

https://dspace.org/

The impact of mineral resource rent tax on the financial performance of mining companies in South Africa

Mathivha, Mukondeleli

2017

http://hdl.handle.net/10539/23131

Mathivha, Mukondeleli (2017) The impact of mineral resource rent tax on the financial performance of mining companies in South Africa, University of the Witwatersrand, Johannesburg, <http://hdl.handle.net/10539/23131>

Downloaded from a DSpace repository. https://dspace.org/

WITS BUSINESS SCHOOL



THE IMPACT OF MINERAL RESOURCE RENT TAX ON THE FINANCIAL PERFORMANCE OF MINING COMPANIES IN SOUTH AFRICA

BY MUKONDELELI MATHIVHA

SUPERVISOR: PROFFESOR CHRISTOPHER MALIKANE

OCTOBER 2016

DECLARATION

I, Mukondeleli Mathivha, declare that this research report is my own unaided work, except where indicated and acknowledged. It is submitted in the partial fulfilment of the requirements for the degree of Master of Management in Finance and Investment at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

…….

Mukondeleli Mathivha

Signed at…….On the.....day of October 2016

ABSTRACT

This study assesses the impact of a change in tax system in South Africa and the effects caused thereof on both the government and mining companies .This is done by comparing different tax models and analyzing the results to determine their suitability to be used in South Africa. A hypothetical case study is used to achieve the goals of the study by employing six different case scenarios under different threshold rates, tax rates and corporate income tax rates on a mining project. An NPV generated from a discounted cash flow under each scenario is used to evaluate the project success, the tax revenue generated shows how much government stands to make. The results show that the project NPV is highest when both the corporate income tax rate and the resource rent tax rate are reduced. The study also reveals reducing the tax rate has a greater effect on changing project NPV and potential government revenue than reducing the threshold rate and/or the corporate income tax rate. An assessment on the readiness of South Africa to changing tax systems shows that although the resource rent tax system can generate high revenues for government, the disadvantages of changing tax systems on the country as a whole currently outweigh the advantages.

ABBREVIATIONS

CIT	Corporate Income Tax
EBIT	Earnings before interest and tax
GDP	Gross Domestic Product
MPRDA	Mineral and Petroleum Resources Development Act
MRRT	Mineral Resource Rent Tax
NPV	Net Present Value

TABLE OF CONTENTS

DECLARATION 2
ABSTRACT 3
ABBREVIATIONS 4
LIST OF FIGURES 6
LIST OF TABLES 6
1. INTRODUCTION 7
1.1. Background 7
1.2. Research Problem 8
1.3. Research Objectives 8
1.4 Significance of the Study 9
1.5 Research Problem 9
1.6. Outline of the Report 10
2. LITERATURE REVIEW 11
2.1. Introduction 11
2.2. History of Mineral Taxation 11
2.3. Resource Rent Tax Theories 16
2.3.1. Neutrality 17
2.3.2. Ability to collect revenue 18
2.3.3. Adaptability 18
2.3.4. Investor perception of risk 19
2.4. Resource Rent tax Model 20
2.5. Resource Rent Tax Success Rate 21
2.5.1. Australia 22
2.5.2. Other Countries 23
2.6. Current Tax Regimes in South Africa 23
2.6.1. Royalties 24
2.6.2. Corporate Income Tax (CIT) 25
2.6.3 Other Taxes 26
2.7. Conclusion 26
3. METHODOLOGY 27
3.1. Introduction 27
3.2. Hypothetical Case Study 27
3.2.1. Project Background 27

3.2.2. Model Assumptions 28
3.3. Model Design 28
3.4. Conclusion 29
4. RESULTS AND DISCUSSIONS 30
4.1. Introduction 30
4.2. Presentation of Results 30
4.3. Discussion 34
4.4. Conclusion 36
5. CONCLUSION AND RECOMMENDATIONS 37
5.1. Introduction 37
5.2. Discussion 37
5.3. Conclusion 38
5.4. Recommendations 38
REFERENCES 39
APPENDIX 42

LIST OF FIGURES

Figure 1: Resource Rent Tax explained 16
Figure 2: MRRT revenue generated under each case scenario 30
Figure 3: Comparison of MRRT revenue collected under category A and category B 31
Figure 4: NPV generated from each case scaenario 32
Figure 5: MRRT revenue collected by keeping either the threshold rate fixed or MRRT rate. 33
Figure 6: NPV generated by varying either the MRRT rate of the threshold rate 34

LIST OF TABLES

Table 1: Tax policy adjustments unique to the mineral resource industry (Otto 2006) 12
Table 2: Different Fiscal instruments used by governments 15
Table 3: Countries that have used RRT in the petroleum and mining sectors (Daniel, Keen et al. 2010) 19
Table 4 : Category A and Category B case scenarios 29
Table 5: Combination of threshold rate and MRRT rate 32

1. INTRODUCTION

1.1. Background

The discovery of the Witwatersrand goldfields in the 1880's led to major industrialization in South Africa. The Johannesburg Stock Exchange was formed a year after the discovery of gold, with the purpose of seeking funding for the mining industry. Mining would become one of the industries in the forefront of the South African economy (Curtis 2009).

Gold mining has since decreased in production (StatisticsSA 2015), however South Africa is still the leading producer of other minerals such as Platinum Group metals, chromium and manganese (Curtis 2009). Despite the recent challenges of labor unrest, low commodity prices and weaker demand, the industry continues to be a major contributor to the country's economy. The contribution of the industry towards the GDP was 8.3 percent in 2013 and a report from the Chamber of Mines of South Africa (2013) showed that the mining industry is still making noticeable contributions in the economy. This is through contributions to export revenue, investment (private sector investment and overall total investment), tax revenue and employment. The Chamber of Mines (2013) showed that mining has contributed R2.4 trillion to export earnings and to the GDP over the past decade, in 2013 the industry contributed 12.2 percent towards total investment in the economy (ChamberofMinesofSouthAfrica 2013).

The mining industry is one of the biggest contributors to South Africa's tax revenue. Mining houses are taxed slightly differently from other sectors. Mining companies pay corporate income taxes and mining royalties that are specific to the mining industry. The introduction of the Mineral and Petroleum Royalty Development Act (MPRDA) brought an increase to the total contribution of taxes to the economy. Between 2009 and 2011 taxes increased from 10 billion to R25.7 billion following the introduction of the royalties act and by 2013 this amount had increased to approximately R27 billion (Cawood and Oshokoya (2013). The industry's contribution to the tax revenue is however affected by a number of factors such as commodity prices (Hogan and Goldsworthy 2010).

Governments tax mining companies because not only are mineral resources nonrenewable but also because the state should benefit from the exploitation of their country's resources. According to South Africa's Freedom Charter and the MPRDA, the mineral wealth shall be owned by the people. The MPRDA (2012) stipulates that the state is the custodian of the country's minerals. However over the years there have been concerns that government is not taxing mining companies enough and with the backing of the Freedom Charter and the MPRDA a debate of resource nationalism began in 2010(Cawood and Oshokoya 2013).

The risks associated with mining are quite significant and therefore the potential return should be commensurately high (Ball and Bowers 1984). Mineral resources are exhaustible and the period of mining a resource is not always guaranteed. Social costs associated with environmental damage done through the mining process itself are also a significant risk. Commodity prices which play an important role in determining revenue pose a risk since they are fluctuate considerably. However when times are good and commodity prices boom, mining houses stand to make large amounts of revenue (Otto 2006). It is in this time that governments may want to change their tax systems (Land 2008).

In March 2012 the ruling party released a State Intervention in the Mineral Sector (SIMS) report, a document that addressed the shortfalls of the current taxation instruments used for South Africa's mining industry. The country currently collects revenue through royalties and corporate income tax (ANC 2012).

The report sought to develop ways that could be used to obtain optimal results in terms of growth, development and employment created from the exploitation of the country's assets. One of the proposals made in the report on ownership and control of the nation's mineral assets, was for the country to adopt resource rent tax as an instrument used in the mining industry. The report discourages nationalization of mines pointing out that the government would not be able to afford going into either complete nationalization or 51 percent ownership of mines, as the former could cost the government over 1 trillion (ANC 2012).

1.2. Research Problem

Mining companies contribute significantly to the South African economy however the South African government feels that the mines can make a greater contribution to the economy if mining taxes are increased (ANC 2012). Although the government seeks to implement this system, there has been very little study done on the effects to mining companies on the proposed resource tax regime changes (Laporte and de Quatrebarbes 2015)

This study aims to look into the impact that will be caused by introducing a new tax system in the industry and how the rest of the economy will be affected. Will it be of benefit as the government suggests or will it dent companies and chase away investors? This study will be helpful to government, investors and the general public.

1.3. Research Objectives

Objectives of the study are:

- To create an optimum MRRT model to be used by the South African government.

- To ensure a fair share of rent is collected without chasing investors out of the mining industry and/or the country.
- To assess the financial impact that will be incurred if the new MRRT regime is implemented on South African mining companies.

1.4 Significance of the Study

The concept of resource taxation can prove to be complex to understand and to practice in the resource industry. Some even believe that changing South Africa's current tax regime is a hasty decision that is not only unnecessary but also unfair to investors who have to bear the risk of investing in an uncertain asset (Cawood and Oshokoya 2013). With studies having been done on MRRT as a form of revenue collection, not much focus has been placed on the impact that the introduction of this regime will have on financial performance of companies. The success of MRRT is based on the ability of government to generate revenue. Studies have shown that the revenue that government stands to make from using resource rents, without taking into account the effects of deterring investments, will be more than the revenue that is currently being collected from royalties (ANC,2012). In South Africa however there hasn't been much empirical evidence to prove this (Cawood and Oshokoya 2013). While there is a lot that government will have to take into consideration before it even begins to start implementing this proposed regime, finding a model that will suit South Africa's industry is important. Government should also take into consideration that there are different qualities in resources and in a given economic environment the performance of the mines will also be different (Otto 2006).

This study will be significant because it will focus on the impact that this proposed MRRT will have on the financial performance of mining companies. Although it is obvious that companies' profits will be impacted, it is not obvious how the amount can be estimated. This study will also focus on creating a potential model that can be used by government to avoid chasing away current and future investors. Government will find this useful since they want to offer a suitable tax environment that will attract investors into the country. Investors will find this information useful as they can then decide when and if the new regime is implemented, whether to continue with their investment or seek other opportunities.

1.5 Research Problem

Resource companies in South Africa pay corporate income tax and as of 2010 royalties are also payable by the industry. According to Cawood (2012) the contribution made by mining companies to the economy is already more than other companies contribute and the current royalties system used has improved tax revenue for government. This would explain why the mining industry is believed to be one of the bigger contributors to economic development (Curtis 2009).

Despite beliefs that the current system used is effective, the South African government still believes that the state is being robbed of its share on the mineral wealth of the country (SIMS 2012). Some governments opt for renegotiation of tax regimes when they realize they are losing out on profits made by mining companies (Land 2008). However investors may not take well to a change in tax regime (Sarker and Whalan 2011).

Mining is a risky investment and investors believe that they need adequate compensation for taking on the investment and not investing in something else less riskier. A certain level of uncertainty develops within investors when governments decide to demand bigger shares of rents from mining companies by changing tax regimes to favor them as host countries (Palmer 1980). Some investors may even decide to stop investing in that country (Land 2008) .The introduction of a MRRT would be over and above the current tax regimes that South Africa is using (ANC 2012). Although studies have been made to assess the effectiveness of the current tax regimes in collecting rents, the public is still misinformed about the difference between revenue collection and revenue management by the government and believes that more rent needs to be collected (Cawood and Oshokoya 2013).

