Change in Corporate Debt Levels in South Africa from 1994 to 2016

By

Kyla van der Westhuizen (VWSKYL002)

Research paper presented in partial fulfilment of the requirements for the degree of Master in Financial and Risk Management

Supervisor

Associate Professor Glen Holman

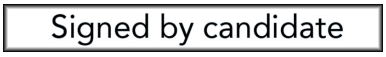
October 2019

Plagiarism declaration

I know plagiarism is wrong. Plagiarism is to use other's work and pretend that it is one's own.

This paper entitled: "Change in Corporate Debt Levels in South Africa from 1994 to 2016" is my own work.

Each significant contribution to, and quotation in, this paper from the work(s) of other people has been attributed and has been cited and referenced. I have not allowed, and will not allow anyone to copy my work with the intention of passing it off as their own.

Signature 

Kyla van der Westhuizen (VWSKYL002)

Abstract

This paper investigated the change in corporate debt levels in South Africa from 1994 to 2016. Included is an analysis of factors that companies take into consideration when determining the company's capital structure.

This study used data from companies, largely from the mining sector, within sectors listed on the Johannesburg Stock Exchange (JSE), including chemicals, general industries, oil and gas. Four different leverage measures were used to determine the change in capital structure for the period under review, as well as six of the most commonly used determinants of capital structure.

A high-level interpretation of the results reflected the following; a slight but relatively consistent increase in the use of debt relative to equity over the period for both the total sample and the mining sector. An increase in the use of long- relative to short-term debt was also found, as well as a convergence between the use of current and non-current liabilities.

Results from the analysis of the capital structure determinants varied, with some showing statistical significance. Asset tangibility was positively correlated to debt, while profitability and growth had a negative relationship. The relationship between company size, tax and cost of debt and leverage was varied.

Keywords:

Capital Structure Theory, Capital Structure Determinants, Interest Rates, Capital Market, Mining

Contents

List of Acronyms

Acronym	"Definition"	Page
JSE	Johannesburg Stock Exchange	1
BESA	Bond Exchange of South Africa	2
NPV	net present value	9
TLBV	liabilities to book value of equity	13
TLMV	liabilities to market value of equity	13
LLBV	liabilities to book value of equity	13
LLMV	liabilities to market value of equity	13
TDBV	debt to book value of equity	14
TDMV	debt to market value of equity	14
ANC	African National Congress	19
BBBEE	broad based black economic empowerment	23
NUS	National Utility Service	32
SARB	South African Reserve Bank	33
BMA	Bond Market Association	35
SIZE	Company size	39
TANG	Tangibility of assets	39
PROF	Profitability	39
GROW	Growth	39
CORD	Cost of debt	39
TAX	Tax rate	39
IFRS	International Financial Reporting Standards	40
EBIT	earnings before interest and tax	42
JIBAR	the Johannesburg Interbank Agreed Rate	43
ZAR	South African Rand	59

List of Figures

List of Tables

Chapter 1: Introduction

Background

The capital structure decision has been one of the most essential decisions for corporates in South Africa following the end of Apartheid. After 1994, macro-economic objectives were set through fiscal and monetary policies to achieve sustainable economic growth. These policies have impacted the capital structure decisions within South Africa significantly.

This study looked at the South African economy for the period 1994 - 2016. This period coincided with the changes in economic policies as the country moved out of a time of poor economic growth as a result of the country's isolation from the rest of the world. This was due to sanctions imposed by the international community which resulted in an outflow of capital. Company's within the Johannesburg Stock Exchange (JSE) sectors, particularly in mining, were analysed. This sector is of interest as it historically accounted for a third of the South African market and dropped significantly during the period, down to 8% by 2016.

There have been numerous debates and studies regarding capital structure and its determinants which were used in this paper as a basis from which to understand the relationship between capital structure determinants and leverage. A significant study that assisted this paper was written by SJ Kasozi in 2009. This study was done during 1995 and 2005 and noted the high level of book-leverage ratios within the mining sector. The paper is further supported by a study in 2013 by Mohammed and Hamze covering 1990 and 2012. This looked at the capital structure determinants within the mining sector, allowing discussion of different capital structure theories that may impact a company's capital structure decisions.

Problem Statement

This paper discusses the South African changes in leverage within companies. The availability of scope for this study was achieved due to the significant changes within

the South African environment over the period selected. There have been many financial events/crises between 1994 and 2016 that impact the South African debt markets. These include the end of Apartheid in 1994, the Asian crisis of 1997-1998 and the financial crisis of 2008. Each historic event meant that South Africa was required to create new policies to weather the storm, including manipulation of the interest rates to achieve results to support the economy.

The South African bond market, first established in the late 1980s, was also impacted by the events and underwent considerable changes during this period. It was only in the late 1980s that the public debt market was established. The development of the Bond Exchange of South Africa (BESA), an exchange platform that created an additional source of capital to the market, had a large impact on capital structure decisions of companies. Over time, the BESA was able to obtain the necessary licensing and expand its access to capital and further impact the capital structure decisions of companies. As an added feature, foreign investors were able to access the domestic financial markets, allowing them to invest in the South African bond market (Stals, 1999; Slabbert, 2018).

Given the significant changes over the period, both locally and internationally, this paper serves as an opportunity to understand the capital structure changes and leverage decisions within South Africa better, particularly through each of the significant financial events. In addition, it determines whether capital structure determinants have a significant relationship with the capital structure of a company and whether they can predict capital structure changes. This paper is one of four that look into this relationship, each with a focus on specific sectors, which in this case includes the metal and mining sector. In addition, this study analyses mining companies that have not survived their listing status during these events, and the impact the leverage ratios may have.

Research Methodology

This is a quantitative study, firstly by a trend analysis over the period and how leverage has changed to adapt to the economic events, as well as determining the correlation between company leverage and capital structure determinants. This includes

company size, asset tangibility, profitability, growth, the cost of debt and corporate tax rates to company leverage, during 1994 and 2016. The focus of this study is to determine whether capital structure determinants impact the decisions surrounding capital structure.

Overview

The chapter following the introduction provides the theoretical framework on which this study is based, looking in detail at different capital structure theories, the determinants thereof and the relationship between each determinant and the capital structure decisions. To understand the relationships from a South African perspective, the chapter delves into the South African interest rate environment and debt market and the relationship between leverage and corporate performance. The chapter also goes into the history of mining in South Africa and any significant events over the period that may influence the capital structure decisions of mining companies. The following chapter then describes the research and methodology used, with the research design inspired by previous research found in the literature review. This method is put to work in the Results chapter, which provides an analysis of the results and an interpretation of the empirical findings. The paper concludes with the main findings of the study, as well as any potential areas for future studies.

Chapter 2: Literature Review

2.1 Introduction

This chapter covers the theories that influence the capital structure of a company extensively. Through these theories, prior literature is explored to either confirm or contradict the relationships the theories and certain capital structure determinants have with a company's capital structure, focusing more specifically on leverage.
The review also looks at the history of South African interest rates and bond markets. This is to provide the readers with sufficient background on the market impact of how these rates have changed and how it may have altered management capital structure decision making.

2.2 Capital Structure Theory

There has been a large amount of debate regarding the optimal capital structure of a company over the years, with extensive research taking place over the past 60 years. This research began with Modigliani and Miller (M&M) in 1958, with many researchers either adding to or contradicting their theories. However, the one area that was consistent among all research was the idea of the 'golden ratio', reflecting the optimal capital structure for maximising shareholder return.

This chapter goes into the detail of the different theories that have been used to describe the different choices of capital financing, as well as the relationships found between capital structure decisions and capital determinants within a company.

2.2.1 Irrelevance Theory

M&M (1958) believed that the capital structure was irrelevant to shareholder value, deriving the concept of the capital structure irrelevance theory. This theory was divided into two propositions. **Proposition 1** looks at how the value of a company is impacted

by a change in its capital structure, with the belief that the value of the company was determined by its cash flow. This theory held the following assumptions:

1	No taxes
2	No transaction costs
3	No bankruptcy costs
4	Perfect information symmetry with regard to the company's financial policy
5	Equal interest rates for both lenders and borrowers

Under perfect market conditions, the financing and capital structure decisions made by the company are believed to have no impact on either the cost of capital or the market value of the company (i.e. there is symmetry of market information). In addition, there were no taxes which allowed for tax benefits of debt over the usage of debt, and no bankruptcy costs related to additional usage of debt or a spread regarding interest rates between the two options. The assumptions also included a lack of transaction costs in share issues or the issuance of debt. Because they believed the cash flow of the company determined its value and that these cash flows were independent of capital structure, the capital structure was considered irrelevant. **Proposition 2** is more relaxed, focusing on how the required rate of return of debt and equity holders is impacted by a change in capital structure. This required rate of return for debt is considered to be lower than that of equity, regardless of whether taxes are considered. This means that increasing the debt in the company's capital structure would result in a lower cost of capital. In addition, if they brought in the consideration of taxes and the fact that interest on debt is tax-deductible when a company adds debt to its capital structure, it reduces taxes which subsequently increases the cash flow of the company. However, the added interest net of taxes causes a reduction in the company's net income. Overall, as the company value is reliant on cash flow and not net income, M&M concluded that the value of the company increased by adding the net present value of the interest tax shield. Under this assumption, the company value would be expected to increase with added debt to the capital structure. However, with an increase in debt comes an increase in the risk of bankruptcy. This added risk leads to equity holders requiring a higher rate of return on their investment. Therefore, any decrease in the cost of capital through the use of added debt is offset equally by an increase in the cost of equity (Modigliani & Miller, 1958).

2.2.2 Agency Theory

The introduction of the agency theory concept was first addressed by Adam Smith in 1776. His work, The Wealth of Nations, demonstrated that having someone other than an owner manage their investments, could result in decisions over the investments not aligning with that of the owner and being to the detriment of the said owner (A. Smith, 1776). Fast forward 200 years into the 1900s when this theory was revisited by Jensen and Meckling. Their research still suggested that, in a relationship between a principal and agent, the agent may not act in the best interests of the principal. This follows the risk that management may avoid making value-add investments, due to the effort involved. They then created a strategy to align the interests of both parties, through monitoring activities by the principal, budget restrictions and incentive schemes to limit decisions made by the agent that might destroy value (Jensen & Meckling, 1976).

When considering debt in a company's capital structure, additional risks arise, especially where management owns an equity stake in the company. These risks include management acting in the best interests of the equity holders to the detriment of debt holders. This would be the case where management chooses to increase the company's debt to make riskier investment decisions, as any losses would accrue to the bondholders and any gains would be allocated to the shareholders. This has often led to debt holders requiring restrictive covenants within the debt issuance to limit their downside risk. However, in extreme circumstances, where management uses an exorbitant amount of debt on the balance sheet, the resulting increase in bankruptcy costs forces them to perform to prevent losing their jobs. Consequently, this creates a threat to management when using too much debt financing that is great enough to encourage them to increase cash flow to meet interest and debt payments. This is also expected to increase productivity to make better future investment decisions to maximise company value, aligning their interests with both the equity and debt holders (Jensen & Meckling, 1976).

2.2.2.1 Free Cash Flow Theory

An extension of agency theory was later found to be that companies with excess free cash flow often invested in value-destroying products simply because they had the

resources. The free cash flow theory is more likely to be present in companies where management receives investment incentives, resulting in investment projects simply because there was additional cash available and not because the investment would be profitable. This led to the belief that additional debt, and the resulting interest payments, would tie up any free cash flow they may otherwise have had, to prevent management from making unprofitable decisions (Smith, 2010).

