig.4:- Tax system sensitivity to commodity price

The breakeven price for Zambia based on the assumed production and cost profiles was estimated at US$5,970/tonne falling in the range US$5,650-US$6,000 per tonne depending on the specific regime. This resulted in a marginal effective tax rate of 15.4 percent at a 12 percent discount rate (Fig.5). This breakeven price is below the current long-term projection price of US$6,640/tonne indicating that the stylised investment project is economically viable post-tax.

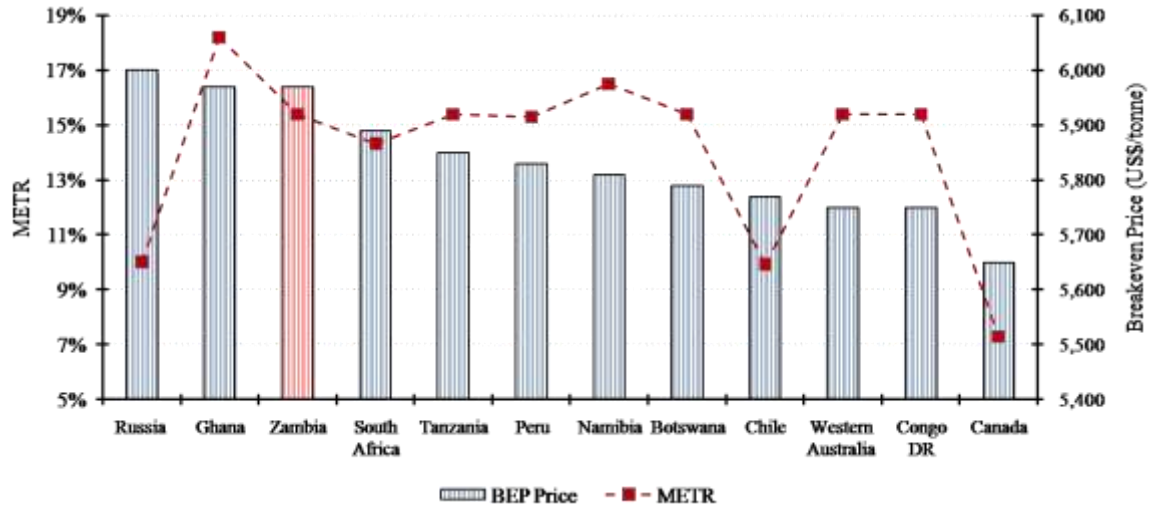

Fig.5:- Minimum sales breakeven price

Price variations were also used to test the neutrality of the Zambian fiscal regime in relation to the peer jurisdictions (Fig.6). Zambia, Ghana and Russia have METR between 24 - 26 percent giving low neutrality fiscal mixes that can affect investment decisions. Canada, Western Australia and Congo DR with lower METR gave high neutrality resulting in investment attractiveness.