Currently South Africa does not have a model that will be used for the proposed resource rent tax. This model must be developed in a way that it will capture a 'fair' share of rents but will not discourage investment in the country, new or old. Without a model the potential revenue that can be collected is not known for sure, and therefore the success of this MRRT is questionable. A model for an optimum tax regime would enable calculation of the impact that this new regime would make on mining companies and their performance financially.

In this study an attempt will be made to find the optimum MRRT model that will suit the South African mining industry and its investors, thereby allowing the assessment of the financial impact that investors will be subjected to under this new regime. Results of this assessment can be used by the government, investors and the public. Governments will be able to see who is benefitting more.

1.6. Outline of the Report

Having introduced the topic, Chapter 2 will cover the literature behind the concept of Resource Rent taxes, the background and comments that have been said about this proposed tax model. It is essential to look into the success of MRRT in other countries. In Chapter 3 the research methodology and approach to solving the research problem will be discussed. This will include the data and its sources. The results of the study will be given and analyzed in Chapter 4, including the finding of the study. Chapter 5 covers the findings of the study. A conclusion on the study will be made in Chapter 6 and recommendations will be made in this chapter.

2. LITERATURE REVIEW

2.1. Introduction

Taxation is a way for governments to obtain revenue from the different sectors within the economy. This revenue is eventually used to develop the country's infrastructure and for the needs of the public in general (Nakhle 2008). South Africa is a resource endowed developing country and even though the economy's dependence on resources is decreasing compared to other industries, it is still considered as a resource dependent country. Efficient ways of revenue collection are important (Barma, Kaiser et al. 2012). This study will focus on the background behind mineral taxation in particular and resource rent taxation theories and models that have been in use in other countries. The study will also look at theories that have been presented by scholars on mineral taxation.

This chapter is structured as follows: a discussion on the general history of mineral taxation in section 2.2 followed by a greater focus into resource rent tax in section 2.3 with specific focus on theories that have been presented. Resource rent tax models that have been in use thus far will be discussed in section 2.4 and examples of countries that have used this tax system will be in section 2.5. Section 2.6 will discuss the current regimes used in South Africa before finally concluding the review in the last section of the chapter, section 2.7.

2.2. History of Mineral Taxation

Governments tax corporates as well as individuals, and the revenue collected is then used to build a better economy for the nation. Mining is a very risky industry to invest in, however with risk comes return. Mineral rich countries usually open their doors to investors who can bear the risk embedded in mining, while the government puts policies in place to also reap the rewards from the exploitation of these minerals (Palmer 1980) (Cawood and Oshokoya 2013). There are a number of benefits to resource extraction, the biggest and most important benefit is the revenue collected from mining taxes (Daniel, Keen et al. 2010).

The resource industry is often not taxed in the same manner as other industries this is because of the unique features of mining businesses. One of the unique features of mining that affects tax and government revenues is that it is a cyclical industry, the volatility of commodity prices makes revenues to sometimes be very high and at others very low. The periods when commodity prices are very high are called 'commodity booms' and it is in this time that government can make more revenue if their fiscal tax regime is properly designed to take advantage of these booms. Table 1 below shows the unique characteristics of the mining industry and the tax policy adjustments that governments make especially for this industry (Otto 2004) (Otto 2006).

The taxation of mineral resources is done differently because of the industry's characteristics that differ from those of other industries. Governments that are in mineral rich countries use taxation as way to give the nation what is rightfully theirs. These governments use tax policies that bring the highest portion of mining profits back to the state. The uniqueness of the mining industry gives government reason to create tax policies that are only applicable to the industry. If the tax incentives are too advantageous to mining or too discriminative against other industries, investors may disinvest in non-mining sectors in favor of the preferential treatment of mining (Otto 2004).

Table 1: Tax policy adjustments unique to the mineral resource industry (Otto 2006)

Reason for special treatment	*Tax policy responses*
A lengthy and costly exploration program will precede the start-up of a mine. During this exploration period there will be no present income against which to offset these costs.	• Offset preproduction (preincome) exploration expenses against future income (loss carry-forward, amortization).
Mine development is exceptionally capital intensive, and an operation will initially need to import large quantities of diverse equipment and expertise from specialized suppliers.	• Provide various means to accelerate recovery of capital costs once production commences. • Allow service costs to be carried forward and amortized after production commences. • Reduce rate or exempt from import duties. • Reduce rate, exempt, refund, or offset for value-added tax (VAT) on imported equipment and services.
Mined product is destined for export markets.	• Reduce rates or exempt from export duties. • Exempt from VAT or zero rate exports.
Different minerals have very different labor, cost, price, value added, environmental, and social attributes.	• Vary royalty rate for different groups of minerals.
The scale of operations may be small or large.	• Vary royalty rate by size of production. • Exempt small-scale operations from some types of taxes.
Mines produce raw materials that are prone to substantial price changes on a periodic basis related to the business cycle.	• Waive certain types of taxes, usually royalties, from time to time for projects experiencing severe short-term financial duress. • Allow losses to be carried forward.
After mining ceases and there is no income, a mine will incur significant costs relating to closure and reclamation of the site.	• Require a set-aside of funds for closure and reclamation in advance of closure and provide some sort of deduction for this set-aside against current income tax liability.
Many mining projects will have a long life span and companies fear that once their captive investment is in place, government will change the tax law, negatively affecting their returns.	• Stabilize some or all of the relevant taxes for at least part of the mine life. • Stabilize taxes by statute or in the form of an agreement.
Where the level of investment is particularly large (a megaproject), investment may be possible only under a severely modified tax system.	• Enter into a negotiated agreement with the company and include special tax provisions that supplant the general tax law in whole or in part.
A company may enjoy special tax treatment for one operation but may have ongoing exploration that may lead to other operations.	• Apply ring-fencing principles (accounts from the mine may not be mixed with accounts for activities outside the mine).

Most mineral rich developing countries may offer tax incentives to private companies in order to attract investors however the fiscal regimes must not be too relaxed such that the state is not able to get the maximum benefit of the mineral wealth (Cawood and Oshokoya 2013). There has been a growing concern mostly in developing countries that governments have not been taxing private companies responsible for the exploitation of the country's minerals enough as compared to the super profits that they are making. Governments seek to create a good relationship with the investors.

The state believes that they should get a fair share of the mineral wealth created as they own the resources being exploited. The debate about resource nationalism was started with reference to the above concerns. Cawood and Oshokoya (2013) show in their definition of resource nationalism that citizens of a resource rich country require some sort of benefit and can make a claim on the resource assets in that country.

Governments are faced with the task of making sure that the policies that are put in place are fair to both the investor and the state. Keeping in mind that the goal of the government is to secure a greater share of the wealth created from mining, the policies implemented to do this must not be too hard on the investor causing disinvestment in the country. Investors believe that for the great risk they are taking in mining they must be greatly rewarded in return, taking a high portion of the profits they make can lead to decreased investment and poor exploitation of the mineral resources. Most mineral rich developing countries need good tax policies to attract investors and encourage more mineral exploration by private companies (Cawood and Oshokoya 2013).

The concept of mineral taxation and rent dates back to the 19th century when David Ricardo explained the concept of land tax. According to Ricardo rent should be paid for land with the highest quality as compared to other pieces of land. The difference in the quality between two pieces of land determine the amount of rent due. The more fertile the land, the more produce will be made from that land, leading to the farmer making more profit than his counterparts. However only when there is production from land with a lower rank of quality can the farmer from the most fertile land start paying rent (Ricardo 1891). This kind of rent would later be referred to as Ricardian rent (Otto 2006). In this context rent can be defined as the money given to the land owner by a farmer who makes a greater profit compared to other farmers because of the advantage of farming in a more fertile land and therefore getting produce easier than the other farmers.

He explained it further by showing that the lesser fertile land will require more labor to cultivate and make the same amount of produce as compared to the most fertile land. The farmer of the most fertile land must then pay for the ease of production as compared to other farmers.
Although David Ricardo was discussing rent based on fertility of agricultural land, similarities of agricultural land and mineral deposits can be drawn since minerals are not

deposited the same across the land. Some mines have high grade deposits while others have low grade deposits, and most ore bodies are not of the same size, which therefore means that the level of production cannot be the same (Otto 2006).

Payment to governments for mineral extraction goes as far back as pre-world war II. Garnaut and Ross (1975) built on the foundation laid by David Ricardo by taking the discussion further than just land tax and focusing on the resource industry and how governments can get as great a share as possible from the profits made without compromising the level of investment in the country (Garnaut and Ross 1975). These two authors argued that in order for government to get more of the mineral wealth a 'Resource Rent Tax (RRT)' would need to be imposed on the investor. While the process of determining an optimal level of taxation or a mix of taxes cannot be easy (Otto 2006), resource rent tax would be found to be one of the best ways that governments can use to capture as much profit as possible (Land 2008).

Resource rent tax was developed during the 1970s when the mining industry was performing exceptionally well due to rising commodity prices. The fiscal tax regime was developed to capture profits termed as 'rent' in a gold-copper mine in Papua New Guinea.
The United Kingdom then followed on these footsteps and imposed a Petroleum Revenue Tax on the country's oil industry. Garnaut and Ross were regarded as one of the first authors to publish work and shed some light into the concept of resource rent taxation (Land 2008).

Resource rent is the surplus return on a project investment that is earned after all deductions have been made from the total revenue of a project. Any amount received in excess of what the investor was expecting is regarded as rent, returns above the minimum expected return of a project (Garnaut and Ross 1975). Resource rent can also be referred to as economic rent, however these two are not exactly the same. Economic rent is the return that is earned not only from mineral exploitation but also from other factors such as skills from the manager that could earn the investor more return (Daniel, Keen et al. 2010). Other definitions of economic rent include the definition given by Hogan and Goldsworthy (2010), *"The economic rent in an economic activity is the excess profit or supernormal profit, and is equal to revenue less costs where costs include normal profit or a "normal" rate of return to capital".* Other authors explained economic rent differently by defining it as *'the product sale price less the costs of production, transportation and distribution, including a minimum return on capital employed, over the full cycle (i.e. lifetime) of a project'* (Kellas 2010*)*. Resource rent tax cannot influence the decision of an investor to invest in a project, because rent is over and above the expected return (Otto 2006).

Although this study is focused on resource rent tax, mineral taxation is a broad topic and includes other forms of taxation.

Mineral taxation can be classified into a number of fiscal instruments, which can also be further broken down into different kinds of taxes. These fiscal instruments are explained in table 2 below (Hogan and Goldsworthy 2010).

Table 2: Different Fiscal instruments used by governments

Rent based taxes

- *Brown tax* – named after Brown, this is levied as a constant percentage of the annual net cash flow (the difference between total revenue and total costs) of a resource project with cash payments made to private investors in years of negative net cash flow. The Brown tax is a useful benchmark against which to assess other policy options, but is not considered to be a feasible policy option for implementation since it involves cash rebates to private investors (Brown 1948).
- *Resource rent tax* – rather than providing a cash rebate, negative net cash flows are accumulated at a threshold rate and offset against future profit. When this balance turns positive it becomes taxable at the rate of the resource rent tax. The resource rent tax was first proposed by Garnaut and Clunies Ross (1975) for natural resource projects in developing countries to enable more of the net economic benefits of these projects to accrue to the domestic economy.
- *Excess profits tax* – the government collects a percentage of a project's net cash flow when the investment payback ratio (the "R-factor") exceeds one. The R-factor is the ratio of cumulative receipts over cumulative costs (including the upfront investment). This method differs from the resource rent tax in that it does not take explicit account of the time value of money or the required return of the investor. No excess profits tax in the R factor form has been applied to the mining sector.