2.2.3 Trade-off Theory

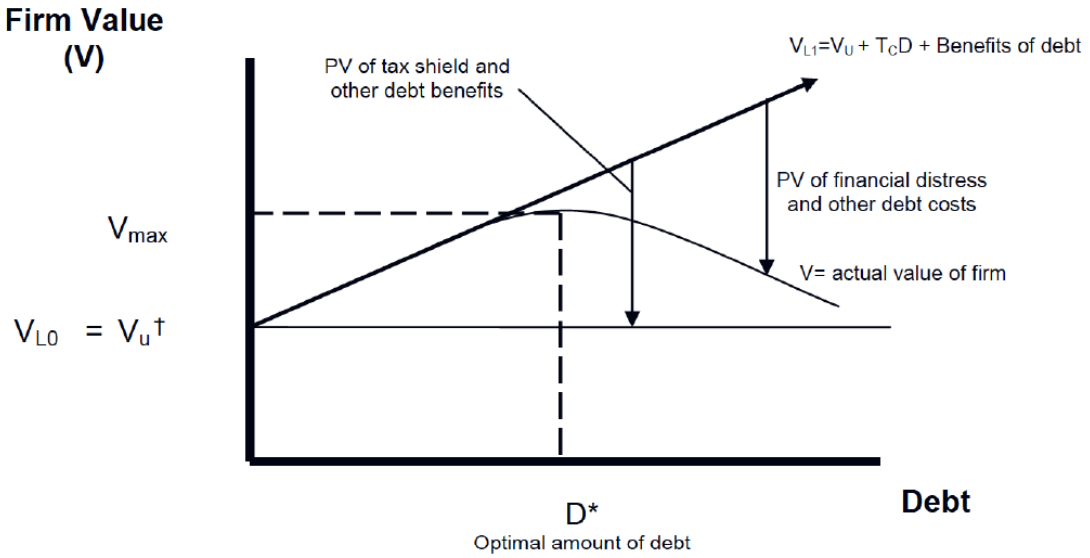
One of the subsequent theories that came from M&M's irrelevance theory was the trade-off theory, which looked at the effects of tax and bankruptcy costs and how they assist companies in finance choices with regards to their capital structure. Ultimately, this assists in finding the optimal capital structure to maximise the value of the company. The trade-off considered here is between either facing the downside risk of bankruptcy and financial distress or agency costs. Myers' (1977) theory was based on borrowing without relying on imperfect or incomplete financial markets. According to this theory, the amount of debt the company issued should maximise the value of the company, with no direct relationship to the probability of default. The trade-off theory suggests that higher debt usage creates a tax benefit and reduces the risk of agency costs. This is due to cash flow being mostly tied up in interest payments. However, the downside is that it also increases the possibility of bankruptcy and financial distress. This creates a trade-off between the negative and positive impacts of debt. Using this theory, companies identify their target debt to equity ratio, with the structure converging to that ratio over time as they alter their financing decisions (Xhaferi & Xhaferi, 2015).

Fama and French (2002) note that bankruptcy costs are higher for companies that are less profitable, as well as companies with higher volatility in earnings, leading them to having to reduce their debt spending relative to other companies.

Figure 1 illustrates where a company that is maximising their value would operate. To be a value maximising company, they would have to sit on the top of the curve as they benefit mostly from the tax shield on interest payments. In addition, it demonstrates

that, if the company were to take on more debt, they would experience a reduction in value as the cost of financial distress increased (Hovakimian & Opler, 2001).

Figure 1: Optimal capital structure under the trade-off theory



V_{max} occurs when marginal benefit of debt = marginal costs of debt.

† perfect market assumption

(Hovakimian & Opler, 2001)

2.2.4 Pecking order theory

Pecking order theory does not seek to find the optimal capital structure, but instead places emphasis on the different funding sources that are available to the company, which then determines the capital structure. It suggests a hierarchy of these different financing sources on the basis of information asymmetry between managers and investors, and that management do not issue equity unless they believe it is overvalued by the market. To avoid signalling downsides, management would rather use internal financing. This leads to new investments being financed firstly by retained earnings, secondly by debt (where the extra issuance of debt is not considered to be too expensive, taking into account the increase in bankruptcy costs), and finally by equity (Myers & Majluf, 1984).

Myers and Majluf (1984) performed an analysis of a company that had assets on its balance sheet, as well as investment opportunities for growth within the company. During this analysis, they made the following assumptions:

1. Managers would always invest in projects with a positive net present value (NPV), and
2. Managers would always act in the best interests of the company's current shareholders and thus would only raise equity capital if the shares were fairly valued or overvalued in the market.

They found that any equity issuance would, therefore, create a market perception that the shares are overvalued, creating a decline in the share price and negatively affecting current shareholders. On the contrary, a debt issuance would create a market perception that the shares were undervalued on the market and may result in an increase in share price as more investors purchase shares. This led to the conclusion that equity finance was the costliest to a company and its shareholders (Karadeniz, Kandir, Balcilar, and Onal, 2009).

In later research, Myers (1984) found that companies look at both current and future financing costs. When considering current and future costs, companies who are expecting to make larger future investments have a low debt to equity ratio. This prevents tying up their cash flows so as to be able to take on future debt for investment opportunities without creating large bankruptcy costs. Therefore, it is believed that, *ceteris paribus*, companies with larger expected future investment opportunities will have low current leverage (Myers, 1984; Tong & Green, 2005).

2.3 Capital Structure Determinants

With the understanding of the above capital structure theories, it is imperative to ensure a thorough understanding of the various factors involved in historical capital structure decision making that have proven to be the most effective. This section focuses on these capital structure determinants from previous literature to derive the method that is used in this paper, with emphasis on the metal and mining sector, which is the focus area in this study.

In 1988, Titman and Wessels analysed eight determinants to explain capital structure decision making in 469 companies between 1974 and 1982. Their research relied on six different debt ratios as dependent variables, including long term, short term, total debt to market and book values of equity. They then took industry classification, growth, tax shield, asset structure, size, earnings volatility, uniqueness and profitability as their independent variables that would determine whether they influenced the company's capital structure decisions. The outcome of this study showed that companies with unique or specialised products that require suppliers and staff with a specific skill set would have a higher liquidation cost. This suggests that companies that manufacture these specialised products would require lower leverage, compared to larger companies which often have a more diversified income stream and a lower probability of bankruptcy. This is also due to larger companies being more likely to obtain debt at lower costs, which would incentivise them to finance investment decisions with debt over equity. The study also found that cyclical companies with higher volatility of earnings reflected lower debt usage. This results from debt requiring periodic interest payments. This means that high volatility earnings create the risk of being unable to meet payments in periods where the company experiences lower earnings. From a tax perspective, companies with more non-debt tax shields were found to be less incentivised to increase their debt usage as the marginal rise in tax benefits decreases with more non-debt tax shield items. In addition, the growth cycle of a company is thought to influence the amount of debt used for financing. A large number of potential investment opportunities would lead to lower current leverage, creating a negative correlation between growth and debt levels. This is thought to mirror agency theory, in that management in equity-controlled companies have a higher probability of investing in value-destroying projects to maximise wealth from

their debt holders where no large future investment decisions are expected. The asset structure (tangibility) of a company is also able to influence its financing decisions as certain assets, such as property, can be used as collateral and are more attractive to potential debt holders (Titman & Wessels, 1988).

If we were to investigate the different leverage ratios, Titman and Wessels (1988) noted that all the debt ratios used in this study had a negative relationship with the uniqueness of the company. When looking simply at short term debt, results showed a negative relationship between the size of the company, which was believed to be due to transaction costs, to a company based on the type of debt funding they require. Lastly, growth, non-debt tax shields, earnings volatility and tangibility did not have a material relationship with leverage ratios.

Rajan, Raghuram, Brien, Diamond, Fama, Kaplan, Kashyap, Miller (1995) conducted a similar study between 1982 and 1991 with companies in over 31 countries. This study was focused on determining whether the capital structure of these 31 countries followed the United States, Japan, Germany, France, Italy, the United Kingdom and Canada (the G-7). They used leverage ratios, with the focus on the stock of debt relative to company value, which they define as total liabilities relative to total assets. The capital structure determinants used in the study were asset tangibility, market-to-book ratio, profitability and company size. The authors noted that companies with higher tangibility were more liquid and reduced the risk of bankruptcy, as they were able to turn these assets into cash more quickly than any other asset type. The market-to-book ratio was, however, negatively correlated to leverage as companies with higher market-to-book ratios would prefer a stock issuance due to a potential overvaluation of stock on the market. This would lead to a decrease in the leverage ratio as more stock is issued relative to debt (Rajan et al., 1994).

The authors noted that there was potential for both a negative and positive relationship with leverage and company size. Larger companies have an inverse relationship with bankruptcy risk and thus are willing to take on more debt. However, there was also the potential for the relationship having little/no correlation in countries with low bankruptcy costs, as the downside to bankruptcy was not as severe. However, they also believed that there could be a possible negative relationship due to size possibly being a proxy

for higher information symmetry which could increase their preference of equity over debt. In line with their research, the impact on leverage due to company size produced mixed results as the relationship between the two seemed to be country dependent. The authors then concluded that their knowledge of the relationship between company size and leverage was inconclusive. Their final capital structure determinant, profitability, was found to be negatively correlated with leverage. The theory that the reason behind this was the possibility of low or smoothed dividend pay-outs. This would increase retained earnings relatively and, based on the pecking order theory, reduce the need for debt as funding would be found internally (Rajan et al., 1994). This is a different result to Titman and Wessels (1988) who found the relationship to be positive as higher profitability would lead to a better ability to fund debt payments.

In 2005, a study between 1992 and 2000 of 6000 Swedish companies was performed by Han-Suck Song, who found that, on average, Swedish companies are highly leveraged, with a large portion of consisting of short-term debt. The leverage ratios that were used to test this relationship consisted of short-term, long-term and total debt relative to capital. The capital determinants used in this study were growth, non-debt tax shield, asset tangibility, company size, earnings volatility, uniqueness and profitability.

The non-debt tax benefit was found not to have a significant relationship with total debt ratios as a whole but a positive relationship with short-term debt and a negative relationship with long-term debt. Song (2005) argued that, because it is expected that a non-debt tax benefit impacts leverage negatively, the results above indicate that non-debt tax benefits substitute the tax benefits of long-term debt financing and the related depreciation of fixed assets. Tangibility was found to have a highly significant positive relationship with all debt ratios in this study, except for short-term debt which was negative. Song (2005) believed this to be because long-term debt is used to finance tangible (fixed) assets, and non-fixed assets are commonly financed through short-term debt. Company size had the largest impact on leverage in this study, having a positive relationship with both total and short-term debt, but a negative relationship to long-term debt. Profitability was found to be negatively correlated to all debt ratios due to the pecking order theory, suggesting that the higher the profitability and related retained earnings, the lower the debt usage. Both growth and uniqueness of a

company were found to have little significance to leverage decisions, with income variability having almost no significance (Song, 2005). With respect to growth and income variability, this confirmed Titman and Wessel's (1988) findings of no significant relationship but contradicted what they found to be a negative significant relationship between a company's uniqueness and leverage decisions.

A study by Fan, Titman and Twite (2010), covered 36,767 companies listed on the stock market in over 39 countries from 1991 to 2006. They measured leverage as total debt relative to the market value of the company, as well as the maturity of debt, measured as the book value of long-term debt relative to total debt. The capital determinants used consisted of asset tangibility, company size, profitability and market-to-book ratio. Their results show that leverage is positively related to asset tangibility and company size but negatively related to profitability and market-to-book ratio. When it came to debt maturity, it was noted that long-term debt was used more than short-term debt in companies that have more asset tangibility, profitability and are a larger size (Fan, Titman, & Twite, 2010). However, it was found that market-to-book ratio had a weak relationship with debt maturity, contradicting the results of Titman and Wessels, 1988.

Ilyukhin (2017) did a study covering 48 listed companies in Russia from 2009 to 2015. An important point to note in this paper is that Russia is subject to regular economic fluctuations due to changes in commodity prices and economical and political sanctions. The determinants used in this study included business risk, profitability, size, growth, capital expenditure, asset tangibility, uniqueness, tax rate, depreciation, industry leverage, stock market returns, lending and inflation rate. The ratios that represented leverage consisted of total liabilities-to-book value of equity (TLBV), total liabilities-to-market value of equity (TLMV), long term liabilities-to-book value of equity (LLBV), and long-term liabilities-to-market value of equity (LLMV).

Ilyukhin found that business risk had a positive relationship with all leverage measures, which contradicts the trade-off theory that suggests the higher the business risk, the lower the borrowing to negate increased costs of financial distress. Profitability had a negative relationship with leverage, which is consistent with prior research, as well as the pecking order theory.