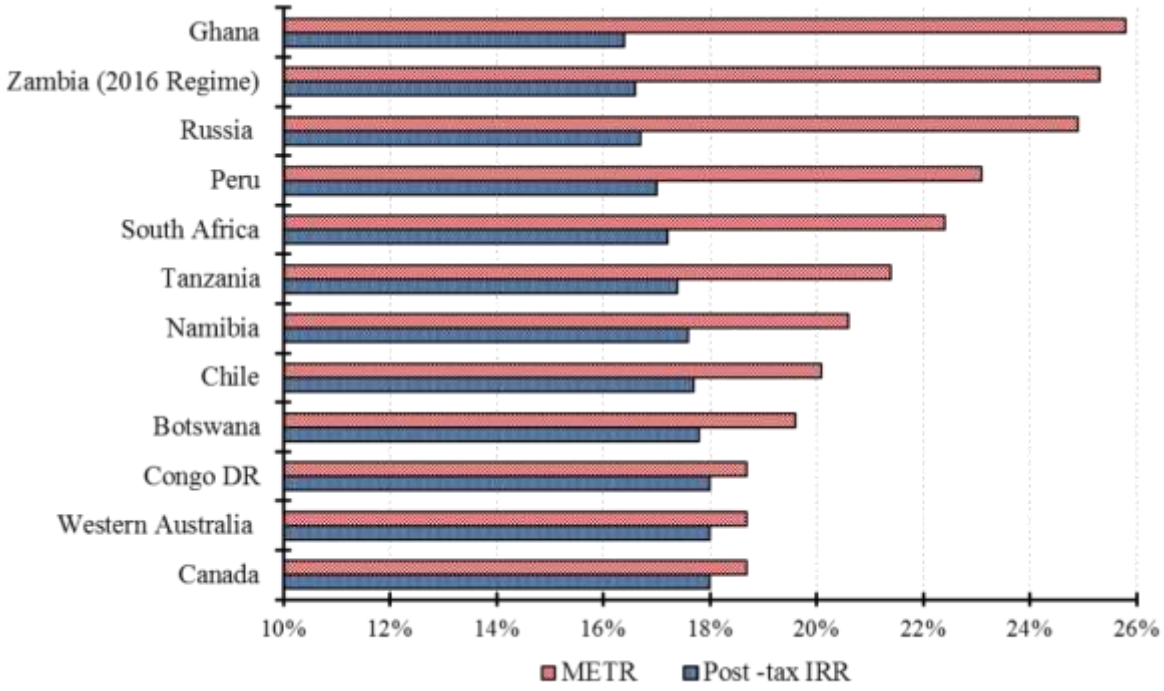

Fig.6:- METR and post-tax IRR for different jurisdictions

Operating cost:-

Variations in the operating costs resulted in a regressive mine taxation regime for Zambian (Fig. 7). This partially reflected the levels of revenue based taxes like gross mineral royalty which are not related to profits. In situations of high operating costs, a copper mine would be under economic pressure with low competitiveness affecting investment decisions.

Based on this, it is suggested that cost components should be transparent to assist policy makers in Zambia to formulate improved taxation regimes appropriate for both parties to argue taxation from an informed perspective. Operating costs have remained a secret for mining companies in Zambia as noted by Manley (2012) that no one, except the mining companies themselves, knew what the costs were and even today, it is not possible to determine how much return the mining companies make.

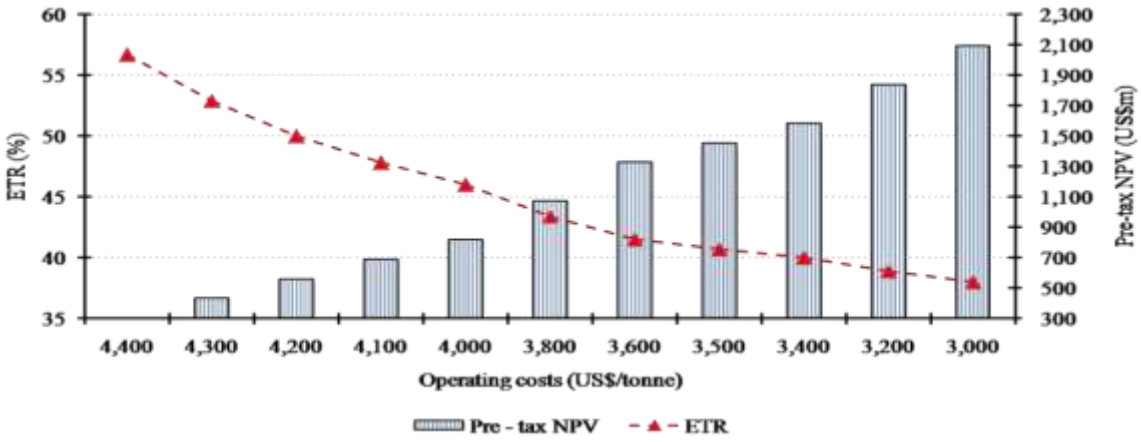

Fig.7:- Tax system sensitivity to total operating costs

Capital cost:-

Mine investment is capital intensive. Variations made to capital outlays in the copper model gave a fairly neutral fiscal regime for Zambia. Variations from $800 - $2,100 million generated profitability levels above the minimum cost of capital with minor deviations in METR falling between 14.2 and 15.1 percent indicating minimal distortion while the ETR merely ranged from 40 - 43 percent (Fig.8).

Centered on these findings, Zambian needs to fully comprehend investment capital outlays to formulate equitable taxation system considering that; the nation's fiscal regime provides investment incentives like capital allowances and loss carry forward periods, and some multinational corporations often structure their capital financing arrangements to achieve complete benefits through reported profits or levels of taxes they pay.