Profit-based taxes and royalties

- Corporate income tax – typically an important part of the fiscal regime for all countries; a higher tax rate may be applied to mineral companies within the standard corporate income tax regime, and it may be designed to vary with taxable income (e.g. Botswana).
- *Profit-based royalty* – the government collects a percentage of a project's profit; typically based on some measure of accounting profit. This differs from the standard income tax in that it is levied on a given project rather than the corporation.

output-based royalties

- *Ad valorem royalty* – the government collects a percentage of a project's value of production.
- *Graduated price-based windfall tax* – the government collects a percentage of a project's value of production with the tax rate on a sliding scale based on price (that is, a higher tax rate is triggered by a higher commodity price).
- Specific royalty – the government collects a charge per physical unit of production.

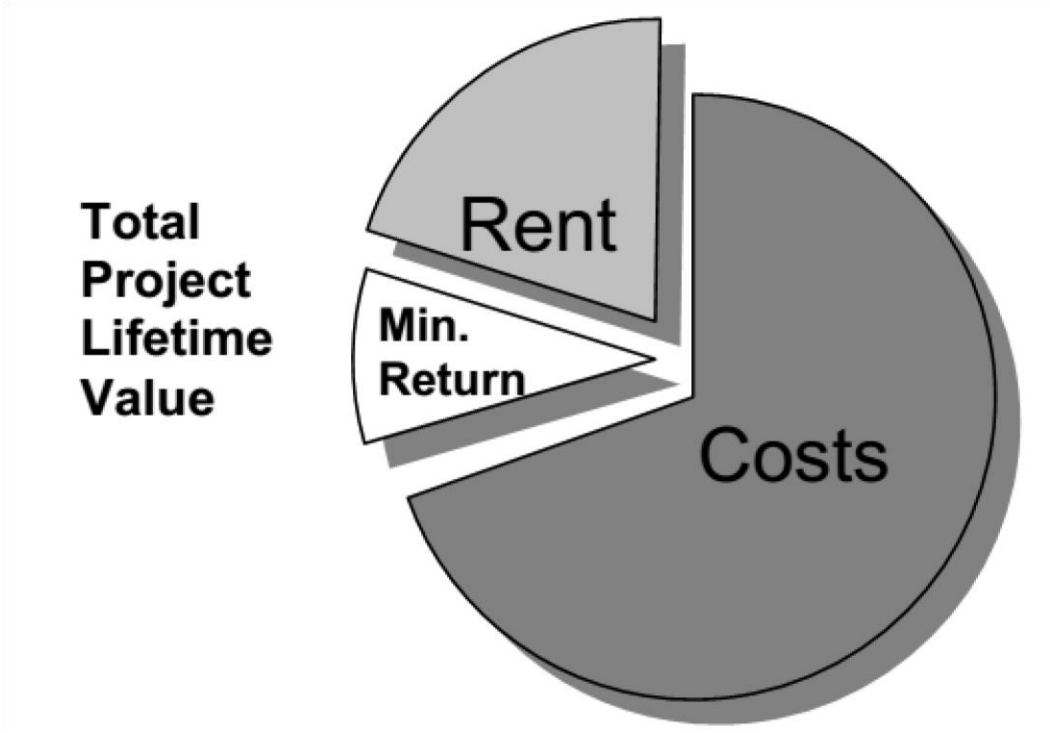
State equity

- *Paid equity* – the government becomes a joint venture partner in the project. Paid equity on commercial terms is analogous to a Brown tax where the tax rate is equal to the share of equity participation.
- *Carried interest* – the government acquires its equity share in the project from the production proceeds including an interest charge. Carried interest is analogous to a resource rent tax where the tax rate is equal to the equity share and the threshold rate of return is equal to the interest rate on the carry.

2.3. Resource Rent Tax Theories

Garnaut and Clunies (1975) defined Resource rent as 'A profit tax that begins to be collected when a certain threshold internal rate of return on total cash flow has been realized', this means that the system only starts taxing once the investor's minimum rate of return has been reached. An MRRT system taxes the economic rents or what is known as above normal profit as explained above in section 2.1.The ability of the system to tax economic rent has made the system very attractive to governments, although the factors of the system have been found to be complex to determine, theoretically the potential to raise high revenues is why it is preferred over other tax systems. Figure 1 below shows how the total value of a project over its lifetime can be explained. MRRT only focuses on the 'rent' remaining once the costs and the rate of return have been deducted (Land 2008).

Figure 1: Resource Rent Tax explained



When taxing the economic rent of a project there is no influence by the tax system on the investor's decision making process, this is known as neutrality and is explained in more detail in section 2.3.1 below. MRRT is also very attractive because its ability to raise revenue increases as the economic rents of a project increase.

The government's objectives when setting up a fiscal policy are to create a policy that will be economically efficient in bringing in maximum revenue but not chasing investors away from investing in the country (Ball and Bowers 1984).

There is a criteria that governments use to assess the efficiency of a tax system. This study will look into the criteria used and later use this to determine whether or not resource rent tax meets the government's objectives.

2.3.1. Neutrality

A tax system that does not affect investment decisions of an investor is said to be neutral. This kind of tax system will not help an investor decide if the project is profitable or not and thus if he should or should not invest, it does not affect the performance of the mine in terms of production or anything related to the stages of mining. A neutral tax system should also not affect or influence the exploitation speed of resources.

Rent and profit based taxes are regarded as more neutral than other types of taxes, as revenue collection is based on the profitability of the project, they are therefore considered at the end once production has taken place (Daniel, Keen et al. 2010).

A tax system that is non-neutral can cause distortions in the decision making process of an investor about a project. Usually unit based taxes can have the effect of influencing the process of mining by causing over exploitation of resources and having higher cut-off grades that will create more profit even after tax. This reduces the size of economic reserves and therefore shortens the life of mine (Guj 2012).

Although Garnaut and Clunies, other authors and scholars believe that RRT is neutral, Smith (1999) showed that once a firm decided to do more exploration thereby delaying production and the time of investment, the tax credits obtained become a reason for the firm to change investment decisions. RRT is only neutral when there are no opportunities to do further exploration and to deter exploitation, however once the RRT parameters are known the investor can decide to change his investment timing or the rate of production, thus making MRRT non neutral (Smith 1999).

On their paper 'The Resource Rent Tax: A Penalty on Risk Taking', Ball and Bowers (1984) showed that RRT was not as economically efficient as Garnaut and Clunies (1975) had shown on their paper.

Ball and Bowers argued that RRT was simply a penalty on successful risk taking done by an investor, the authors used a hypothetical case of an investment proposal to show that RRT

can cause a viable project to be rejected, and thus causing the claims that RRT is neutral to be untrue.

Ball and Bowers (1984) further used the concept of a call option and the Black-Scholes model to show that with an increased RRT payment, there is an increased risk on the side of the investor.

2.3.2. Ability to collect revenue

The higher the level of taxation the more revenue governments collect, however only until a certain point. Increasing the level of taxation can deter investment flow. The more wealth government receives, the less companies receive, with the number one goal of an investor being to make as much profit as possible, if this keeps decreasing then the investor has very little reason to keep his investments in the country (Otto 2006).
The ability of a tax system to collect revenue is important since rent collection is one of the major reasons why government tax the mineral resource industry. Government should design a tax system that is able to satisfy the needs of the state, it should not be too soft such that governments end up losing the potential revenue because of under taxing (Cawood and Oshokoya 2013).

The maximum marginal tax rate affects the ability to raise revenue, and therefore the optimum level of taxation should be carefully determined. There is also great importance in how the government uses the revenue collected. This is a well-studied topic in literature and scholars have showed that governments can use revenues in such a manner that will not lead to the public thinking that the mining industry is being under taxed.

2.3.3. Adaptability

The flexibility of a tax system during different circumstances in the economy is significant in determining an efficient tax system. An adaptable system will also be applicable across a range of projects and commodities. Such a system will also affect the revenue raising capability because an adaptable system will also be progressive. Progressiveness means that the more profit a project makes, the more the tax system will extract revenue. A system that is not progressive is regressive, and not economically efficient. This can be used to indicate the adaptability of a tax system (Daniel, Keen et al. 2010).

Adaptability increases the stability of a tax system and thus reduces the rate of return of the investor because the risk is reduced (Garnaut 2010), the relationship between risk and return is discussed more in section 2.3.4.

2.3.4. Investor perception of risk

The higher the risk, the greater the reward, this is how investment works. The more the risk the more the investor will require a minimum rate of return for the risk he is taking by investing in a project.

The risk is usually country risk and relates to the political risk and the stability of a tax system. The stability of a tax system is assessed by studying previous investments and the reaction of government in times of commodity booms or great profits, the ability of government to change existing tax systems to new systems that favor government and can bring in more revenue (Garnaut and Clunies 1975) .Should the investor believe for any reason that government can change the fiscal policy then he has reason to increase the rate of return. A high rate of return reduces the revenue collected by government (Garnaut 2010).

A conclusion can be made from the study of government objectives that RRT is economically efficient. The RRT system is neutral, progressive and has the potential to raise high revenues for government.

When using a progressive and adaptable tax system there is very little reason for government to change an existing system in a different time in the economy or to renegotiate fiscal terms. As discussed above this reduces the investor's perception of risk and therefore his minimum rate of return. A reduction on the investor's rate of return leaves more revenue available for government to collect (Land 2008).

Although RRT has not been used in practice in many countries, most countries use a mix of taxes to achieve their objectives. Scholars have attempted to show how pure RRT can be used as a tax system, but there has been very little research done on how this system can be purely used in countries like South Africa that have decreasing level of resource endowments. Table 3 shows the countries that have used the RRT system, the sector and the period when the system was employed (Daniel, Keen et al.
2010). The RRT system has been mostly employed in the petroleum industry. According to Land (2008) past experience has shown that using a pure RRT imposes risk on government. With the high level of uncertainty in the mining industry, there is a risk placed on the potential for government to receive revenue.

Table 3: Countries that have used RRT in the petroleum and mining sectors (Daniel, Keen et al. 2010)

COUNTRY	SECTOR	YEARS IN FORCE
Papa New Guinea	Petroleum	Since 1977
	Mining	From 1978-2002
Australia	Petroleum	Since 1984
	Mining (Iron ore and Coal)	2012

Tanzania	Petroleum	Since 1984
Various	Petroleum	Mid 1980s
Madagascar	Petroleum	1980s
	Mining	1980s
Ghana	Mining	From 1985-2003
	Petroleum	Since 1984
Canada, British Colombia	Mining	Since 1990
Zimbabwe	Mining	Since 1994
Namibia	Petroleum	Since 1993
Russia	Petroleum	Since 1994
Angola	Petroleum	Since mid-1990s
Azerbaijan	Petroleum	Since 1996
Kazakhstan	Petroleum	Since mid-1990s
Solomon Islands	Mining(Gold)	Since 1999
Timor-Leste	Petroleum	Since 2003
Malawi	Mining	Since 2006
Liberia	Mining	Since 2008

Although the higher end of the spectrum shows that most authors prefer RRT, some simply believe that the system is too complex and can only lead to confusion. With very little evidence from practical applications, scholars are leaning more towards existing systems already tested than the use of RRT (Cawood and Oshokoya 2013).
The RRT design is too complex and difficult and this is believed to be one of the reasons that have caused it to fail in countries that have employed this system (Sunley and Baunsgaard 2001). The design of the RRT will be discussed below.

2.4. Resource Rent tax Model

The design of a fiscal system is one area that has been focused on by most researchers because it determines the success or failure of the whole tax system. Resource rent tax has been criticized for being too complex to use in other countries (Boadway and Flatters 1993).