Future growth was negatively correlated to leverage, consistent with the findings of Titman and Wessels (1988), with the relationship not being statistically significant. Company size was positively related to three of the four leverage ratios, but only the relationship with LLMV was statistically significant. This is unlikely to be a result of the trade-off theory as larger companies are more stable with less business risk, resulting in higher leverage opportunities. However, this does contradict agency cost and pecking order theory stating that larger companies have less information asymmetry and more internal funding available.

Asset tangibility produced a variety of results, which contradicts prior research, as well as agency theory which states that higher tangibility of assets leads to increased borrowing capabilities and lower bankruptcy risk. Company uniqueness had a positive relationship with leverage, which contradicts prior studies, as well as trade-off theory. Tax expense did not have a statistically significant relationship with any leverage variables, but both average industry leverage and inflation had positive relationships with leverage (Ilyukhin, 2017).

In more recent research that covered the same timeframe as this study (1994 to 2016), but in different sectors, Slabbert (2018) and Philogene (2019) found the following relationships within capital determinants and capital structure:
Slabbert's paper in 2018 looked at 68 companies within different sectors, largely capitalisation stocks, retail companies and food producers. It incorporated leverage ratios such as total debt-to-book value of equity (TDBV), total debt-to-market value of equity (TDMV), total liabilities-to-book value of equity (TLBV), and total liabilities-to-market value of equity (TLMV). The capital determinants included company size, tangibility of assets, profitability, growth, cost of debt and the South African corporate tax rate. Slabbert found that company size had a significant positive relationship with all leverage ratios. Tangibility was negatively correlated to all leverage ratios, but the results were not statistically significant, which contradicts many previous studies in this regard. Profitability had a positive relationship with TDBV and TLBV, but a negative relationship with TDMV and TLMV. Growth was positively correlated to all leverage ratios, with the cost of debt and corporate tax being negatively correlated to all four ratios (Slabbert, 2018). Philogene (2019) performed the same study over 76

companies in real estate, travel and leisure, and construction and material sectors within South Africa. Her results reflected that of Slabbert (2018), with the exception of tangibility, which was negatively correlated to only TDMV and TLMV and was positively correlated to TDBV and TLBV (Philogene, 2019).

2.3.1 Capital Structure Determinants – Summary

There is an extensive variety of research presented on the relationship between debt and capital structure determinants. The table below summarises the results of the research covered in this literature review to determine the methodology to be used in this study.

Table 1: Summary of the relationship between debt and capital structure determinants

Determinant	Titman & Wessels (1988)	Rajan et al. (1995)	Song (2005)	Fan, Titman & Twite (2010)	Evgeny (2017)	Peer studies[1]	Conclusion
Growth	Negative	Not tested	Weak correlation	Not tested	Negative	Positive	**Negative** *In line with trade-off, agency, and free cash flow theory*
Non-debt Tax shield	Negative	Not tested	Weak correlation	Not tested	Not tested	Not tested	**Negative**
Tangibility	Positive	Positive	Positive	Positive	Weak	Mixed outcomes	**Positive** *In line with trade-off and agency theory*
Company Size	Positive	Inconclusive	Positive	Positive	Positive	Positive	**Positive** *In line with trade-off theory, but contradicting agency and pecking order theory*
Earnings Volatility	Negative	Not tested	Little correlation	Not tested	Not tested	Not tested	**Negative**
Uniqueness (R&D/Sales)	Negative	Not tested	Little correlation	Not tested	Positive	Not tested	**Negative** *In line with trade-off theory*
Profitability	Positive	Negative	Negative	Negative	Negative	Mixed outcomes	**Negative** *In line with pecking order theory*
Market-to-book	Not tested	Negative	Not tested	Negative	Not tested	Not tested	**Negative**
Business Risk	Not tested	Not tested	Not tested	Not tested	Positive	Not tested	**Positive** *Contradicts trade-off theory*
Tax expense	Not tested	Not tested	Not tested	Not tested	Weak	Negative	**Little correlation** *Contradicts trade-off theory*
Average industry leverage	Not tested	Not tested	Not tested	Not tested	Positive	Not tested	**Positive**
Inflation	Not tested	Not tested	Not tested	Not tested	Positive	Not tested	**Positive**
Cost of debt	Not tested	Not tested	Not tested	Not tested	Not tested	Negative	**Negative**

[1]Peer related studies include Slabbert (2018) and Philogene (2019)

The most popular determinants in these studies are tangibility, company size and profitability. Tangibility and company size have a positive relationship with leverage, supporting the trade-off theory, whereas profitability's negative relationship with leverage supports pecking order theory. These factors were used in this study, along with growth, tax expense and cost of debt, which is in line with Slabbert (2018) and Philogene (2019). The studies have concluded that, overall, growth is in line with trade-off theory with a negative relationship, corporate tax showed little/no relationship and cost of debt had a negative relationship with leverage.

These determinants are utilised and further analysed in Chapter 3, Methodology, where the measures of these determinants are discussed and aligned with the relevant theories. The results of these determinants were outlined in Chapter 4, Results, once the appropriate statistical research had been conducted.

2.4 Corporate Performance

Many research papers over the years have tested capital structure determinants and their relationship with company leverage, with other researchers attempting to find out if it is a company's leverage that explains its performance. This section, therefore, hopes to determine through previous studies whether capital structure decisions have an impact on company performance.

Abor (2005) performed a study which investigated whether capital structure influenced the performance of 22 listed companies in Ghana from 1998 to 2002. Their findings were highly dependent on the type of capital funding used, with a significant positive relationship found between short-term debt profitability, a negative relationship between long-term debt and profitability and a positive relationship between total debt and profitability. Lastly, it was found that companies rely on short-term debt as their main financing source, supporting the concept of short-term debt being less expensive than long-term debt resulting in increased profits (Abor, 2005).

A study by Zeitun and Tian (2007) in Jordan during the period 1989 to 2003 found that a company's capital structure has a significantly negative relationship with

performance. The authors noted that this negative relationship might be due to the large number of economic shocks in the Middle East which would have influenced the results of this study over the timeframe selected. In addition, they did note consistency with prior papers in that there was a significant positive effect between short-term debt relative to total assets and the performance of companies. This supports the argument that short-term debt is less expensive and creates an increase in profits the more it is used (Zeitun & Tian, 2007).

Fosu (2013) carried out a similar study on 257 South African companies between the years 1998 and 2009. Fosu noted that many South African companies listed on the JSE are controlled by a pyramid ownership structure. This creates the perception that South African agency costs are lower than the United States or the United Kingdom, and any conflicts would sit between majority and minority shareholders instead. The results from Fosu's study found a positive relationship between financial leverage and corporate performance, following the theory that financial leverage reduces agency costs, especially with South African companies who are conservative in their use of debt (Fosu, 2013).

2.5 Mining in South Africa

South Africa is famous for its abundance of mining resources and has one of the world's largest reserves of manganese and platinum group metals, gold, diamonds, chromite ore and vanadium. This built the South African economy over the years due to high foreign demand, with gold accounting for more than a third of the global market (Kearney, 2012). South Africa started strongly in the 1800s, being one of the key players in the global mining industry, with world-class facilities that worked with carbon steel, stainless steel, gold, platinum and aluminium. The country's mining remains a cornerstone of the economy as it continues to contribute to activity, foreign trade and job creation, making it critical to socio-economic development (Kearney, 2012).

Unfortunately, South Africa's metal and mining market share had drastically declined to 8% by 2016 as the secondary and tertiary markets took over and reduced the relative GDP spending on mining over the last two decades (Stats SA, 2017). The

most notable climber in the tertiary markets is the finance sector, which became the largest industry in 2016, with government not far behind (Stats SA, 2017). Since the beginning of this decline, especially in gold mines, there have only been two years of positive annual growth, in 2002 and 2013 (South African Markets Insight, 2019). The knock-on effect of this was the decline in the labour force from 339 000 individuals in 1997, to 166 000 in 2007 (South African Markets Insight, 2019). This fall is investigated below, as the history of South African mining is analysed further.

2.5.1 Mining: The Backbone of the Economy

Mining in South Africa began in 1867 when Erasmus Stephanus Jacobs discovered the first diamond, the Eureka, in Hopetown, South Africa. This was later dubbed “The Mining Revolution”. Gold was later discovered on separate occasions by both Jan Gerrit Bantjes and the Struben brothers in 1884. However, the magnitude of gold mining was only really experienced when the main mining reef was discovered by George Harrison on Langlaate Farm in 1886 (Chibba, 2019).

The metal and mining sector performed extremely well, leading to the creation of the JSE in 1887. This was purely to fund the mining sector. The Chamber of Mines (currently known as the Minerals Council South Africa) was founded two years later (Mining for Schools, 2019). Through the success of gold mining in South Africa, output soared to 118 tonnes in 1898, allowing South Africa to take the top spot as the world’s leading gold producer (Mining for Schools, 2019). As South Africa entered the 20th Century, the Anglo-Boer War caused extreme disruptions in the mining industry, even going as far as shutting down some of the mines (Mining for Schools, 2019). In 1914, a founding member of the African National Congress (ANC), Sol Plaatjie, praised miners, whose work assisted with holding the economy together, with the following statement:

> *Two hundred thousand subterranean heroes who, by day and by night, for a mere pittance, lay down their lives to the familiar ‘fall of rock’ and who, at deep levels, ranging from 1 000 to 3 000 feet in the bowels of the earth, sacrifice their lungs to the rock dust which develops miners' phthisis and pneumonia.*

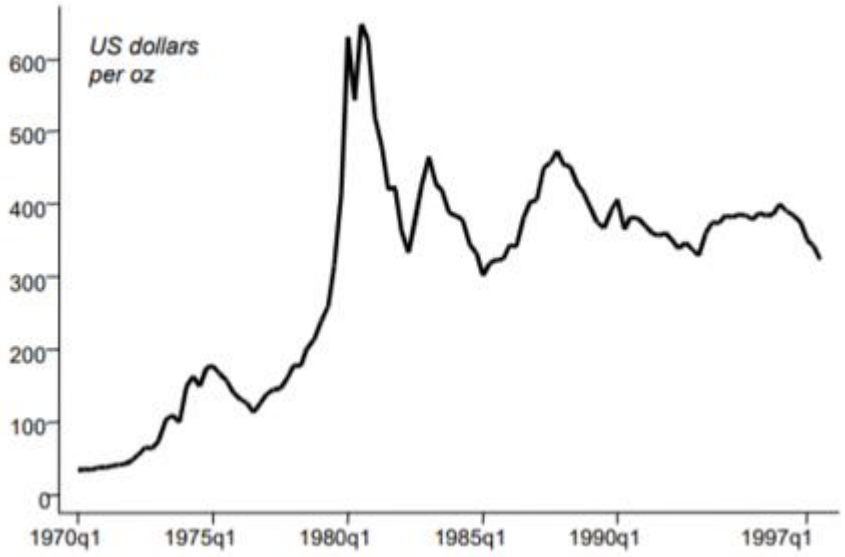
Throughout mining history, these dangers allowed miners to demand higher wages (Chibba, 2019).

In 1921, the Rand Rebellion caused white mineworkers to protest the attempt to replace semi-skilled white labour with cheaper black labour. This protest turned violent, leaving approximately 200 people dead, and caused the labour force to drop by 15,000, which assisted the major slump in gold production (Mining for Schools, 2019). These violent historic events negatively affected mining, but the industry experienced some relief when the Great Depression hit in the 1930s, experiencing a boom and creating a surge in employment (Mining for Schools, 2019). Mining experienced another boom in the 1970s, with a production peak of over 1000 tonnes. This came after President Nixon requested that the dollar be removed from the gold standard as an attempt to end stagflation. Once separated from the dollar, gold shot up to $120 per ounce (Amadeo, 2019).