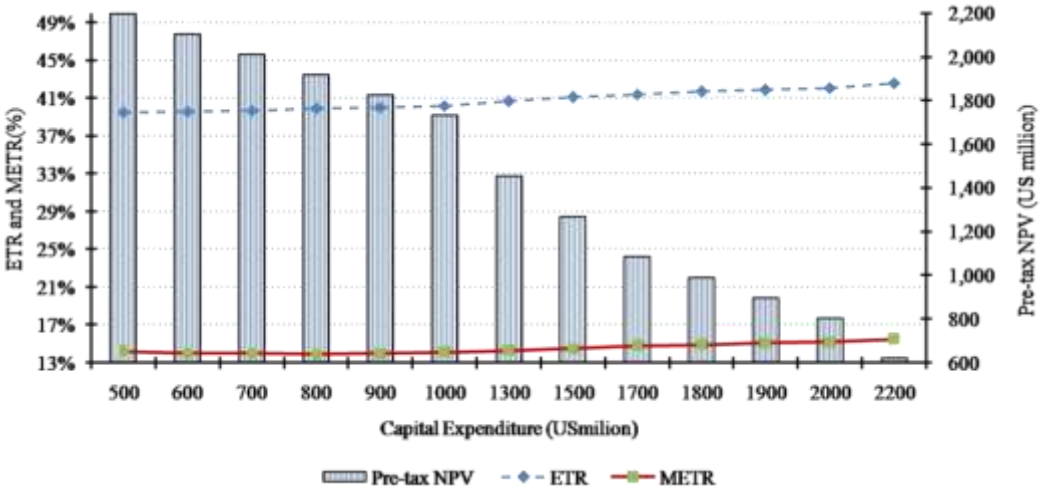

Fig.8:- Tax system sensitivity to capital expenditure

Mineral royalty tax (MRT):-

Zambia imposes a royalty tax using a base of sales value of the final base-metal mineral product. The tax system is regressive with mineral royalty tax variations (Fig.9). Royalty tax provides guaranteed revenues for the government regardless of profitability but higher royalty rates distort investment. The 2016 taxation system using a sliding mineral royalty of 4-6 percent for base metals could be considered competitive since it generates profitability levels above the minimum required rate of return (12%) given the assumptions in the copper model.

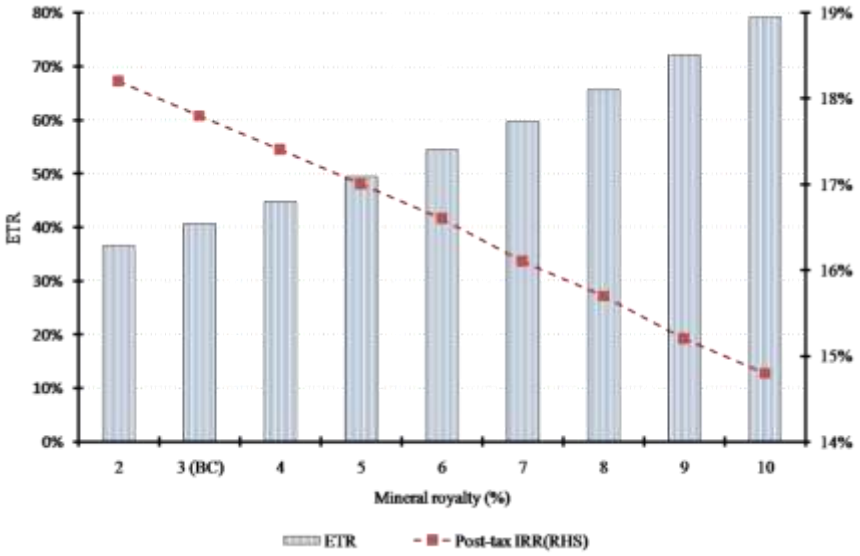

Fig.9:-Tax system sensitivity to mineral royalty tax

Suggestions built on variation of mineral royalty are made that:

- rates close to international norms 2-5 percent (Pricewaterhousecoopers, 1998) should be followed by Zambia when designing mineral royalty taxes;
- the range of 3 - 8 percent MRT, given the assumptions in the model, was found to be equitable, non-distortionary and can be applied for Zambia; and
- since the tax system is regressive with royalty sensitivity, the upper threshold rate of 6 percent in the sliding royalty system for Zambia if not revised upward will still make the taxation system regressive with copper price streams higher than $6,000/tonne.

Corporate income tax (CIT):-

Variations of CIT rates in the copper model showed a fairly neutral tax system (Fig. 10). At 30 percent, Zambia has a general CIT rate practical for many countries globally. CIT rates vary between 26.6 and 40 percent for other countries (Mintz et al., 2016). Variations made to CIT rates indicated that the range of 28 - 45 percent resulted in a non-distortionary post-tax IRR falling between 16 and 18 percent. This implies that government can vary CIT rates within that range provided it reinforces institutional capacities to deal with complicated tax administration from the foreign operated mining projects. Minh Le et al. (2016) perceived that CIT on multinationals is always a concern as they have greater avenues for profit-shifting, transfer pricing and tax avoidance.