A lot of questions have been asked regarding how the tax system should be designed in order to bring in maximum revenue for government and secure future investments. Some authors have studied how effective an efficient RRT system should perform, and one of the features is that it should tax full rents (Daniel, Keen et al. 2010).The way in which RRT works is that it only taxes positive cash flows and allows for all costs including capital costs to be deducted from the revenue.

In the case of a negative cash flow, the cash flow is carried forward into the next year at an interest rate calculated based on the internal rate of return of the investor (Garnaut 2010). In this section the focus will be on how best to design an RRT system, based on previous research and on countries that have employed the system in their countries.

The two main features of a resource rent tax model are:

- The threshold rate – This is the rate at which the RRT is triggered, and it should be higher or equal to the investor's rate of return. Governments have the choice to use different techniques to determine the threshold rate. A cost of capital can be obtained from the capital markets where a certain risk premium is then added to the cost of capital to determine the required rate of return of the investor. This requires government to have sufficient market information. Determining the risk premium can be very hard but once determined, the government can then set a fixed threshold rate. However there is also the option of using the risk free rate of return obtained from government bonds and then adding a fixed rate over and above this risk free rate (Daniel, Keen et al. 2010). In this option the risk free rate changes annually but the threshold rate added to this is fixed. There are also other options that government can choose to determine the threshold rate, such as negotiation with investors, however this can lead to different rates that are specific to a particular type of project. Usually the threshold rate is across the industry and not a project to project rate (Land 2008). The higher the threshold rate the more a RRT system becomes neutral, because this increases the after tax profits to the investor and decreases the potential government revenue (Smith 1999).

- The tax rate- This is the rate at which profits are taxed once the threshold rate has been reached. Government cannot tax the excess profits at 100 percent because this will cause disinvestment and also discourage any future exploration in the country even though it would be getting maximum revenue. This is where the balance needs to be exercised to satisfy both the investor and government. A high tax rate can bring in maximum revenue for government however it can cause many distortions to the RRT. Tax rates can be determined through negotiations with investors (Land 2008). If the tax rate is too high the whole tax system could have distorting effects in the nature of reducing future exploration, new investments and can possibly cause other mines to close down (Garnaut 2010). A system with a high tax rate is stable but has many distorting effects on investment decisions.

2.5. Resource Rent Tax Success Rate

There are very few practical examples of RRT being used as an individual tax system across the minerals industry, most countries use hybrid tax system or a combination of tax system to avoid fiscal risk. In this section the paper focuses on countries that have used the RRT even though it has been used with other tax system.

2.5.1. Australia

Australia is one of the top mining countries in the world, being one of the largest producers of gold, iron ore, aluminum, uranium and brown coal (Guj 2012). The resource industry in Australia is a considerable contributor to the GDP, contributing approximately 9 percent to the total output between 2010 and 2011,although this was down from the 11.5 percent contributed in between 2007 and 2008 (Hogan and McCallum 2010). In 2011 the mineral exports accounted for more than half of the total exports in the country. The industry is also a major contributor to tax revenue in the country and this is why the tax systems used are important to ensure government gets a fair share of the resource wealth (Hogan and McCallum 2010).

The concept of Resource Rent Tax was introduced in Australia in the early 1980s' in the petroleum industry and became the basis of most research that was done about RRT, the tax system has since been modified to suit the objectives of the government and the investor (Hogan and Goldsworthy 2010). This study will not focus on the petroleum resource rent tax (PRRT) but rather on the recently proposed mineral resource rent tax (MRRT).

The mineral resources in Australia like other countries belong to the state (Garnaut 2010), and it is therefore the objective of the government to maximize the revenue collected while attracting private investors (Hogan and McCallum 2010). The topic of RRT was recently revisited as Australia sought to change its tax system to capture more rents like most other countries have been trying to do recently. Although changing of fiscal regimes to capture more rents is a sign of instability, investors have a choice of engaging in renegotiations with government or taking their business elsewhere (Land 2008).

In 2012 the Australian government introduced a new fiscal regime for the iron ore and coal industry. This tax system would be known as the MRRT and would be a tax on economic rent. The MRRT was actually a modified version of a previously proposed tax system, the Resource Super Profit Tax (RSPT).

The MRRT was designed as follows:

- Tax rate – A tax rate of 22.5 percent was imposed. There is a headline rate of 30 percent and a 25 percent extraction allowance against MRRT liability.
- Threshold rate- A threshold amount of $75 million per annum was applicable. Companies making a profit below $75 million where not liable to pay MRRT.
- Tax base – The basis of the tax was mining profit before deductions of interest expenses.

Although this new tax system was not widely accepted in the industry, the estimation was that it would perform better than the previously proposed RSPT. The new MRRT system would affect fewer mining companies (only iron ore and coal companies) as compared to those that would have been affected by RSPT and companies would also be taxed less

(Sarker and Whalan 2011). Studies that were carried out showed that the new MRRT would increase mining production, investment and employment (Kraal and Nash 2010). However to the disappointment of government, the new introduced MRRT did not do this. The tax system did not raise the expected revenue and this was attributed to the complexity of the design and the drop in commodity prices. The failure of this system has caused the government of Australia to repeal the tax, even though it was introduced after a royalties and RSPT were deemed not good enough systems for the government. This raises the question of which tax system Australia will be imposing next on its mining industry.

2.5.2. Other Countries

The Australian case is one that did not go well, however there are other countries that have employed the RRT in their resources industries. Countries such as Ghana have employed the RRT system in the resource industry (Addy 1998). Malawi imposes a 10 percent RRT that is triggered when after tax cumulative cash flow exceeds 20 percent. Angola has changed the tax system to generate more revenue and meet policy objectives following the high oil prices, the country uses a PSC system which is profit based and progressive (Daniel, Keen et al. 2010). Governments of most of the resource rich countries have the objective of getting a fair share of the mineral wealth however the way in which the tax revenue is used is also important in determining the success of the overall tax system. Most resource endowed countries are subjected to the 'resource curse', this is when a country that is rich in mineral resources cannot sustain itself once the resources have depleted because it is resource dependent (Sarker and Whalan 2011).

2.6. Current Tax Regimes in South Africa

In 1998 a White paper specific to Minerals and Mining Policy was released, the paper dealt with most if not all issues pertaining to mining, including taxation. The policy had six main themes of which one of them was 'Business Climate and Mineral Development', under which was the discussion of mobility and changes in access to mineral rights (Africa 1998). Discussed further under that theme were issues of taxation and the objectives that a tax system should serve, with one of the mentioned requirement being the contribution of the mineral industry to tax revenue through royalties.

This policy created a platform for development of The Mineral and Petroleum Resources Development Act 28 (MPRDA) of 2002(Cawood and Minnitt 2001).

The main aim for the MPRDA was to allow all people of South Africa the opportunity to benefit from the nation's resources and to give ownership of the resources to the nation. With the complexity of state owned and privately owned mineral rights divisions and combinations in existence, there was a need for the MPRDA to have a simplified approach to mineral rights holding (Cawood and Minnitt 2001) and the act clearly states that the resources of the country belong to the South African citizens.

The act stipulates the payment of royalties to the government for the use of land by private parties. In 2008 the Mineral and Petroleum Resources Royalty act (MPRRA) was promulgated and came into effect following its promulgation (Cawood and Oshokoya 2013). Private sector dependent countries allow the investor to take a share of rent as a reward for taking on a risky investment, but also give a share to government through royalty and taxes (Cawood 2010). The ownership of mineral rights gives government the right to have a claim on mining revenue, and the South African government does this in three ways, through royalties, corporate income tax and finally through dividends tax. Cawood (2010) describes these as positions that government holds in the hierarchy of claims on mining revenue.

2.6.1. Royalties

The MPRRA had the objective of targeting mineral rents during commodity booms, and clearly states that royalties must be paid for exploitation of mineral resources to the National Revenue Fund. Royalties payable are calculated based on the classification of the mineral and the royalty act differentiates between a 'refined' mineral resource and an 'unrefined' mineral resource and these are defined in Schedule 1 and 2 of the MPRRA. Different minerals have different conditions when refined and unrefined and the act provides these conditions in Schedule 1 and 2 respectively. The basic royalty calculation is the multiplication of the royalty rate by the royalty base (Africa 2002).

Royalty Rate

The royalty rate is calculated from the royalty formula, and has been designed to fluctuate with the profitability of the mine rather than being a fixed rate. The profitability of the mine is measured by the Earnings before interest and tax (EBIT) to sales ratio. The formula for the refined and unrefined rate are as follows (Cawood and Oshokoya 2013):

REFINED: $Y(r) = 0.5 + [EBIT/ (AGGREGATE\ GROSS\ SALES\ X\ 12.5)]\ X\ 100$

OR $Yr\% = 0.5 + (X/12.5)$

UNREFINED: $Y(u) = 0.5 + [EBIT/ (AGGREGATE\ GROSS\ SALES\ X\ 9)]\ X\ 100$

OR $Yu\% = 0.5 + (X/9)$

These two formulae are based on the structure of $Y\% = (a + b)$ Where, a = the minimum factor of 0.5% for both refined and unrefined minerals.

$b = X/F$

X = the measure of profitability calculated as EBIT/AGGREGATE GROSS SALES

F = 12.5 for refined rate and 9 for unrefined rate. The maximum rate for 12.5 is 5% and the rate for 9 is 7%.

The maximum rate is used during periods of commodity booms and the minimum scale is used during down times, this indicates that the government recognizes that there are good times in the industry and times when commodity prices are falling. The sliding scale nature of EBIT allows the formula to be adjustable for good and bad times. EBIT is defined as the gross sales after adding recoupments under the Income tax Act less the capital expenditure less the operating expenditure. Only earnings obtained for the purpose of mineral exploitation are considered in this calculation while negative EBIT is not considered (Cawood 2010).

Royalty Base

According to the act, the base of the act is the arm's length gross sales value less the allowable deductions during the period of assessment, which is a year (12 months). The gross sales price increases if the minerals are sold below the refined condition, and if they are above the refined condition then the price is adjusted accordingly.

Payment of royalties is regarded as a fair and competitive way of having investors give back to the state. Cawood and Oshokoya (2013) state that the royalty system is an efficient way of revenue collection for the government and should not be changed as the mining industry is already under a great enough tax burden, however they believe that South Africa has issues of revenue management that need to be sorted out in order to reap better rewards of the royalty system. With corruption on the rise, people have not been able to see the full wealth creation made by the new royalty system.

2.6.2. Corporate Income Tax (CIT)

The standard CIT rate in South Africa is 28 percent across all mining companies except the gold mining companies.

The gold mining formula is used to calculate the tax levied from gold mines. The formula is of a sliding scale similar to that of royalty payments. The gold tax rate is calculated as follows (Cawood and Oshokoya 2013):

$Y = 43 – 215/X$ OR $Y = a – ab/X$

Where,

X = Taxable income/ Gold mining revenue, expressed as a percentage.

a = marginal corporate tax rate which only applies to taxable income above the value of b.

b = 5% tax free tunnel, this is a 5% tax exemption on of the first 5% of profit.

The gold mining formula is self-adjusting and allows government to tax the gold companies more when the gold price is high and low when the gold prices are low (Cawood and Oshokoya 2013). Mining and quarrying contributed 9.7 percent to the total tax assessed by South African Revenue Services (SARS) in 2015.The recent designs of CIT regimes can have an influence on an investor's perception of how attractive investing in a country is, so South Africa should also keep its CIT system competitive in order to attract investors (Mullins 2010).

2.6.3 Other Taxes

Dividend tax (DT) is a tax that is charged on dividends that are declared by a company. The DT rate is currently at 15 percent and applies to shareholders who receive dividends distribution (SARS 2015).