In 1980, the mining industry ‘struck gold’ in the market once again, as the gold price spiked to $800 due to increased optimism for mining in the market. The industry saw a sharp increase in development and employment during this time. In 1994, as the Apartheid regime came to a close, South Africa’s capital markets were re-integrated with the global capital markets which exposed its mining industry to global mining changes and investor perceptions. Investors placed a large amount of pressure on South Africa to break up their conglomerate structures and become focused mining companies (Robinson, 2016). However, the increased scepticism was outshone by increased optimism of expansion within the South African mining market, allowing for international trade and further increasing optimism within the market (Analytics, 2000; Editor, 2018). Unfortunately, due to the volatility of the market, this increase was unsustainable, and when the prices came down once more, companies felt the financial impact as margins were squeezed drastically. At the same time, management had little awareness of capital management and related capital efficiency ratios (return on equity and return on investment). When this lack of awareness was publicised, many investors lost faith in the industry. This led to them devaluing the industry by mid-1990, and putting pressure on mining houses to curtail loss-making operations and improve efficiency. As a result, many mining houses to sell off their non-core

assets. This was the beginning of the 20-year slump in gold and other commodity prices which experienced a further shock in 1997-1998 as the country felt the impact of the Asian Crisis. By 1999, gold prices had fallen below $260; copper was at its lowest price in over a century and platinum was one-sixth of its previous price. This further destroyed the margins of an industry that relies on high prices to succeed. Unfortunately, this continued slump led to half of the mining shafts in South Africa falling into losses (Analytics, 2000). Figure 2 demonstrates the described fluctuations.

Figure 2: Gold price in quarterly averages 1970 - 1997



(Chamber of Mines, 2000)

These tough times forced the industry into survival mode as mining companies began cutting costs wherever possible to save margins(Editor, 2018). Internationally, mines cut exploration budgets, corporate restructuring, and closed non-essential mines in order to salvage some return for investors (Analytics, 2000). The resulting savings allowed for relief from certain debt pressures as costs declined.

Many mining companies began merging to survive the crisis period. From 1990 – 1998, approximately 250 companies changed hands, split almost down the middle between metals and gold mining. Each merger looked for one thing: an opportunity for returns in a low price environment (Analytics, 2000; Antin, 2013).

An example of a positive merger during 1998 was the Goldfields and Gencor merger (creating Gold Fields Limited). This merged company is one of the largest in the world with eight mines in South Africa at the time. This merger allowed the company to dramatically reduce selling, general and administrative costs. In addition, many of the non-core mines were shut down or sold off. Lastly, management focus was concentrated on revenue and costs to ensure higher returns for investors (Analytics, 2000).

In September 1999, the European Central Bank and 14 other European central banks announced that gold remains an important commodity investment. They expected sales for the next four years to be capped and that gold leasing would not be expanded (Antin, 2013). The immediate reaction of the markets was positive, allowing the gold price to rise to above $300, before stabilising to levels still much higher than during the crisis (Analytics, 2000).

As the 21st century approached, some of the older mines began reaching the end of their useful lives, leading to job losses and downscaling (Editor, 2018). This was offset by the restructuring of mining groups, technological advancements and innovative methods of improving productivity (Analytics, 2000).

2.5.2 Mining in the New Millennium

South Africa has dropped from being a large platinum producer worldwide to only contributing to 6% of GDP in 2014. A combination of unfortunate factors led to the decline of the industry, including the credit bubble, poor government spending, labour unrest, corruption, slow overseas markets and a lack of foreign direct investment (News24, 2014).

By 2002, South Africa held as much as half of the worlds gold resources and 40% of reserves (Mining Africa, 2017). In 2004, the South African economy was still recovering from the aftermath of the Apartheid regime. It experienced challenges from both the government's empowerment schemes and the requirements of the Mining Charter, which was introduced in that year (Kane-Berman, 2017). In 2005, the country's gold exports were valued at approximately $3.8 billion (Mining Africa, 2017).

In 2008, when the notorious great financial crisis hit the globe, many investors flocked towards safe-haven assets, including mining resources such as gold. Although 2008 saw production fall by 16.2% in the mining sector due to the lack of demand for manufactured resources (jewellery and motor vehicle components amongst others). Unfortunately, the decline in production was still not enough to handle the decline in demand, resulting in a stockpile of various minerals (South African Markets Insight, 2019; Llewellyn, 2014). However, the mined resources in its purest forms, already out the ground, became investor's investment choice as safe-haven assets, as they pulled their money out of assets that are highly influenced by interest rates.

By the end of 2011, South Africa's mining industry contributed the most to economic transformation, with R150 billion worth of deals with broad-based black economic empowerment (BBBEE) (Kearney, 2012). However, at the same time, the "commodity supercycle" ended after 12 years of price increases. This impacted negatively on the mining industry, which had been declining consecutively over the last few years (Kane-Berman, 2017).

2012 was struck by a devastating event in the mines, with the infamous Marikana Massacre, where police took the lives of 34 miners, injuring 78 more (Chibba, 2019). Although the government said that this tragedy did not negatively affect the country's ability to attract investors, the manufacturing industry reported that the weakening production in the mining industry over the past 18 months had already reduced demand for locally manufactured goods (Kane-Berman, 2017).

In May 2013, the Federal Reserve broadcast a programme to downsize the US Federal Reserve by $85 billion per month in QE3. This encouraged investors to turn their backs on emerging markets rather quickly and reinvest in developed economies. Unfortunately, this resulted in a devastating blow to emerging markets, as over $19 billion investments were pulled from these markets in a three-week period, which impacted currencies throughout the world. From a South African perspective, the currency and bond markets fell apart with the surprising loss of foreign investment. At the beginning of 2014, GDP fell drastically with a 24.7% drop in mining production.

With many strikes being experienced in the mining sector, the 2014 strike was seen as one of the more costly and longest in history (Reuters, 2014).

By 2016, the two deepest mines in the world could be found in South Africa. Both mines belong to AngloGold Ashanti. The first mine, the Mponeng gold mine, was over 4 kilometres deep, with the second, TauToni, exceeded 3.9 kilometres. Gold continued to be South Africa's second-largest source of foreign income (Mining Africa, 2017). Unfortunately, this was not enough to maintain the mining market share, as it declined to 8%. This drop was partially due to the fall in commodity prices, but also due to damaging policies and strikes, as well as the relative growth in other industries as the economy matured by the expansion of the services and manufacturing sectors. These were initially largely dependent on mining but gained independent momentum and outshone mining (Kane-Berman, 2017). The drop in market share was, therefore, more to do with the maturity of other industries, as it only shrunk by 7.3% from its peak in 2005, and was smaller in 2016 than in 1994 (Kane-Berman, 2017). However, the top 20 mining companies were able to withstand this shrinkage and, between 2001 and 2008, grew by 5% per annum (Kane-Berman, 2017).

2.5.3 Why Would a Company Delist?

The history of the mining market in the last few decades demonstrates the volatility of the market. With debt being a vital part of success in a company and an interesting research area for its relationship to company variables, another aspect of it could be how the use of debt could be to the detriment of a company, causing it to delist.

Charitou, Neophytou and Charalambous (2004) noted that

> *the phenomenon of financial distress that leads to business failure attributes to high-interest rates, recession-squeezed profits, heavy-duty burdens, industry-specific characteristics, government regulation and the nature of operations.*

They believed that the largest threat to a company's success or demise, regardless of other company-specific aspects, was leverage and the risk of insolvency.

Cassim (2014) noted that there is a correlation between ratio analysis and the prediction of financial distress. The study examined the ability of financial ratio analysis, including that of leverage ratios, to forecast business failure. This data covered South African listed companies for the period 2007 to 2012 (Cassim, 2014).

Altman and Hotchkiss (2006) found that size does not necessarily predict the success of a company and that demonstrating whether a company becomes insolvent is the ability to repay debt. This reveals the necessity of observing leverage ratios to determine the likelihood of a company delisting from the JSE due to profitability issues.

Cassim (2014) included the use of market value and book value of equity in relation to liabilities to determine the probability of default due to the size of the leverage. The probability of default is directly correlated with the profitability of a company and whether they can repay interest instalments.

When considering the likelihood of delisting due to profitability, metal and mining companies are open to a high degree of volatility as the price of commodities fluctuates significantly over time. Added to this, the fact that the metal and mining market share dropped significantly allows for further investigation into how much of the decline to 8% assisted with the delisting of companies in comparison to general market events and leverage decisions.

2.5.4 Mining and Debt Studies

Kasozi (2009) found that cyclical, capital intensive industries, including general mining, had the highest book-leverage ratios in South Africa between 1995 and 2005 (53%), with the market value leverage ratio declining to 39% in comparison. This variation infers that companies in this industry either consistently experience higher prices on the market or have issued a large number of ordinary shares over the period for which this study is complete (Kasozi, 2009). The research also found that mining had a

relatively higher profitability of 51%, supporting the theory that companies with higher profitability can take on more debt. Interestingly, the mining sector had low business risk in comparison to other sectors, including construction and materials, travel and leisure and general retailers. The sector also noted a 4% growth rate in this period. The study concluded that the high book value of mining might be a function of the growth in infrastructure for the overall economy (Kasozi, 2009).

Another later study by Mohammad and Hamze (2013) focused on five key companies in South Africa in the oil, gas and mining industries between 1990 and 2012. The author's choice of variables included the total debt ratio, current ratio, size of the company, growth, net debt tax shield, tangibility, size, liquidity and profitability. The results of this study demonstrated a positive, non-significant relationship with growth and a significant relationship with liquidity at 0.01. Net debt tax shield was found to have a non-significant positive relationship with leverage and profitability had a significant negative relationship at 0.01. Size is positive at the 0.05 level and tangibility is found to have a non-significant positive relationship with leverage (Mohammad & Hamze, 2013).

These relationships are further examined in this study when the results of the South African mining industry over the years are analysed.

2.5.5 Drivers of Metal and Mining Industry: Commodity and Electricity Prices

2.5.5.1 The Background of Commodity Prices

To understand one of the underlying causes of the industry movements, it is important to note that mining markets rely heavily on commodity prices. Commodities experienced one of their greatest bull runs in history between 2002 and 2012. Certain analysts believed this to be a "supercycle" where commodity prices were expected to rise for decades due to demand from China and India. These beliefs came crashing down in 2012, forcing some of the largest commodity and mining companies to cut spending and sell off certain assets to survive. The capitalisation of the top 40 mining companies in the world was cut in half by 2015. There was minimal exploration in 2015, with Bernard Swanepoel of Harmony Gold warning that, if South Africa failed to

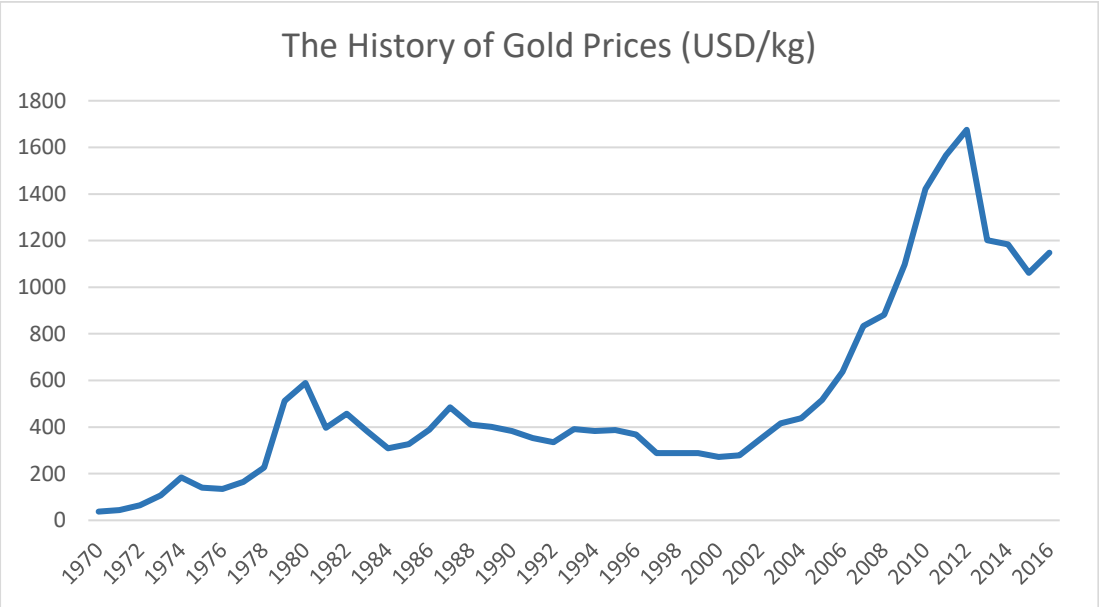
convert mineral rights into discoveries, there would possibly be no mining industry in 20 years. There was a high risk of this taking place, as the lack of funding due to the reputational risk of mining meant that most assets would remain in the ground (Kane-Berman, 2017). To make matters worse, government increased their expectations that mining companies consider and contribute to social needs such as education and healthcare. In 2015, Susan Shabangu, the Minister of Minerals noted