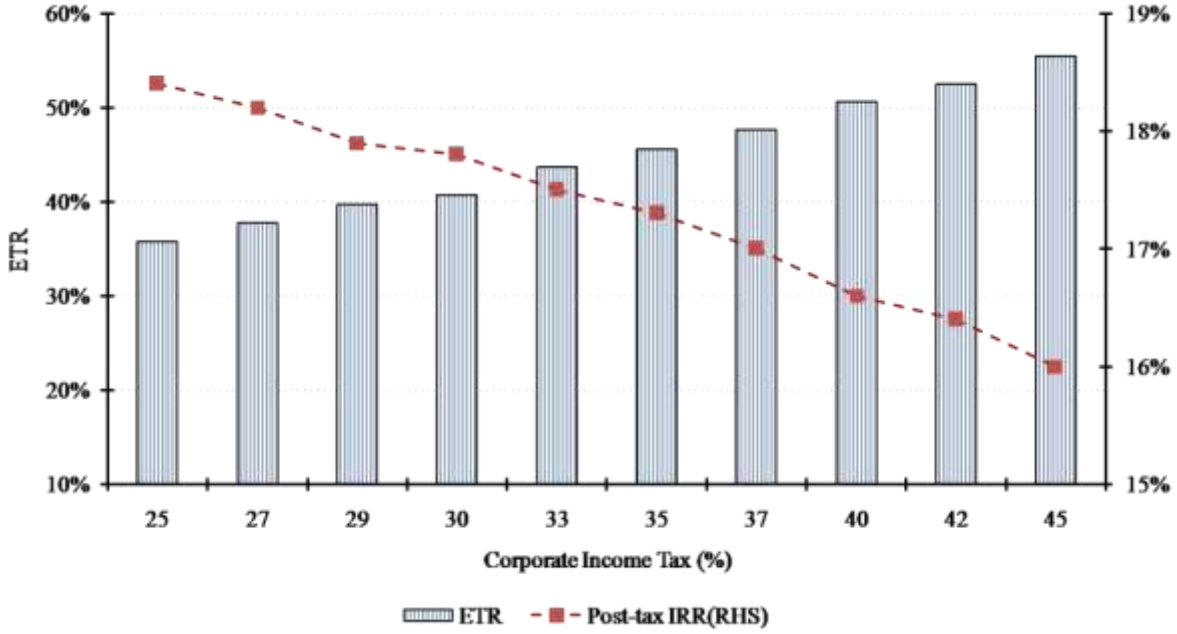

Fig.10:- Tax system sensitivity to corporate income tax

Conclusions and recommendations:-

Conclusions:-

The practicality of the study was to evaluate the competitiveness of the Zambian mine fiscal regime employing the stylised copper mine model. It is concluded that the headline tax rates for CIT (30 percent) and gross MRT (4-6 percent) employed by Zambia in the mine fiscal regime are comparable to most of the rates applied in other studied jurisdictions representing the competitiveness of the 2016 fiscal regime.

The undiscounted ETR obtained at 54.5 percent for this type of copper project based on the employed headline taxes and project assumptions was found to fall within the World Bank's ideal optimal range (40 - 60 percent). Based on this, it is concluded that in comparison with other peer jurisdictions studied, the June 2016 mine tax regime for Zambia using the stylised copper model can be viewed internationally competitive from a foreign investor's perspective.

Conclusions are also made that competitiveness of the fiscal regime does not exclusively depend on fiscal tools used but also on other policy features in the mineral policy. Using the input sensitivity in the stylised copper mine model, the study also makes conclusions that, the Zambian mine taxation regime is not progressive and behaves regressive with respect to royalty rates, commodity prices and total operating costs. However, with capital costs and income tax, the tax system is fairly neutral.

Recommendations:-

Based on the results from the study, it is recommended that:

- Government institutions in Zambia dealing with tax policy formulation, tax administration and sector monitoring (Ministry of Mines and Minerals Development) need to be strengthened to improve on equitable appropriation of rents based on the used sliding-royalty tax, competitively set corporate income tax and various provisions in the fiscal regime;
- Zambian mine fiscal regime should include progressive tax instruments like *excess profits tax* that are indexed to prices than profitability. Increasing commodity prices make the tax system regressive as the 'government take' reduces due to lack of excess profits tax in the mine fiscal regime; and
- Zambia should not design taxation systems that focus on a single fiscal tool but should consider all types of fiscal instruments in the right proportion. Furthermore, emphasis should not be placed on the misleading levels of tax rates but on a healthy combination of all such taxes forming the fiscal regime.

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