2.7. Conclusion

Mineral taxation is important for the development of the economy in resource dependent countries. Designing a suitable tax system may pose many challenges and government needs to strike a balance between capturing sufficient rent to meet the needs of the state and keeping the investor happy enough to continue investing in the country.

Although RRT has been one of the more favored tax systems because of the theories behind it, many have gone against the claims of efficiency that the system has been praised for. Despite the concept of RRT being in existence for so long countries such Australia haven't reaped the rewards of using the tax system as much as they had hoped. South Africa however uses a royalties system which is considered to be efficient but needs to be managed better for people to reap the full rewards.

3. METHODOLOGY

3.1. Introduction

In this chapter, the research methodology will be discussed, these are the methods that were used to achieve the project objectives. In section 3.2 the hypothetical case will be presented with model assumptions. Section 3.3 focuses on the research design, the model used and the model limitations before a conclusion is made in section 3.4.

Having studied the background of the tax system used in South Africa and the history behind the need to propose a new tax system, it is now necessary to focus on achieving the objectives of this research. One major problem that researchers have faced when trying to quantify the change that is brought by a new tax system is access to data, this challenge leaves very few choices for one to use when evaluating a tax system empirically. South Africa is currently using a hybrid tax system as discussed in chapter 2 above, and therefore in this study a hybrid tax system will also be used, however the system will be designed according to the suggestions made on the ANC SIMS (2012) report. There are very few empirical studies that have been carried out on rent sharing and this could be largely attributed to the many limitations available in the resource industry. With more and countries having a sense that their governments are getting less than a fair share of the rent, an empirical study to show just how much government could get from a change of regime could prove to be helpful to many.

3.2. Hypothetical Case Study

The use of a hypothetical model to study the effects of change in tax system is popular because although companies have balance sheets available to the public, most mining companies have a number of operations around the world and their balance sheets show total tax paid which is calculated using various formulas from the different host countries where their operations are in. The best option then becomes creating a hypothetical case study with assumptions made that resemble those of an actual mine.

3.2.1. Project Background

MATHIS is platinum mine located in the eastern limb of the Bushveld complex in South Africa. The mining project was 100 percent equity financed by private investors. The investors are South African and therefore any other taxes from the home country are not considered for this study except the CIT and MRRT. The mining rights are owned by the state. The project is expected to start producing in 2015 with 63 thousand ounces produced in the first year of operation, and then ramping up to 95 thousand ounces a year until the project comes to an end. The life of the project is 10 years.

3.2.2. Model Assumptions

The model assumptions were made with reference to the hypothetical iron ore project model created by Kraal and Nash (2010).

- The project had an initial capital outlay of $80 million in 2014 and continued to inject capital of $3 million and $5 million into the project till the end of the project. All other expenses in 2014 and before that were not considered, these include costs incurred for obtaining exploration and mining permits since these where sunk costs.
- Operating expenses were approximately 4 percent of the original capex in the first year and in the years following that were reduced to 3.7 percent of capex.
- Annual Inflation was 6 percent (Inflation.eu 2016) and was compounded year on year using an inflation multiplier of 1.1, 1.2 and 1.3 every 3 years (Kraal and Nash 2010).
- The investors minimum required rate of return is 13.5 percent (KPMG 2012).

3.3. Model Design

The ANC SIMS report suggests that mining companies pay 28 percent CIT and a 50 percent MRRT rate on company profits with a threshold rate equal to the long term bond rate (8 percent) plus 7 percent. The report however does not specify how mining allowances will be treated, therefore mining allowances were not taken into consideration in this model. For this study six cases were generated to yield different MRRT values. The six cases were generated by varying the threshold rate, MRRT rate and CIT rate from those suggested on the SIMS report. The threshold rate cannot be lower than the minimum required rate of return of an investor and was thus increased from this minimum rate in the case scenarios. Keeping the threshold rate is a possibility that was not explored in this study. Each case scenario therefore has a different tax model.

The case scenarios are tabulated below and are divided into two categories, A and B, where category A contains the case scenarios with the same CIT rate of 28 percent and category B contains the case scenarios with a CIT of 25 percent. The case scenarios were arranged such that the odd numbered cases are in category A while the even numbered cases are in category B.

The six generated cash flows are shown in the appendix, with the net cash flows compounded at the threshold rate. MRRT was calculated using the formula used by Kraal and Nash (2010) in valuating an iron ore project in Australia.

- *MRRT = MRRT RATE x (PROFIT-ALLOWANCES)*

Table 4 : Category A and Category B case scenarios

CATEGORY A

	Threshold Rate (%)	Tax rate (%)	Corporate Income Tax (%)
CASE 1	17	30	28
CASE 3	15	50	28
CASE 5	13.5	60	28

CATEGORY B

	Threshold Rate (%)	Tax Rate (%)	Corporate Income Tax (%)
CASE 2	17	30	25
CASE 4	15	50	25
CASE 6	13.5	60	25

3.4. Conclusion

Although hypothetical cases are not the first choice when conducting research, in most cases that involve tax, a hypothetical case becomes the easier way to find out the impacts that tax would have on companies. Lack of data and data sources leaves hypothetical cases as an available option to carry out research. With very little research available on impact of tax on projects and mining companies in South Africa and with the SIMS report not having covered some aspects of the MRRT model, many assumptions have to be made however this opens up opportunity to study different scenarios to determine which would be suitable for South Africa.

4. RESULTS AND DISCUSSIONS

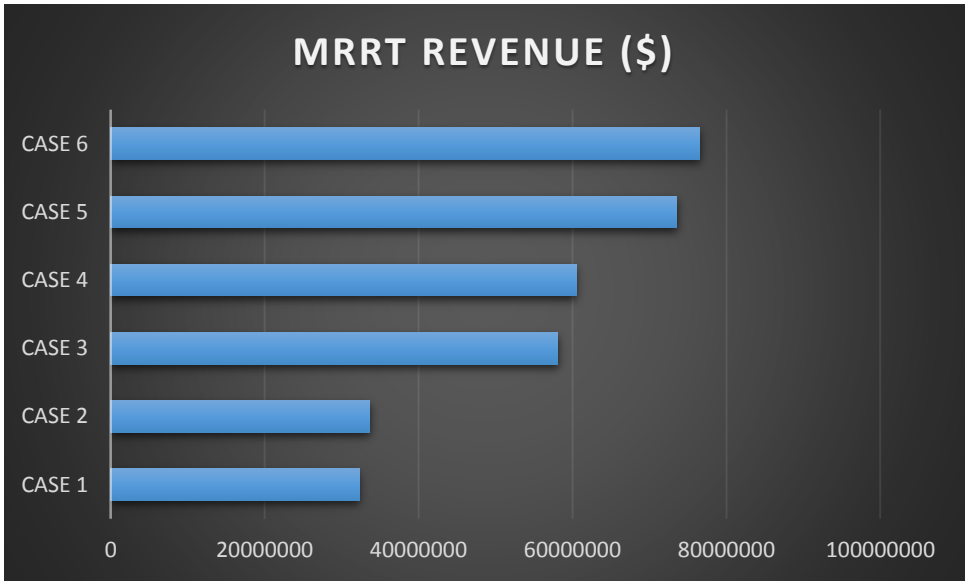
4.1. Introduction

In chapter 4, the results obtained from the model described in chapter 3 are presented. In section 4.2 the findings will be presented and discussed. Section 4.3 will have discussions about the necessity of changing a tax regime in South Africa and what implications this has on the investor – government relationship. Section 4.4 will conclude the chapter.

4.2. Presentation of Results

In each of the cases as presented in chapter 3, the MRRT and NPV of the project were obtained to further value the project. Figure 2 below shows the results of the MRRT revenue that government stands to make in each case scenario.

Figure 2: MRRT revenue generated under each case scenario



Findings show that case scenario 6 makes the most revenue for government. Case 6 has the lowest threshold rate which means the point at which MRRT is triggered is achieved much earlier in profit making, allowing the government to tax more rent from the company. This case also has the highest tax rate at 60 %, allowing government to again tax the company more compared to other cases. The general findings are however that the revenue seems to increase from case 1 indicating that the revenue will be most influenced by the combination of the MRRT tax rate and the threshold rate. Case 1 has the worst tax model for government if the purpose of tax is revenue generation, because not only is the company taxed less, the threshold rate is also the highest.

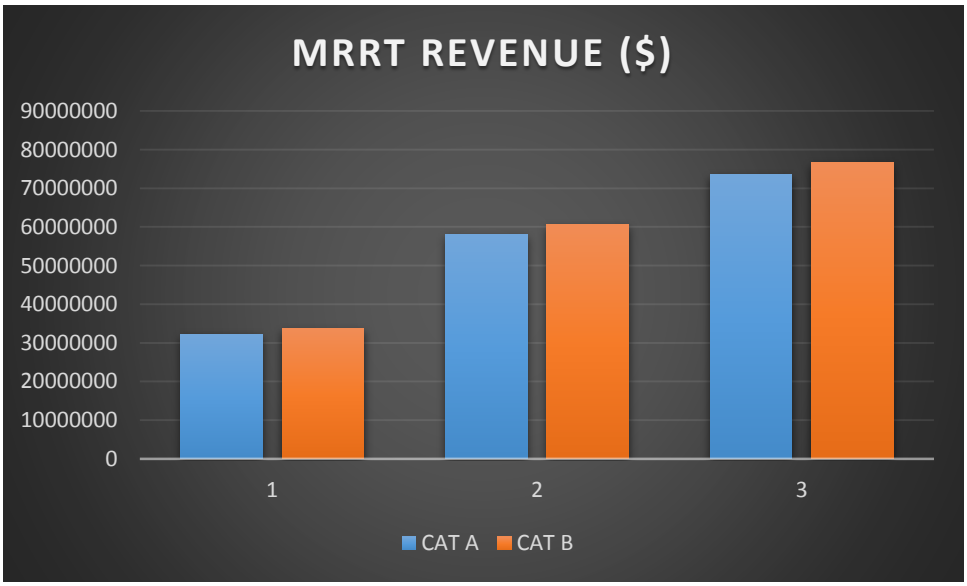
Case 5 which is the suggested model according to the SIMS report is almost the highest revenue generating model, and is thus a good fit for government should their biggest

objective be revenue generation over and above other objectives. The effects of varying the CIT are shown on figure 2.2 below.

CATEGORY A and B FINDINGS

Figure 2.2.1 below shows the comparison of the two categories. The difference between the two categories is only 4 percent across all the MRRT revenues for the six case scenarios, whether or not this difference is enough for government to reduce CIT for mining companies is a topic that still needs further research. An interesting observation made was that under that overall MRRT revenue collected under cases of category B was higher than revenue collected under category A. This observation can be attributed to the fact that a reduced CIT rate increases the net income subject to MRRT which therefore means that government has a bigger amount to tax from. Case 6 therefore has the most optimal tax rates for government.