> *Gone are the days when mining contribution is measured only its contribution to the gross domestic product or royalties that it pays to the fiscus. Communities expect mining companies to become engines of socio-economic development of their areas (Lane, Guzek, & van Antwerpen, 2015).*

Commodity prices sank to their lowest levels at the beginning of 2016, causing many companies to shut down operations. This was a huge challenge for mining companies, as they are required to predict the prices of their products worldwide and South African companies faced even more difficulty because of historical events, government policies, regulatory uncertainty and labour strikes. This was exacerbated by the lack of appropriate infrastructure in comparison to the required infrastructure spending. This caused investors to steer away from funding mining due to a lack of confidence that the infrastructure development for operations would improve (McNitt, 2012). Investors who do choose to fund the mining sector have started to attach a risk premium to South African mining investments, which has impacted the cost of capital of mining companies negatively (Lane et al., 2015). David Shapiro, a South African market analyst, believed that January 2016 “marked a low point for the JSE and globally for commodity prices.” He further stated that there were “deep concerns about the outlook for resource shares” (Shapiro, 2016). However, it appeared to have recovered by late 2016, with the resource index of the JSE, which dropped by almost 40% in 2015. It then rose by 26% in 2016, with a research house commenting, “We are certainly in a sweet spot for commodity prices at present and it is a good time to be a resource producer” (Kane-Berman, 2017). The South African mining industry has been restructured in the last 20 years, with unfortunate cost-cutting including retrenchments. Anglo American, one of the largest South African mining companies, whose shares rallied by almost 300% in 2016, plans to minimise their South African

operations and focus on their richer platinum mines and De Beers (Kane-Berman, 2017). Figure 3 demonstrates the impact of the above on gold prices.

Figure 3: The history of gold prices (USD/kg)

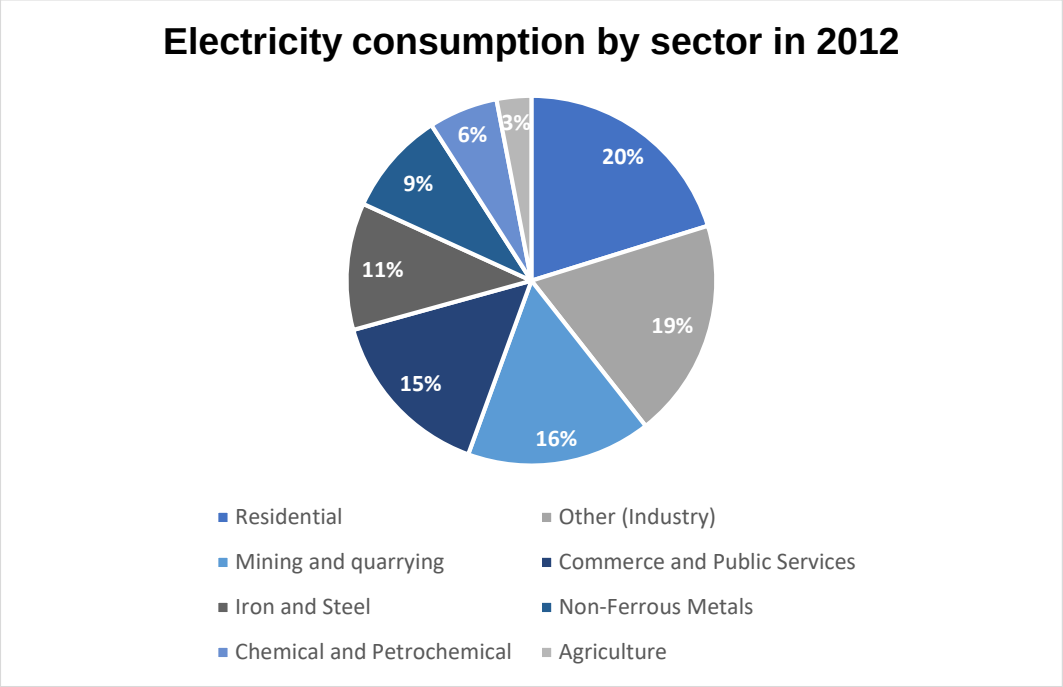


(Bloomberg, 2019)

2.5.5.2 Does Eskom Impact Mining?

There is a negative correlation between Eskom tariffs and the success of mining companies, as the increase in prices leads to a higher gold production cost. The increasing electricity costs is in line with the current erratic supply, causing load-shedding across the country and threatening the productivity of the gold mining sector due to its energy-intensive characteristics (Neingo & Tholana, 2016).

Figure 4: Electricity consumption by sector in 2012



(Department of Energy, Aggregate Energy Balances, 2012)

The above figure shows that the metal and mining market accounted for 36% of the electricity usage in 2012, with mining and quarrying taking up 16%, iron and steel 11%, and non-ferrous metals 9%. This supports the high reliance on electricity tariffs for mining success.

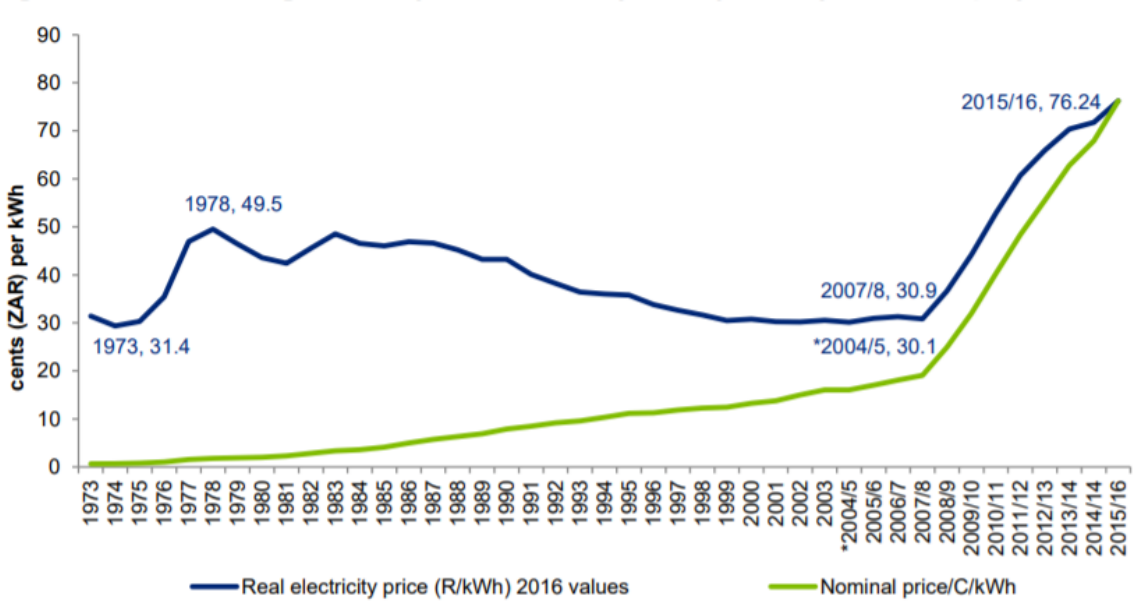
Blignaut et al (2015) found that the price elasticity of electricity demand varies over time. The study estimates price elasticity of demand for electricity in South Africa by sector over the 5-year period before and after 2008, the time of the power supply crisis in the country. Table 2 shows us that, between 2002 and 2007, electricity prices fell partially in real terms. In the following five years after a period of load shedding in 2008, the country experienced an exponential increase in prices. The results concluded that, after 2008, the price elasticity of demand was significant and negative, especially for the mining market. The results show that, although the price elasticity of electricity demand is inelastic, industrial sectors, specifically mining, became more responsive to changes in the price of electricity in the years where prices increased rapidly (Deloitte, 2017). This supports the theory that metal and mining are highly influenced by electricity prices.

Table 2: Price elasticities of electricity demand, 2002 to 2007 vs 2008 to 2012

Electricity Price Elasticities Before and After 2008		
	2002 - 2007	2008 - 2012
Agriculture	Non-significant	-0.235
Coal Mining	Non-significant	-0.291
Commercial	Non-significant	-0.291
Gold and Platinum Mining	-1.745	-0.417
Iron and Steel	Non-significant	-0.279
Liquid Fuels	Non-significant	-0.418
Non-ferrous Metals	0.821	-0.342
Rest of Chemicals	Non-significant	-0.24
Rest of Manufacturing	Non-significant	-0.251
Rest of Mining	1.068	-0.465
Transport	Non-significant	-0.346

(Blignaut et al, 2015)

Figure 5: Trend in average electricity prices realised by Eskom per kWh (1973 to 2015/16)



(Deloitte Analysis, Eskom data and 2011 annual report)

Figure 5 demonstrates the change in electricity prices between 1973 and 2015/2016. As this study focuses on 1994 to 2016 only, the changes can be explained by the following timeframes:

- **1990 – 2000: Public outcry over the introduction of 'consumer privileged tariffs'**

  There was a great deal of resistance over the increase in tariffs, with the public arguing that there was an over-investment in surplus to the country's needs, recommending that 'consumer privileged tariffs' must be implemented

- **2001 – 2007: Regulatory framework introduced but prices increased in line with CPI**

  A new framework for the electricity price regulation, based on international methodology for the rate of returns, however, this was not implemented and the regulator chose to increase prices in line with CPI plus 1%.

- **2008 – 2013: Power supply crisis happens, real prices more than double**

  Power crisis began and load shedding started in South Africa from 2008. Eskom was approved for a capacity expansion programme, with prices increasing 114% during this period to facilitate the capital raise.

- **2014 – 2016: Public resistance and regulatory uncertainty**

  The public continued to resist the electricity price increases and load shedding was once again introduced in 2014 (Deloitte, 2017).

Table 3 demonstrates South African's position in the market in relation to electricity prices. These comparables indicate that South Africa is in the top half of pricing in comparison to the rest of the countries in the table. With South Africa being such a significant global mining producer, the relative pricing would result in higher mining costs for South Africa.

Table 3 demonstrates South African's position in the market in relation to electricity prices. These comparables indicate that South Africa is in the top half of pricing in comparison to the rest of the countries in the table. With South Africa being such a significant global mining producer, the relative pricing would result in higher mining costs for South Africa.

Table 3: South Africa's performance in the National Utility Service (NUS) ranking of country's electricity prices, 2011 to 2015

Country	Rank	2011	Rank	2012	Rank	2013	Rank	2014	Rank	2015
Italy	16	0.1970	16	0.20230	18	0.20560	17	0.21010	18	0.1570
Germany	15	0.1856	15	0.15150	17	0.18800	16	0.19210	17	0.1522
United Kingdom	12	0.1510	12	0.12450	16	0.15400	15	0.15400	16	0.1416
Belgium	13	0.1523	11	0.11920	10	0.11770	12	0.12680	15	0.1117
Portugal	9	0.1351	14	0.13630	13	0.13300	14	0.13840	14	0.1105
Spain	14	0.1537	13	0.13520	15	0.14100	13	0.13640	13	0.1104
Slovakia		N/A		N/A	11	0.11790	9	0.10470	12	0.0990
United States	3	0.0948	5	0.08890	6	0.09330	5	0.10000	11	0.0943
France	4	0.0961	4	0.08760	7	0.09950	10	0.10740	10	0.0897
South Africa	**2**	**0.0855**	**6**	**0.09130**	**4**	**0.09100**	**4**	**0.08970**	**9**	**0.0846**
Austria	11	0.1458	8	0.11050	9	0.10630	7	0.10440	8	0.0838
Poland	6	0.1187	7	0.09300	5	0.09300	8	0.10460	7	0.0833
Netherlands	10	0.1437	9	0.11280	8	0.10590	6	0.10080	6	0.0823
Australia	5	0.1002	10	0.11680	14	0.13380	18	0.97100	5	0.0817
Czech Republic		N/A		N/A	12	0.12170	11	0.12550	4	0.0803
Canada	1	0.0798	1	0.07580	2	0.08390	2	0.08110	3	0.0723
Finland	8	0.1211	3	0.08640	3	0.08410	3	0.08590	2	0.0642
Sweden	7	0.1194	2	0.07950	1	0.08250	1	0.07870	1	0.0534

("International Electricity and Natural Gas Report and Price Survey" (2010-2015), NUS Consulting Group; Deloitte Analysis)

2.6 South African Interest Rate Environment

Previous research has shown that capital structure determinants can explain capital structure decision making, and debt usage is able to influence company performance. However, there are still macro-economic factors that can influence the decision making of a company. For this study, our focus is only on interest rates as our macro-economic factor. This chapter analyses the history of the South African interest rates and how they have influenced management decisions over the years.

In 1994, Dr CL Stals, the Governor of the South African Reserve Bank (SARB), announced the recovery of the South African economy after one of the country's longest post-war recessions. He noted that the focus in that year would be to maintain economic growth at a steady rate for future years, with the maintenance of financial stability being crucial for this to happen. The post-Apartheid money market saw a rising demand for funds as private sector investment spending increased. This increase in demand relative to supply allowed the yield curve over a full maturity spectrum to move to a higher level after February 1994. Long term interest rates increased faster than short term rates, creating a steep upward slope as the gap between these rates widened (Stals, 1994).

During 1995, the money supply increased with an increase in inflation, leading to a concerned Reserve Bank to tighten monetary policy and encourage a rise in interest rates to slow down inflation growth. This caused short term interest rates to rise from 10% to 14% in 1995 (Stals, 1995). The Reserve Bank ultimately agreed that the interest rates must be determined by the underlying supply and demand of loanable funds in the market, which in its current state would undoubtedly lead to higher interest rates. Dr Stals stated that, if they were to lower interest rates for any length of time, the economy risked experiencing persistent high inflation. This led to an even further increase in short interest rates in 1996, reaching 16% for short term funds. On the other hand, the yield on long term government instruments experienced a decline from 16.7% in June 1995, to 13.7% in January 1996 (Stals, 1996). In 1997, the Reserve Bank started to decrease interest rates gradually as the plans for recovery of the balance of payments that had been implemented began to gain momentum. At the same time, the Reserve Bank had to be cautious, as being part of the global financial

markets meant that interest rates in South Africa would determine whether the currency strengthened or weakened (Stals, 1997).

This economic upside was short-lived. In late 1997, the East Asian crisis created turmoil in currency and capital markets that flowed into South Africa. Consequently this caused many to sell their foreign investments in bonds and equities, sending the interest rates straight back up as bond and equity prices plummeted. The Reserve Bank was quick to tighten the monetary policy for a faster return to stable currency and market confidence, which in turn allowed for interest rates to decline once more (Stals, 1999).

In later years, while the world was welcoming a new millennium, South Africa was dealing with highly erratic interest rates. The yield on long term government instruments fell drastically from a high of 18.3% in late 1998 to 13.3% in early 2000. This was due to a combination of the strengthening of the Rand, low inflation, fiscal discipline and a positive outcome from international ratings agency assessments. Long term rates continued their volatile behaviour by rising to 15.2% mid-2000 and dropping to 13.7% in August of that year, which reduced the differential between short-term and long-term rates (Stals, 2000). After recent years of positive sentiment towards the capital market and South African growth prospects, it all came crashing down when the US sub-prime mortgage market bubble burst and forced a tightening of credit and liquidity conditions throughout international markets. This resulted in interest rates once again increasing to high levels. However, although interest rates did rise, South Africa was not hit as hard as other countries, thanks to its low levels of external debt, flexible exchange rates and appropriate fiscal and monetary policies (Baxter, 2008).

As the world entered 2010, the global markets were still suffering from significant stresses and strains and South Africa was facing the lowest interest rates in 30 years with a continued appreciation in currency. This led to pressures on export-led sectors and significant unemployment (Marcus, 2010). The aftermath of the global financial crisis continued to put pressures on financial markets in 2012, with the outlook of the domestic market deteriorating and the Eurozone falling into a recession. Asia was also feeling the pressure as growth rates declined, the effect of which flowed into South

Africa and other emerging markets. 2013 was no better, as inflation threatened to breach the upper band and the Reserve Bank tightened monetary policy. This continued until 2016 as the country experienced a drought causing an increase in food prices. This increase resulted in the Reserve Bank having to increase interest rates even further to combat rising inflation. South Africa was not alone in tightening monetary policy. Uncertainties such as BREXIT and the upcoming US presidential elections were expected to have negative effects on the US in the near future, which led them to take the necessary precautions. The 2008 financial crisis set off a continuous rise in interest rates as the cost of debt spiked caused by many borrowers defaulting. However, the Reserve Bank was hopeful in the future, the cycle of hiking interest rates would come to an end as rates were expected to stabilise in the near future (Kganyago, 2016).

2.7 The Bond Exchange of South Africa / The South African Debt Market

In addition to interest rates, it is important to consider the emergence of the South African bond market and where the Bond Exchange of South Africa (BESA) fits into this study. Bonds are a form of debt security used to raise longer-term capital for both government expenditure and investments and are all traded on one platform, BESA. BESA is responsible for the regulation and monitoring of the debt market and aims to have a sound and resilient financial system. Internationally, the US has the largest bond market but, among its peers in the emerging markets, South Africa is the market leader and holds the title of the most developed bond market in Africa. This has led to the country relying heavily on its domestic bond market in comparison to other emerging economies, which is partially due to South Africa's historical position when aggressive sanctions were forced on the country. In the 1980s and early 1990s, government sanctions created limitations in access to foreign lending and the resulting liquidity, which led the South African market to rely on the liquidity and efficiency of the bond market. SARB then formalised a plan to increase efficiency and liquidity by establishing the Bond Market Association (BMA) in the mid-1980s which was able to develop by the early to mid-1990s. The improvements in the bond market and the subsequent growth convinced the private sector to participate in bond issuance. The first corporate bond issuance took place in 1992, and the first government bond

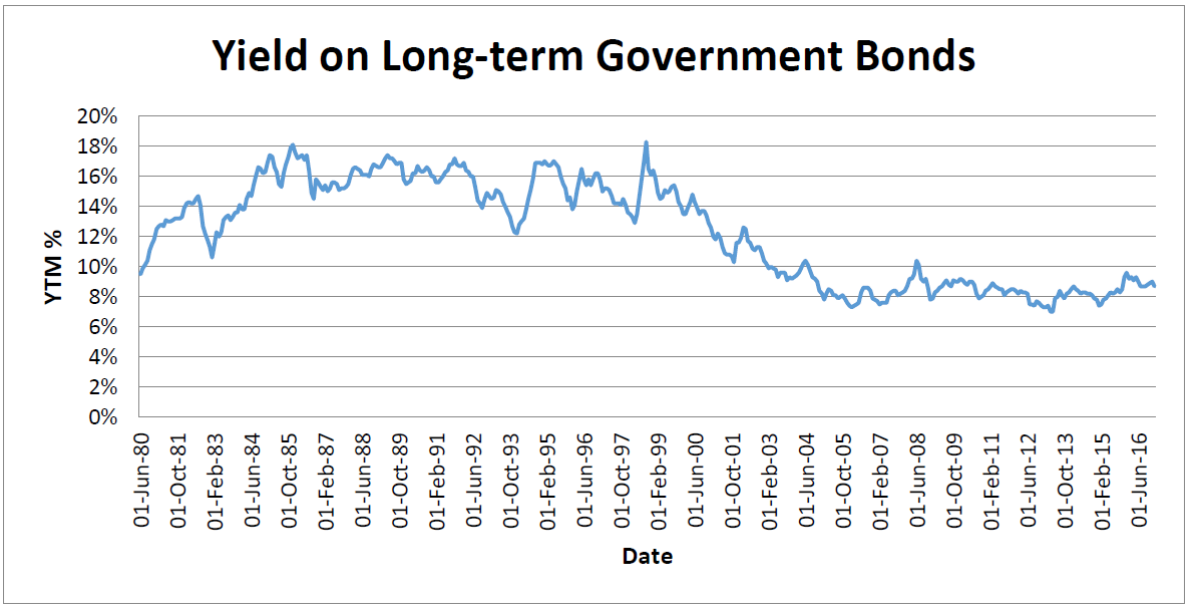
issuance in 1994, with the BMA receiving their licence in 1996 and evolving into BESA. At this stage government bonds remained steady, holding over 80% of the bond market. However, over the years, the government contribution declined and was recorded at 66% in mid-2006 as more companies began trading debt instruments as a source of funding. Some of the largest debt instruments were issued from companies such as MTN, Transnet and Eskom (Mboweni, 2006).

In 2009, the Johannesburg Stock Exchange (JSE) successfully merged with the BESA, causing it to regulate the largest listed debt market in Africa, both by liquidity and market capitalisation. The JSE then prompted the use of a single integrated exchange platform trading spot and derivative instruments. This integration allowed an increase in trade and investor confidence in the South African bond market (JSE, 2019). The BESA's success continued to grow as 2012 approached, as the bond market was included in the World Government Bond Index of Citibank, resulting in large inflows into the domestic bond market. A year later, with the assistance of the JSE exchange platform and the World Government Bond Index of Citibank, the bond market had 1,600 listed debt instruments outstanding at a nominal value of over R1.8 trillion. In that same year, with US quantitative easing expected in 2014, risk-averse non-resident market participants began to sell their bonds in South Africa. However, as the expectations of the impact of quantitative easing were adjusted to realistic levels, non-residents began to purchase bonds once again, offsetting any real damage to the South African bond market (Marcus, 2013).

Figure 6 depicts the South African bond market performance since the creation of BMA and its licenced version, BESA. With the benchmark of the yield on long-term government bonds, the graph illustrates how, after opening at just below 10% in 1980, the yield on long-term government bonds reached a high of 18.3% in 1998. This was just two years after the BESA licensing was approved. It reached a relatively stable state towards the end of 2009 to 2016, where the yield was roughly between 8 – 10% on average. This was due to the merger with the JSE made raising funding through debt securities more easily tradable and attractive.

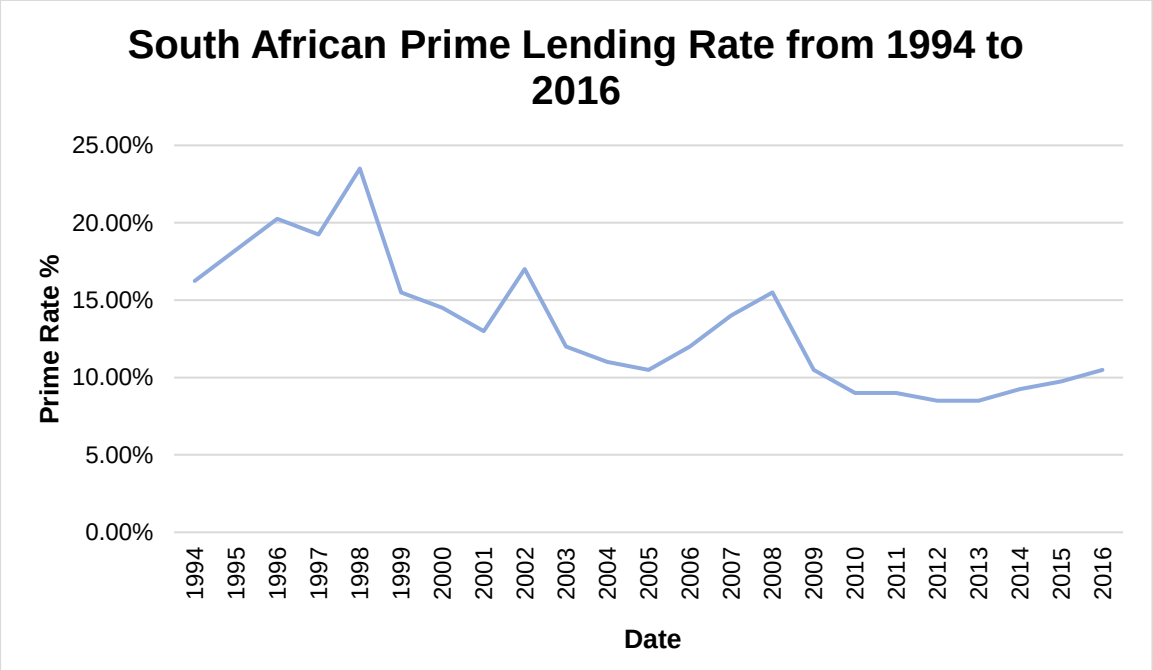
Figure 7 shows the movement in the prime rate between 1994 and 2016. It depicts the decline in the prime lending rate over the years, as well as the spikes during economic events that could influence borrowing capabilities.