Figure 3: Comparison of MRRT revenue collected under category A and category B

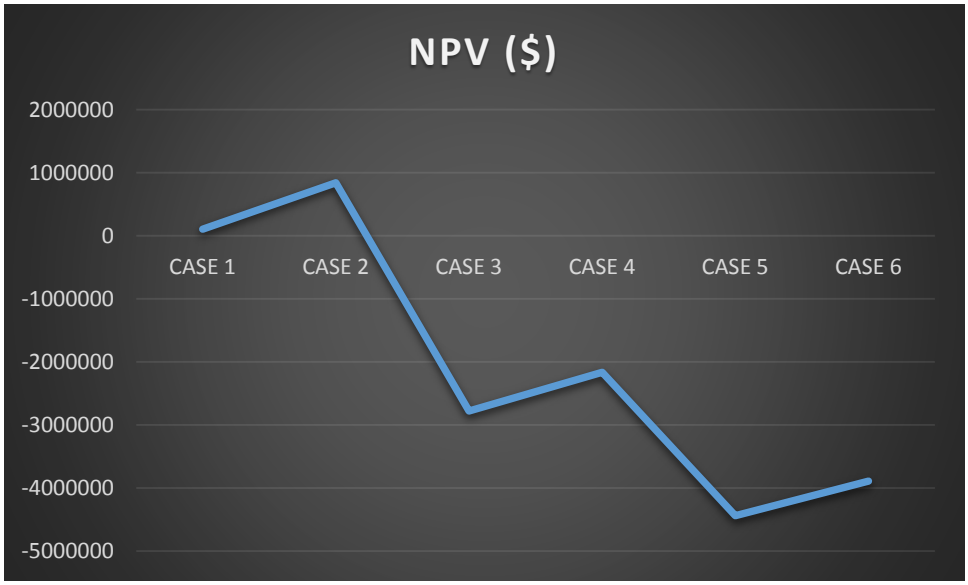


NET PRESENT VALUE

The major findings for the NPV were that the highest NPV for the project is with case 2 as can be seen in figure 4 below. Case 2 has the highest NPV while the rather obvious finding is that the suggested case 5 according to the government generates one of the least NPV. The results show that the combination of the tax rates in case 5 produces the least NPV for the company because they stand to lose more on corporate income tax and with the lowest threshold rate, more money is being subject to MRRT, leaving less profit for the company.

Increasing the MRRT rate whilst decreasing the threshold rate has a downward effect on profit making for companies. The effect of reducing the CIT can be observed here again where the cases with the higher company tax seem to be the lowest NPV generators in the pack.

Figure 4: NPV generated from each case scaenario

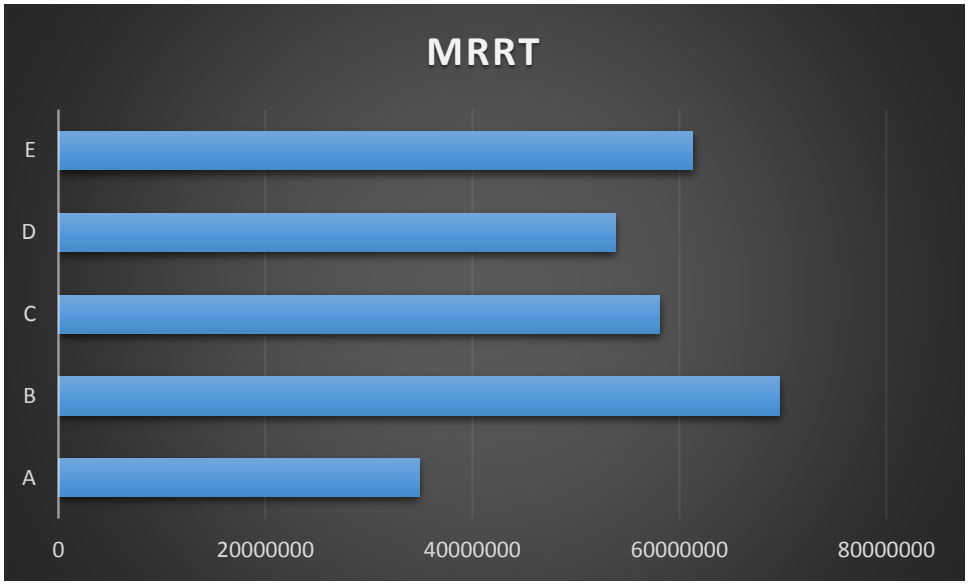


Furthermore the effect of varying the threshold rate while keeping the tax rate and CIT rate fixed was studied, this was to observe the difference that a threshold rate can make in revenue collection for government, and similarly the effect of varying tax rate with other rates fixed was done. The CIT rate was kept fixed for both studies at 28 percent. The results of both these studies are shown on figure 3 below. The first three columns on the graph have the same threshold rate while the last three columns have the same tax rates, the combination of rates is shown on the table below.

Table 5: Combination of threshold rate and MRRT rate

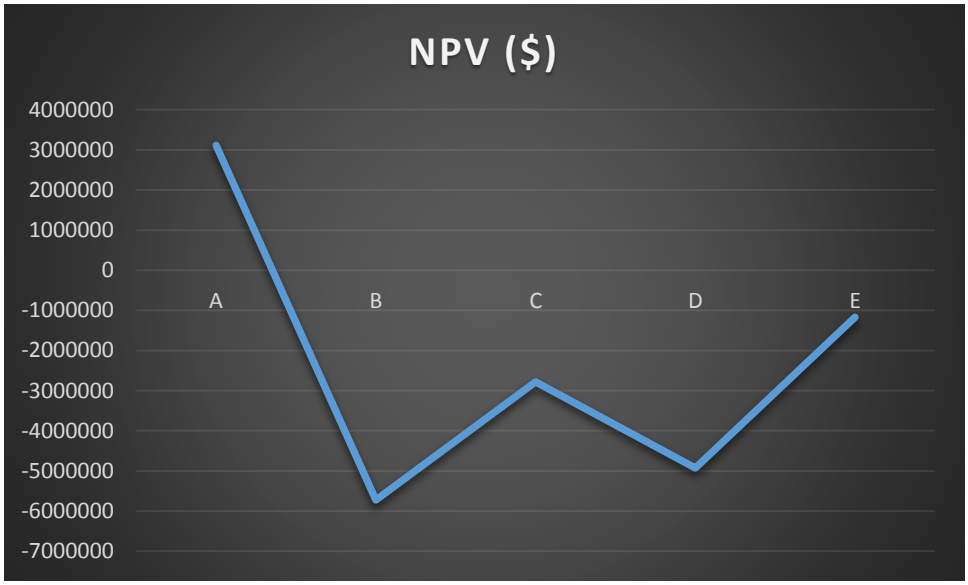
	Threshold rate (%)	**MRRT rate (%)**
A	15	30
B	15	60
C	15	50
D	17	50
E	13.5	50

Figure 5: MRRT revenue collected by keeping either the threshold rate fixed or MRRT rate.



The most evident observation from figure 5 above is the difference between revenue generated in the two cases A and B that have the same threshold rate but different MRRT rates, the difference in revenue is 50 percent while the difference between D and E with the same MRRT rate is 12 percent. This shows that the biggest contributor to revenue generation is the MRRT tax rate. Varying the threshold rate does make a difference however it is almost negligible compared to the difference made by increasing the MRRT rate. This means that government needs to focus more on what an optimal MRRT rate would be but keeping in mind that the rate must not cause investors to re-evaluate their business interests in the country. Figure 5 below shows the corresponding NPVs and from the graph only the combination of a threshold rate of 15 percent and MRRT rate of 30 percent gives a positive NPV.

Figure 6: NPV generated by varying either the MRRT rate of the threshold rate



From the above findings, government needs to consider changing the proposed model of having a threshold rate of 15 percent and MRRT rate of 50 percent to reducing the tax rate to a rate between 50 percent and 30 percent. If government wants to encourage investors to continue exploration in the country then there needs to be a balance between the profit that companies make and the revenue that government can collect. Government should not be too lenient by using a case 2 scenario tax model because they will not be making a fair enough share, however a case 5 kind of scenario with a tax rate that is too high can cost the country loss of investment. Mining companies need to propose a negotiation before the government implements the MRRT model as proposed on the SIMS report because any tax rate higher than 50 percent will make companies operate at losses and may cause existing marginal mines to close.

4.3. Discussion

The objective of government when setting up fiscal policies for tax isn't just revenue collection, but an overall efficient system is preferred. There is therefore great importance in assessing the MRRT system against the current system of royalties to find out if indeed the MRRT is the best choice to use in South Africa. MRRT has a high revenue raising potential (Land 2008) however the current system employed in South Africa is considered to be a very efficient and competitive (Donelly 2012). Cawood and Oshokoya (2013) carried out a study to evaluate the current tax system used in South Africa and found that the introduction of the royalties act actually led to an increase in mining taxes and therefore increased government revenue, which led them to the conclude that introducing an MRRT system was unnecessary.

An efficient tax system focuses on more than just revenue collection, and that is why it is important to have a discussion not only based on the revenue collecting ability of the MRRT but on other factors that will show whether South Africa is ready for a change in tax system to the MRRT system. Although there has been conflicting views about the neutrality of the MRRT system, governments are moving away from the focus on neutrality and basing decisions of tax reform on other issues that are in line with their objectives (Laporte and de Quatrebarbes 2015).

What has not been discussed in this study is the investor's response to a change in tax system .Governments can have incentives in place for mining companies during the early processes of mining (Laporte and de Quatrebarbes 2015), however once production has begun, government can change tax systems which maybe a shock to investors, this is known as a 'tax culture shock' (Sarker and Whalan 2011).

The response of an investor to change in tax system can be varied, and can in some cases lead to the investor choosing to take his investment elsewhere (Land 2008).

As discussed in chapter 2 the investor's perception of risk is influenced by a country's political risk and uncertainty about the stability of the tax system. For future investors a change in tax system will decrease the stability of the tax system in place at the moment of investment and thus either increase the investor's rate of return (Garnaut 2010) or cause a decrease in investment flow (Land 2008).

Land (2008) highlights that one of the problems that governments face when designing a tax system is fiscal risk. The design of the MRRT system allows for tax payment only when there are super profits made however with commodity prices slumping (Mining Weekly,2015), there is an increased risk that government will not collect as much revenue as is anticipated should a decision be made to change tax systems. MRRT would increase the uncertainty of government revenue since it is already known to be a very volatile system (Robson 2012).

An increase in taxation can cause problems of tax avoidance or evasion (Boadway and Flatters 1993), this problem is related to the administrative capabilities of government and their monitoring system (Sunley and Baunsgaard 2001). South Africa has already been found to be one of the countries facing administration challenges with the current royalties act (Cawood and Oshokoya 2013). RRT is already considered a complicated tax system that has high chances of presenting administrative challenges more especially to countries with poor administrative capabilities (Daniel, Keen et al. 2010). A reduction in the number of taxes has been identified as one of the things that could reduce the administrative burden on the government (Calder 2010), the South African government needs to revisit the proposal to impose more than one tax system on the mining industry as proposed on the SIMS report.

One other important deciding factor should be the difficulty associated with designing and implementing a tax system such as MRRT. Firstly there is the complexity in measuring and taxing rents(Boadway and Flatters 1993), secondly deciding on tax threshold and lastly setting the tax rate and the implementation of the two rates,these seem to pose difficulties when designing an MRRT system(Sunley and Baunsgaard 2001).
Although MRRT is what the South African government has proposed as the next step to take in tax reform, Boadway and Keen (2010) highlight that there are other non- distorting tax systems that have a good potential of raising revenue besides MRRT.

4.4. Conclusion

The financial impact of MRRT on companies will be highly distorted for the worst if the government decided to use a case 6 scenario. Government stand to collect high revenues however government is faced with plenty of challenges if they decide to change the tax system from the current royalty system to the MRRT purely for the benefit of high revenue collection. By varying the tax rate governments can design a better suited model that is fair to the investor but still meets the efficiency criteria of a tax system.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

The previous 4 chapters presented the introduction, literature review, methodology and presentation of results, in this chapter the focus will be on combining everything together and making final conclusions based on findings made especially in chapter 4. In section 5.2 there will be a discussion about the findings, then an overall conclusion will be made in section 5.3 followed by recommendations about the research topic and for future research in the last section of the study, section 5.4.