Figure 6: Yield on long-term government bonds from 1980 to 2016



(Source: Iress 2019)

Figure 7: South African prime lending rate from 1994 to 2016



(Investing.Com, 2019)

Today, the debt market is considered highly liquid and well developed, with approximately R25 billion debt instruments traded daily. These instruments include government bonds, corporate bonds and active debt trading on the Repo Market. More than half of the debt listed on the JSE is issued by the South African government, while the remainder is issued by State-owned companies, corporates, banks and other African countries (JSE, 2019).

2.8 Conclusion

Many research papers can be explained by theories that dominate the capital structure decisions of financial institutions today, which include the irrelevance theory, agency theory, the trade-off theory, and the pecking order theory. The capital market determinants that assisted in proving or disproving these theories were the size of the company, profitability, growth and tangibility.

Significant findings from Table 1 show the relationship between capital market determinants and leverage, with the strongest positive relationships being with company size and tangibility and the strongest negative relationship with profitability. This brings forward the argument that certain factors within a company can drive leverage and, in turn, impact the capital structure of a company. It was also found that leverage has an impact on a company's performance, which demonstrates the importance of decisions made within the company.

The literature review also covered the history of South African mining, interest rates and bond market and any significant events that may have impacted the results of a company during that time. This macro-economic background and prior literature assist in creating a methodology of how to demonstrate how the capital structure decisions made by the company relate to certain factors within the company appropriately. With emphasis on how the level of debt changes in each company relative to the market. The focus of this paper is on a sample of companies listed on the JSE after the recovery of the money market post-Apartheid, from 1994 to 2016.

Chapter 3: Methodology

3.1 Introduction

This chapter highlights the methodology used to analyse the movements in corporate debt levels in South Africa between 1994 and 2016. The model and the hypotheses over the relationships are built based on the theoretical framework, as well as the literature that was reviewed in the previous chapter.

3.2 Method of Analysis

The data in this study was tested using a series of methods to address the relationship between leverage and the capital structure determinants appropriately.

The analysis was separated into three main sections:

1. Listed non-metal and mining
2. Listed metal and mining
3. Delisted metal and mining

For both non-metal and mining and metal and mining, the analysis consisted of two separate tests: a trend analysis and correlation and regression analysis.

First, it is important to determine how company leverage has changed over the period, which was done using graphical analysis to find any trends. Once this was completed, the next step was to determine if there was any relationship between the dependent and independent variables by determining the correlation coefficient. To determine whether the relationship was positive or negative, the correlation coefficient will have either a positive or negative sign to show the relationship. If the coefficient is “+1”, the relationship between the variables involved are perfectly correlated and they will move at a 1:1 ratio in a similar direction. If the coefficient is “-1”, the relationship is perfectly uncorrelated and, instead of the variables mirroring one another, they will move in equal and opposite directions. Finally, if the coefficient is zero, there is no correlation between the variables. This test was completed using the Excel data analysis Toolpak

in Microsoft Excel, which produces a correlation coefficient matrix that represents the relationship between the leverage ratios and the capital structure determinants.

Finally, once a relationship was determined, the level of significance of each relationship was assessed using a regression model and the related p-value. This assisted in determining whether the relationship truly exists or if it was formed by chance. This regression was run using the Excel data analysis Toolpak in Microsoft Excel, which assumes a t-distribution where the mean is calculated under the assumption of normality with an unknown standard deviation. Each leverage ratio as defined in the beginning of this chapter runs on separate regressions, with the leverage ratio being selected as the dependent variable in the model and the capital structure determinants being the independent variables. Each regression then produces a p-value that corresponds with the selected leverage ratio and each capital structure determinant.

A correlation coefficient is statistically significant when the related p-value is below 0.05 or 0.01. Although both show statistically significant results, a p-value of 0.01 or less shows an even stronger statistical bond between the two variables. However, if a p-value is greater than 0.05, it cannot be considered a statistically significant finding. This makes it insufficient to conclude that a relationship can be found between the variables. It is still inconclusive as to whether the relationship is as a result of chance or is a true reflection of the relationship.

Finally, the delisted companies were analysed using Microsoft Excel. The reasons for delisting are separated, with the focus being on profitability pressures, as this would be more highly impacted by leverage when delisting. These were then analysed by the number of delisted companies between significant timeframes:

1. 1994 – 1999: Post-Apartheid and the Asian Crisis (Robinson, 2016; Stals, 1999)
2. 2000 – 2005: the commodity boom initial stages (Kane-Berman, 2017)
3. 2005 – 2010: pre- and post-financial crisis consequences (Llewellyn, 2014)
4. 2011 – 2016: the end of the commodity boom (Kane-Berman, 2017)

The understanding of events during these periods is used to explain the trends of companies delisting, before further investigating the leverage of each delisting period and the impact that may have had.

A graphical analysis was then done to identify any trends in the leverage ratios and those companies that delisted. The analysis included the different types of debt used by the companies that delisted in comparison to the listed metal and mining companies during that time. In addition, whether the leverage decisions of these companies could have assisted in their profitability pressures.

The results of the above tests are discussed in more detail in Chapter 4 and were used to determine whether leverage within the company's capital structure has changed for the period 1994 to 2016. As well as if there is a relationship between the capital structure and determinants. Once a relationship was found, the statistical significance of the relationship was assessed to determine if the relationship was able to predict the changes in the level of leverage held in a company's capital structure significantly.

The relationship between dependent and independent variables described above are depicted as follows:

$Y = (\mu_1)(X_1) + (\mu_2)(X_2) + (\mu_3)(X_3) + (\mu_4)(X_4) + (\mu_5)(X_5) + \ldots + (\mu_j)(X_j)$
Where,
Y: Dependent variable, being the leverage ratios and,
X: Independent variable, being the capital structure determinants

This equation, specific to the testing in this paper, is defined below:

$TDBV = (\mu_1)(SIZE) + (\mu_2)(TANG) + (\mu_3)(PROF) + (\mu_4)(GROW) + (\mu_5)(CORD) + (\mu_6)(TAX)$

$TDMV = (\mu_1)(SIZE) + (\mu_2)(TANG) + (\mu_3)(PROF) + (\mu_4)(GROW) + (\mu_5)(CORD) + (\mu_6)(TAX)$

$TLBV = (\mu_1)(SIZE) + (\mu_2)(TANG) + (\mu_3)(PROF) + (\mu_4)(GROW) + (\mu_5)(CORD) + (\mu_6)(TAX)$

$TLMV = (\mu_1)(SIZE) + (\mu_2)(TANG) + (\mu_3)(PROF) + (\mu_4)(GROW) + (\mu_5)(CORD) + (\mu_6)(TAX)$

3.3 Dependent Variables

There are four ratios used in this study to define leverage. These are defined in Table 4 below:

Table 4: Leverage measures

Proxy	Variable	Calculation
TDBV	Total debt-to-book value of equity	Long-term interest-bearing debt + short-term interest-bearing debt / total book value of equity
TDMV	Total debt-to-market value of equity	Long-term interest-bearing debt + short-term interest-bearing debt / total market value of equity
TLBV	Total liabilities-to-book value of equity	Total liabilities / total book value of equity
TLMV	Total liabilities-to-market value of equity	Total liabilities / total market value of equity

Total debt in the above table is defined as long and short term interest-bearing debt, with an increase in interest-bearing debt being directly associated with an increase in bankruptcy risk. Total liabilities consist of total debt, as well as any other accounts, such as trade creditors, provisions and deferred tax, which are defined under the International Financial Reporting Standards (IFRS).

Lastly, book value is defined as the equity value reflected in the financial statements of the company (i.e. the share capital at its original issue value); while market value is defined as the current value of the company's issued equity in the market. This is consistent with Slabbert (2018) and Philogene (2019) and allows for ease of comparison of each study that made up this research topic.

3.4 Independent Variables

As proposed in the literature review chapter, this study uses the following capital structure determinants as the independent variables, company size, tangibility, profitability, growth, cost of debt and the corporate tax rate.

These determinants are shown in Table 5 below, and are each discussed in detail following the definitions of the calculation methods.

Table 5: Capital structure determinants

Proxy	Determinant	Calculation
SIZE	Company size	Natural logarithm of turnover
TANG	Tangibility of assets	Fixed assets / total assets
PROF	Profitability	Earnings before interest and tax (EBIT) / Total assets
GROW	Growth	Natural logarithm of total assets
CORD	Cost of debt	South African prime rate
TAX	Tax rate	South African corporate tax rate

Like the dependent variables, the independent variables are consistent with Slabbert (2018) and Philogene (2019), allowing for ease of comparison of each study that make up this research topic.

3.4.1 Company Size

Company size is calculated as the natural logarithm of turnover of a company. As was noted in Chapter 2, most research found that larger companies have a greater capacity for debt. This indicates that larger companies have a lower probability of default which, in turn, creates a lower bankruptcy cost and risk of financial distress. Following this lower risk of financial distress, larger companies were also found to have easier access to issuing relatively inexpensive debt. As a result, this study expects a positive relationship between company size and leverage, which is in line with the trade-off theory.

As discussed in Chapter 2, this also results in this study predicting a negative relationship with pecking order theory. Specifically stating that the larger the company, the less information asymmetry is experienced. This caused the cost of issuing equity to be much lower.

3.4.2 Tangibility of Assets

The tangibility of assets was calculated using fixed assets relative to total assets, where fixed assets include all tangible assets such as property, plant and equipment. Referring to Chapter 2, this study predicted a positive relationship with tangibility and leverage (Song, 2005). This relationship is driven by the fact that tangible assets are used as collateral for any debt lenders in the case of the company defaulting. This makes them more likely to issue more affordable debt when there are more assets to be used as collateral, lowering the risk if the company was to default. As discussed in Chapter 2, this is in line with the trade-off theory. However, this determinant has a similar relationship to company size in that a negative relationship is expected as higher tangibility should result in fewer information asymmetries, with any increase in tangibility causing a decline in the cost of equity.

3.4.3 Profitability

Profitability was calculated as earnings before interest and tax (EBIT) divided by total assets. As was found in the Chapter 2 literature, a company is more able to take on debt if they have higher profitability to pay off the interest payments of that debt. At the same time, higher profitability lowers the risk of default and related financial distress, which may cause lenders to provide them debt on more favourable terms as they are less of a risk (Fan et al., 2010).

While this was a prominent feature in Chapter 2, many studies found that the argument in favour of pecking order theory was far greater, suggesting a negative relationship with leverage. This was because, as profitability grew, there would be larger retained earnings to use as a source of financing. If we were to follow the pecking order theory, the cheapest form of financing is retained earnings, thus a company would likely

forego the use of debt where they had sufficient retained earnings. For this reason, this study is expecting a negative relationship between profitability and leverage.

3.4.4 Growth

Growth was calculated as the natural logarithm of total assets. Titman and Wessels (1988) calculated growth using capital expenditure (Capex) to assets and research and development (R&D) to assets, but with limited available information, this study, as well as the three additional papers on this research topic, used the natural logarithm of total assets.

As noted in Chapter 2, the relationship between growth and leverage appears to be negative. The argument here is that, if growth is expected in the future, a company will not take out debt today in case they may not have the capacity to take on additional debt in the future to fund their growth strategies. In addition, although growth is often seen in a positive light, higher growth can lead to higher financial distress risks due to the uncertainty of the level of growth predicted. It can, therefore, be argued that it is in line with the trade-off theory.

3.4.5 Cost of Debt

The South African prime interest rate is used as the benchmark for cost of debt in this study. While the most appropriate measure would be Johannesburg Interbank Agreed Rate (JIBAR), this does not have sufficient historical data to be considered for this study, consistent with Slabbert (2018) and Philogene (2019). Before these studies, using a lending rate as a determinant of leverage had not yet been used in published literature.