5.2. Discussion

Very little research has been conducted around South Africa's tax system and other countries in Africa, most of the empirical studies done on taxation in developing countries has been through hypothetical case scenarios (Laporte and de Quatrebarbes 2015) and this can be attributed to the difficulty in measuring rents in existing project and in some cases obtaining economic data and firm data (Boadway and Flatters 1993).

Using a hypothetical mining project to find a suitable mining tax model for this study was limiting as most design features were not factored into the model, due to difficulties presented when dealing with a country's mining tax system as a whole(Laporte and de Quatrebarbes 2015). A common way of determining the threshold rate of return was used as suggested on the SIMS report, and for calculating the NPV an approach adapted from a project evaluation done by Kraal and Nash (2010) was used.

The major findings of this study revealed that the project NPV will be negatively affected should the government decide on a 15 percent threshold rate, 50 percent MRRT rate and a 28 percent CIT rate. On the side of the government however, the highest revenue will be collected if the government uses the 60 percent tax rate but reduces the CIT rate to 25 percent. Keeping in mind that rents cannot be completely taxed (Boadway and Keen 2010), varying the MRRT rate was found to produce the biggest difference between revenue collected as opposed to varying the threshold rate and the CIT. Although there have been a lot of studies that support the findings that MRRT has a greater potential than other tax systems in collection of revenue (Land 2008), revenue cannot be the only deciding factor especially for a developing country like South Africa that faces other challenges with tax policies(Cawood and Oshokoya 2013) and like other countries, needs to strike a balance between being fair to the investor but also receiving a fair share of the mineral wealth(Daniel, Keen et al. 2010).
South Africa has been facing challenges with the current royalty system used and may face difficulties if there is a change in tax system (Cawood and Oshokoya 2013).

Although empirically only one approach was studied (NPV and revenue collection), the theoretical study shows that South Africa might not be ready to change the tax system to something as complex as a MRRT.

5.3. Conclusion

This study was conducted to evaluate the RRT model that was suggested on the SIMS (2012) report and therefore assess the financial implications of implementing RRT in South Africa. Using a hypothetical project case the effects of different combinations of MRRT threshold rates, tax rates and CIT rates were carefully studied, and an optimum model was suggested based on the findings of the case study.

South Africa is a resource endowed country and the tax system that it applies should be able to meet the objectives of the MPRDA of 2012 that was developed to show state ownership of mineral rights. Although RRT has been in existence for a long time the theories made by Garnaut and Clunies (1975) have come under scrutiny and authors have proved that RRT is not what it is believed to be. Countries such as Australia have put the RRT tax system to the test in both the mining and petroleum industry and have had varied results, one being good and the other being bad.

Even though the study was conducted using a hypothetical project case, the study showed that the effect of changing from the current royalty system will be a disadvantage to both the investor and government, despite the fact that government can collect high revenue.

5.4. Recommendations

The major recommendation based on the findings of the study is that South Africa should hold off on implementing the MRRT system and rather continue to do research on how best the RRT can be implemented in South Africa. There is also a recommendation that government should hold negotiations with the mining industry to establish the best tax model that can be satisfactory to both parties. Things that need attention and further research are:

- Research on the overall mining tax system for South Africa.
- Implementing an RRT in the mining industry as a pure tax without using a hybrid model.
- Overall comparison of the current royalties system and the MRRT system.

Once extensive research has been done on the above mentioned recommendations, South Africa can then make a more informed decision about changing from the current royalty system to the suggested MRRT system.

REFERENCES

Addy, S. N. (1998). "Ghana: Revival of the mineral sector." Resources Policy 24(4): 229-239.

Africa, S. (1998). White Paper : A Minerals and Mining Policy for South Africa. Pretoria, Department of Minerals and Energy.

Africa, S. (2002). Mineral and Petroleum Resource Royalty Act.

ANC (2012). State Intervention in the Minerals Sector(SIMS). South Africa.

Ball, R. and C. J. Bowers (1984). "The resource rent tax: A penalty on risk-taking."1-20

Barma, N., et al. (2012). Rents to riches: the political economy of natural resource-led development, World Bank Publications.

Boadway, R. and M. Keen (2010). "Theoretical perspectives on resource tax design." The Taxation of Petroleum and Minerals: Principles, Problems and Practice 24: 13.

Boadway, R. W. and F. Flatters (1993). The taxation of natural resources: principles and policy issues, World Bank Publications.

Brown, E. C. (1948). "Business-income taxation and investment incentives." Domar et al., eds., Income, Employment and Public Policy, Essays in Honor of AH Hansen, WW Norton & c., New York.

Calder, J. (2010). "Resource tax administration: The implications of alternative policy choices." eds) Daniel, P. et al. The Taxation of Petroleum and Minerals: Principles, problems and practice. London. Routledge for International Monetary Fund: 319-339.

Cawood, F. (2010). "The South African mineral and petroleum resources royalty act—Background and fundamental principles." Resources Policy 35(3): 199-209.

Cawood, F. and R. Minnitt (2001). "A new royalty for South African mineral resources." JOURNALSOUTH AFRICAN INSTITUTE OF MINING AND METALLURGY 101(2): 91-96.

Cawood, F. and O. Oshokoya (2013). "Considerations for the resource nationalism debate: a plausible way forward for mining taxation in South Africa." Journal of the Southern African Institute of Mining and Metallurgy 113(1): 53-59.

Cawood, F. and O. Oshokoya (2013). "Resource nationalism in the South African mineral sector:

Sanity through stability." Journal of the Southern African Institute of Mining and Metallurgy 113(1): 45-52.

Chamber of Mines of SouthAfrica (2013). "Facts & Figures 2013/2014." Retrieved from http://www.chamberofmines.org.za/industry-news/publications/facts-and-figures.

Curtis, M. (2009). Mining and tax in South Africa: Costs and benefits, Curtis Research. Retrieved from http://www. curtisresearch. org/SAfrica. MiningTax. Feb09. Curtis. pdf.

Daniel, P., et al. (2010). The taxation of petroleum and minerals: principles, problems and practice, Routledge.3-339

Donelly, L. (2012). "Shabangu says mining resource rent tax must be fair." Retrieved 7 January 2016, Retrieved from http://mg.co.za/article/2012-05-10-shabangu-proposes-a-mining-resource-rent-tax.

Garnaut, R. (2010). "The new Australian resource rent tax." The University of Melbourne [Online]. Retrieved from: http://www. rossgarnaut. com. au/AustralianEconomy.html

Garnaut, R. and A. C. Ross (1975). "Uncertainty, risk aversion and the taxing of natural resource projects." The Economic Journal 85(338): 272-287.

Guj, P. (2012). "Mineral royalties and other mining-specific taxes." International Mining for Development Centre, Australia.8-12

Hogan, L. and B. Goldsworthy (2010). "5 International mineral taxation." The Taxation of Petroleum and Minerals: 122.

Hogan, L. and R. McCallum (2010). "Non-renewable resource taxation in Australia." ABARE Report, April, Commonwealth of Australia, Canberra.

Inflation.eu (2016). "Historic Inflation South Africa- CPI Inflation." Retrieved March, 2016, Retrieved from http://www.inflation.eu/inflation-rates/south-africa/historic-inflation/cpi-inflationsouth-africa.aspx.

Kellas, G. (2010). Natural Gas: Experience and Issues. The Taxation of Petroleum and Minerals: Principles, Problems and Practice: 163-183.

KPMG (2012). Cost of Capital and Impairment Testing Study: 2012

Empirical survey of South african companies South Africa: 1-34.

Kraal, D. and R. Nash (2010). "Minerals Resource Rent Tax (MRRT): mining project evaluation techniques."

Land, B. (2008). "Resource Rent Taxation–Theory and Experience." International Monetary Fund: 116.

Laporte, B. and C. de Quatrebarbes (2015). "What do we know about the sharing of mineral resource rent in Africa?" Resources Policy 46, Part 2: 239-249.

Mullins, P. (2010). "13 International tax issues for the resources sector." The Taxation of Petroleum and Minerals: 378.

Nakhle, C. (2008). Petroleum Taxation: sharing the oil wealth: a study of petroleum taxation yesterday, today and tomorrow, Routledge.

Otto, J. (2004). "International Comparative Tax Regimes." 50 Rocky Mountain Mineral Law Institute 17: 1-45.

Otto, J. (2006). Mining royalties: A global study of their impact on investors, government, and civil society, World Bank Publications.

Palmer, K. F. (1980). "Mineral Taxation Policies in Developing Countries: An Application of Resource Rent Tax (L'imposition des ressources dans les pays en développement: application du concept de taxe sur la rente minière)(Políticas de impuestos a los minerales en los países en desarrollo: Aplicación del impuesto a la renta de recursos)." Staff Papers-International Monetary Fund: 517-542.

Ricardo, D. (1891). Principles of political economy and taxation, G. Bell and sons.33-115

Robson, A. (2012). On the Volatility of Resource Rent Tax Revenue, Minerals Council of Australia.

Sarker, T. and E. L. Whalan (2011). "Reform issues in mineral tax policy for economic development: the Mineral Resource Rent Tax in Australia."

Smith, B. (1999). "The impossibility of a neutral Resource Rent Tax." 1-40.

StatisticsSA (2015). "The decreasing importance of gold mining in South Africa." Retrieved March 2016, 2016, from http://www.statssa.gov.za/?p=4252.

Sunley, E. M. and T. Baunsgaard (2001). The tax treatment of the mining sector: An IMF perspective. World Bank Workshop on taxation for the mining sector,(April 4-5, 2001), Washinton DC.

APPENDIX

					Discounted Cash Flow:Case 1							
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CAPITAL EXPENDITURE($)												
Original Capex	-8E+07											
Ongoing capex		-3000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000
Escalated		-3378000	-5960000	-6290000	-6650000	-7010000	-7370000	-7760000	-8150000	-8540000	-8960000	-9380000
Exploration		0										
Ounces		63000	95000	95000	95000	95000	95000	95000	95000	95000	95000	95000
Escalated $/oz		1050.558	1112.136	1173.714	1240.89	1308.066	1375.242	1448.016	1520.79	1593.564	1671.936	1750.308
Revenue($)		66185154	1.06E+08	1.12E+08	1.18E+08	1.24E+08	1.31E+08	1.38E+08	1.44E+08	1.51E+08	1.59E+08	1.66E+08
Operating Expenses		-35000000	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07
Escalated opex($)		-39410000	-3.6E+07	-3.8E+07	-4E+07	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.1E+07	-5.4E+07	-5.6E+07
Total costs	-8E+07	-42788000	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.2E+07	-5.4E+07	-5.7E+07	-6E+07	-6.3E+07	-6.6E+07
write off of new capex		-136388000	-9.2E+07	-9.3E+07	-9.8E+07	-1E+08	-1.1E+08	-1.1E+08	-1.2E+08	-1.3E+08	-1.3E+08	-1.4E+08
Profit before MRRT		-70202846	13870960	18660430	19819450	20732770	21646090	22881220	23870650	24860080	26171320	27236860
company Tax		-19656796.88	3883869	5224920	5549446	5805176	6060905	6406742	6683782	6960822	7327970	7626321
Net Income subject to MRRT		-50546049.12	9987091	13435510	14270004	14927594	15585185	16474478	17186868	17899258	18843350	19610539
MRRT payment		-15163814.74	2996127	4030653	4281001	4478278	4675555	4942344	5156060	5369777	5653005	5883162
Net Profit After Tax		-35382234.38	6990964	9404857	9989003	10449316	10909629	11532135	12030808	12529480	13190345	13727377
Annual Inflation		6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
Inflation Multiplier		1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4
Compound Inflation		12.60%	19.20%	25.80%	33%	40.20%	47.40%	55.20%	63%	70.80%	79.20%	87.60%
NPV		$107,651.94										
Total MRRT		$ 32,302,148.54										

					Discounted Cash Flow:Case 2							
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CAPITAL EXPENDITURE($)												
Original Capex	-8E+07											
Ongoing capex		-3000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000
Escalated		-3378000	-5960000	-6290000	-6650000	-7010000	-7370000	-7760000	-8150000	-8540000	-8960000	-9380000
Exploration		0										
Ounces		63000	95000	95000	95000	95000	95000	95000	95000	95000	95000	95000
Escalated $/oz		1050.558	1112.136	1173.714	1240.89	1308.066	1375.242	1448.016	1520.79	1593.564	1671.936	1750.308
Revenue($)		66185154	1.06E+08	1.12E+08	1.18E+08	1.24E+08	1.31E+08	1.38E+08	1.44E+08	1.51E+08	1.59E+08	1.66E+08
Operating Expenses		-35000000	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07
Escalated opex($)		-39410000	-3.6E+07	-3.8E+07	-4E+07	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.1E+07	-5.4E+07	-5.6E+07
Total costs	-8E+07	-42788000	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.2E+07	-5.4E+07	-5.7E+07	-6E+07	-6.3E+07	-6.6E+07
write off of new capex		-136388000	-9.2E+07	-9.3E+07	-9.8E+07	-1E+08	-1.1E+08	-1.1E+08	-1.2E+08	-1.3E+08	-1.3E+08	-1.4E+08
Profit before MRRT		-70202846	13870960	18660430	19819450	20732770	21646090	22881220	23870650	24860080	26171320	27236860
company Tax		-17550711.5	3467740	4665108	4954863	5183193	5411523	5720305	5967663	6215020	6542830	6809215
Net Income subject to MRRT		-52652134.5	10403220	13995323	14864588	15549578	16234568	17160915	17902988	18645060	19628490	20427645
MRRT payment		-15795640.35	3120966	4198597	4459376	4664873	4870370	5148275	5370896	5593518	5888547	6128294
Net Profit After Tax		-36856494.15	7282254	9796726	10405211	10884704	11364197	12012641	12532091	13051542	13739943	14299352
Annual Inflation		6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
Inflation Multiplier		1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4
Compound Inflation		12.60%	19.20%	25.80%	33%	40.20%	47.40%	55.20%	63%	70.80%	79.20%	87.60%
NPV		$841,474.71										
Total MRRT		$ 33,648,071.40										

					Discounted Cash Flow:Case 3							
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CAPITAL EXPENDITURE($)												
Original Capex	-8E+07											
Ongoing capex		-3000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000
Escalated		-3378000	-5960000	-6290000	-6650000	-7010000	-7370000	-7760000	-8150000	-8540000	-8960000	-9380000
Exploration		0										
Ounces		63000	95000	95000	95000	95000	95000	95000	95000	95000	95000	95000
Escalated $/oz		1050.558	1112.136	1173.714	1240.89	1308.066	1375.242	1448.016	1520.79	1593.564	1671.936	1750.308
Revenue($)		66185154	1.06E+08	1.12E+08	1.18E+08	1.24E+08	1.31E+08	1.38E+08	1.44E+08	1.51E+08	1.59E+08	1.66E+08
Operating Expenses		-35000000	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07
Escalated opex($)		-39410000	-3.6E+07	-3.8E+07	-4E+07	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.1E+07	-5.4E+07	-5.6E+07
Total costs	-8E+07	-42788000	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.2E+07	-5.4E+07	-5.7E+07	-6E+07	-6.3E+07	-6.6E+07
write off of new capex		-134788000	-9.1E+07	-9.2E+07	-9.7E+07	-1E+08	-1.1E+08	-1.1E+08	-1.2E+08	-1.3E+08	-1.3E+08	-1.4E+08
Profit before MRRT		-68602846	14726720	19494830	20700050	21663770	22627490	23913020	24957050	26001080	27366920	28491260
company Tax		-19208796.88	4123482	5458552	5796014	6065856	6335697	6695646	6987974	7280302	7662738	7977553
Net Income subject to MRRT		-49394049.12	10603238	14036278	14904036	15597914	16291793	17217374	17969076	18720778	19704182	20513707
MRRT payment		-24697024.56	5301619	7018139	7452018	7798957	8145896	8608687	8984538	9360389	9852091	10256854
Net Profit After Tax		-24697024.56	5301619	7018139	7452018	7798957	8145896	8608687	8984538	9360389	9852091	10256854
Annual Inflation		6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
Inflation Multiplier		1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4
Compound Inflation		12.60%	19.20%	25.80%	33%	40.20%	47.40%	55.20%	63%	70.80%	79.20%	87.60%
NPV		($2,777,999.12)										
Total MRRT		$ 58,082,163.84										

					Discounted Cash Flow:Case 4							
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CAPITAL EXPENDITURE($)												
Original Capex	-8E+07											
Ongoing capex		-3000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000
Escalated		-3378000	-5960000	-6290000	-6650000	-7010000	-7370000	-7760000	-8150000	-8540000	-8960000	-9380000
Exploration		0										
Ounces		63000	95000	95000	95000	95000	95000	95000	95000	95000	95000	95000
Escalated $/oz		1050.558	1112.136	1173.714	1240.89	1308.066	1375.242	1448.016	1520.79	1593.564	1671.936	1750.308
Revenue($)		66185154	1.06E+08	1.12E+08	1.18E+08	1.24E+08	1.31E+08	1.38E+08	1.44E+08	1.51E+08	1.59E+08	1.66E+08
Operating Expenses		-35000000	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07
Escalated opex($)		-39410000	-3.6E+07	-3.8E+07	-4E+07	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.1E+07	-5.4E+07	-5.6E+07
Total costs	-8E+07	-42788000	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.2E+07	-5.4E+07	-5.7E+07	-6E+07	-6.3E+07	-6.6E+07
write off of new capex		-134788000	-9.1E+07	-9.2E+07	-9.7E+07	-1E+08	-1.1E+08	-1.1E+08	-1.2E+08	-1.3E+08	-1.3E+08	-1.4E+08
Profit before MRRT		-68602846	14726720	19494830	20700050	21663770	22627490	23913020	24957050	26001080	27366920	28491260
company Tax		-17150711.5	3681680	4873708	5175013	5415943	5656873	5978255	6239263	6500270	6841730	7122815
Net Income subject to MRRT		-51452134.5	11045040	14621123	15525038	16247828	16970618	17934765	18717788	19500810	20525190	21368445
MRRT payment		-25726067.25	5522520	7310561	7762519	8123914	8485309	8967383	9358894	9750405	10262595	10684223
Net Profit After Tax		-25726067.25	5522520	7310561	7762519	8123914	8485309	8967383	9358894	9750405	10262595	10684223
Annual Inflation		6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
Inflation Multiplier		1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4
Compound Inflation		12.60%	19.20%	25.80%	33%	40.20%	47.40%	55.20%	63%	70.80%	79.20%	87.60%
NPV		($2,164,411.81)										
Total MRRT		$ 60,502,254.00										

					Discounted Cash Flow:Case 5							
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CAPITAL EXPENDITURE($)												
Original Capex	-8E+07											
Ongoing capex		-3000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000
Escalated		-3378000	-5960000	-6290000	-6650000	-7010000	-7370000	-7760000	-8150000	-8540000	-8960000	-9380000
Exploration		0										
Ounces		63000	95000	95000	95000	95000	95000	95000	95000	95000	95000	95000
Escalated $/oz		1050.558	1112.136	1173.714	1240.89	1308.066	1375.242	1448.016	1520.79	1593.564	1671.936	1750.308
Revenue($)		66185154	1.06E+08	1.12E+08	1.18E+08	1.24E+08	1.31E+08	1.38E+08	1.44E+08	1.51E+08	1.59E+08	1.66E+08
Operating Expenses		-35000000	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07
Escalated opex($)		-39410000	-3.6E+07	-3.8E+07	-4E+07	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.1E+07	-5.4E+07	-5.6E+07
Total costs	-8E+07	-42788000	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.2E+07	-5.4E+07	-5.7E+07	-6E+07	-6.3E+07	-6.6E+07
write off of new capex		-133588000	-9E+07	-9.1E+07	-9.7E+07	-1E+08	-1.1E+08	-1.1E+08	-1.2E+08	-1.2E+08	-1.3E+08	-1.4E+08
Profit before MRRT		-67402846	15368540	20120630	21360500	22362020	23363540	24686870	25771850	26856830	28263620	29432060
company Tax		-18872796.88	4303191	5633776	5980940	6261366	6541791	6912324	7216118	7519912	7913814	8240977
Net Income subject to MRRT		-48530049.12	11065349	14486854	15379560	16100654	16821749	17774546	18555732	19336918	20349806	21191083
MRRT payment		-29118029.47	6639209	8692112	9227736	9660393	10093049	10664728	11133439	11602151	12209884	12714650
Net Profit After Tax		-19412019.65	4426140	5794741	6151824	6440262	6728700	7109819	7422293	7734767	8139923	8476433
Annual Inflation		6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
Inflation Multiplier		1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4
Compound Inflation		12.60%	19.20%	25.80%	33%	40.20%	47.40%	55.20%	63%	70.80%	79.20%	87.60%
NPV		($4,435,452.30)										
Total MRRT		$ 73,519,321.25										

					Discounted Cash Flow:Case 6							
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CAPITAL EXPENDITURE($)												
Original Capex	-8E+07											
Ongoing capex		-3000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000	-5000000
Escalated		-3378000	-5960000	-6290000	-6650000	-7010000	-7370000	-7760000	-8150000	-8540000	-8960000	-9380000
Exploration		0										
Ounces		63000	95000	95000	95000	95000	95000	95000	95000	95000	95000	95000
Escalated $/oz		1050.558	1112.136	1173.714	1240.89	1308.066	1375.242	1448.016	1520.79	1593.564	1671.936	1750.308
Revenue($)		66185154	1.06E+08	1.12E+08	1.18E+08	1.24E+08	1.31E+08	1.38E+08	1.44E+08	1.51E+08	1.59E+08	1.66E+08
Operating Expenses		-35000000	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07	-3E+07
Escalated opex($)		-39410000	-3.6E+07	-3.8E+07	-4E+07	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.1E+07	-5.4E+07	-5.6E+07
Total costs	-8E+07	-42788000	-4.2E+07	-4.4E+07	-4.7E+07	-4.9E+07	-5.2E+07	-5.4E+07	-5.7E+07	-6E+07	-6.3E+07	-6.6E+07
write off of new capex		-133588000	-9E+07	-9.1E+07	-9.7E+07	-1E+08	-1.1E+08	-1.1E+08	-1.2E+08	-1.2E+08	-1.3E+08	-1.4E+08
Profit before MRRT		-67402846	15368540	20120630	21360500	22362020	23363540	24686870	25771850	26856830	28263620	29432060
company Tax		-16850711.5	3842135	5030158	5340125	5590505	5840885	6171718	6442963	6714208	7065905	7358015
Net Income subject to MRRT		-50552134.5	11526405	15090473	16020375	16771515	17522655	18515153	19328888	20142623	21197715	22074045
MRRT payment		-30331280.7	6915843	9054284	9612225	10062909	10513593	11109092	11597333	12085574	12718629	13244427
Net Profit After Tax		-20220853.8	4610562	6036189	6408150	6708606	7009062	7406061	7731555	8057049	8479086	8829618
Annual Inflation		6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
Inflation Multiplier		1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4
Compound Inflation		12.60%	19.20%	25.80%	33%	40.20%	47.40%	55.20%	63%	70.80%	79.20%	87.60%
NPV		($3,890,925.54)										
Total MRRT		$ 76,582,626.30										