As shown in Figure 7, the South African prime rate has gone from a high of 23% in 1998 and a low of 8.5% in 2012, to a more stable rate of 10.5% in 2016. This decrease from 23% is expected to increase the use of leverage in companies after 1998 as the cost of debt is cheaper and the risk of bankruptcy is also expected to decline. Therefore, a negative relationship is expected between the cost of debt and leverage.

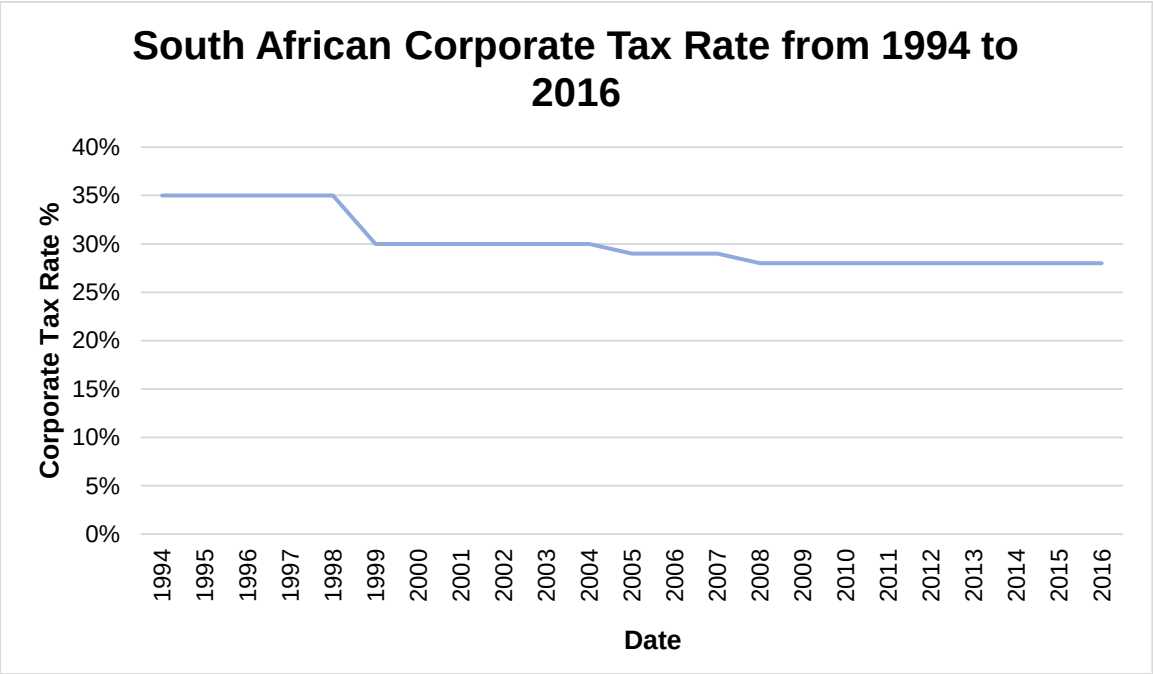
3.4.6 Tax Rate

The South African corporate tax rate was used to measure the corporate tax rate in this study. Previous research has shown that changes in the tax system have a large impact on investment and financing decisions (Correia, Flynn, Uliana, and Wormald, 2011). This is in line with research noted in Chapter 2, where a company's financing decision may be influenced by the tax benefit that could be provided from increased debt.

Therefore, the hypothesis regarding the tax rate is such that an increased corporate tax rate will increase the leverage used within a company, as increased tax benefits would attract companies into increasing their use of debt. On the other hand, decreasing the corporate tax levels would allow for a reduction in debt levels as they have higher net profit after tax that can be used to pay off debt more quickly.

From Figure 8 below, it can be seen that there has been a steady decline in the corporate tax rate from 35% in 1994, to 28% in 2016. This creates the expectation that companies will experience a decline in debt, *ceterus paribus*, as the tax rate declines.

Figure 8: South African corporate tax rate from 1994 to 2016



(SARS, 2019)

Using the above descriptions of the capital structure determinants and the leverage ratios, the following null (H_o) and alternative (H_1) hypotheses for the study can be defined as:

H_o: There is no statistically significant relationship between Y_{1-4} and X_{1-6}
H_1: There is a statistically significant relationship between Y_{1-4} and X_{1-6}

Where:
Y_{1-4} is each of the dependent variables, TDBV, TDMV, TLBV, and TLMV being assessed separately; and,
X_{1-6} is each of the independent variables, SIZE, TANG, PROF, GROW, CORD, and TAX being assessed separately

3.5 Data Sources

The data used in the regression for this study, for both the independent and dependent variables, was obtained from Iress, using the financial statement values. The samples used in this study are from 1994 to 2016, or from when the company first listed to obtain publicly available information. If a company did not have available information it was removed from the sample and any company that was delisted was tested separately. This left a final count of 81 companies across non-metal and mining (39), and metal and mining markets (42) to be used in the Microsoft Excel analysis. The delisted companies (124 during the period) were then separated into “takeover”, “profitability”, and “other”, with “other” including unknown reasons or regulatory issues. Profitability delisting’s included all companies that delisted due to profitability pressures. These were the focus of the study and are described in more detail below. The total number of profitability companies that delisted with available information was 23.

Chapter 4: Results

4.1 Introduction

This chapter focuses on the quantitative results obtained from the research into the impact capital structure determinants have on listed South African companies leverage decisions for the period 1994 to 2016.

These results were based on the testing as laid out in the previous chapter. They were performed first in the non-metal and mining sector, the metal and mining sector, and then companies within the metal and mining sector that delisted during the period. Each of the above were analysed to determine if there were any specific relationships with leverage.

4.2.1 Non-Metal and Mining – Trend Analysis

The testing began with a trend analysis over the use of different types of leverage of the period. The different types of debt considered here were short- and long-term debt relative to total debt, and non-current liabilities relative to total liabilities. The trend analysis is graphically displayed to identify the different uses of debt and any changes therein.

Figure 9: Book value leverage ratios for the non-metal and mining sample

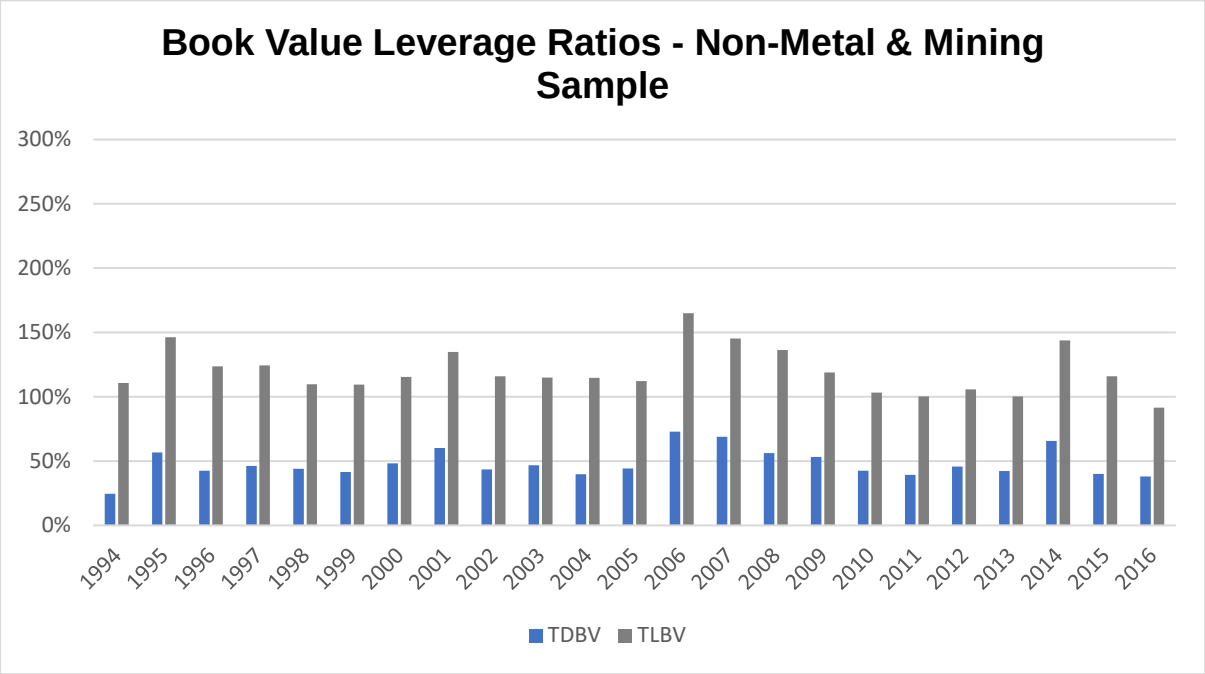
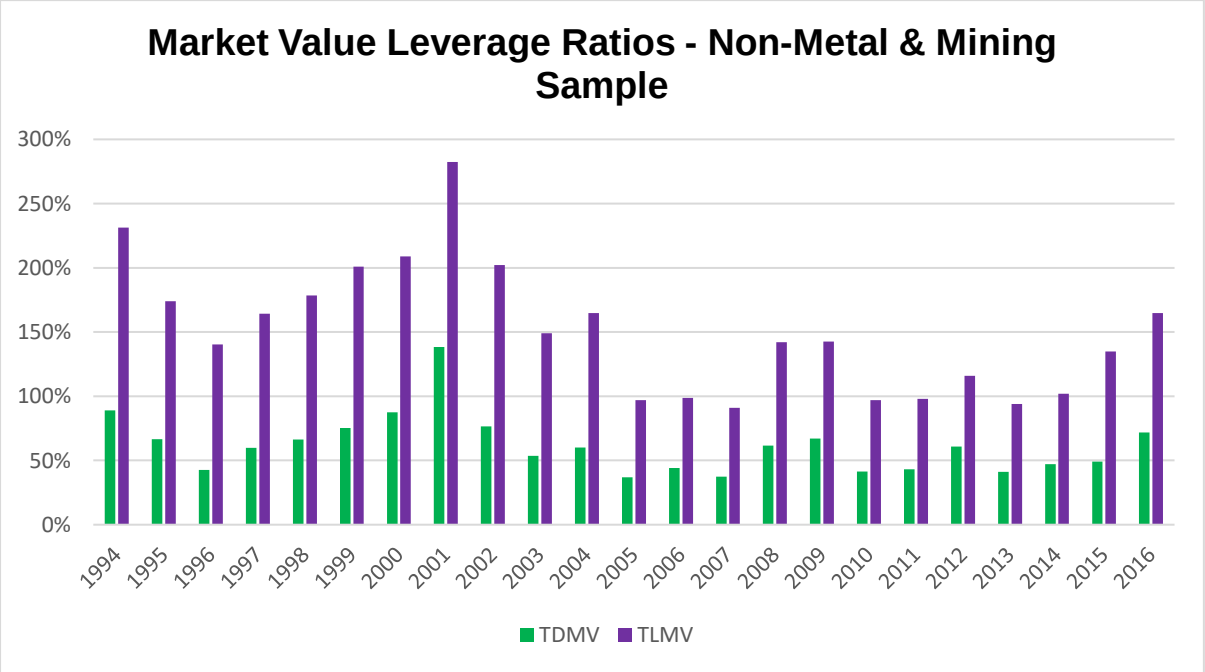


Figure 10: Market value leverage ratios for the non-metal and mining sample



This sample consisted of 39 companies listed on the JSE from late 1994 to 2016 categorised as non-metal and mining. Figure 9 and 10 depicts the change in leverage ratios from 1994 to 2016 for all 39 companies. The graphs show that the ratios with

market value move together and the ratios with book value move together, showing the influence the equity portion has on the ratios. TDMV and TLMV experienced a decline from 1994 to 1996 as the South African economy reopened international trade post-Apartheid, before gradually increasing to reach a peak in 2001. Which was just before the commodity boom assisted in a rise in market prices of markets, including oil, which covers part of this sample. This caused a gradual decline in the leverage ratios. It then changed pace in 2008 as global markets crashed with the financial crisis, causing a decline in equity markets. Fortunately, South Africa was hedged against international market movements which reduced the level of impact felt in the country. Many of the companies in this sample are oil and industrial. These companies rely more on commodity prices, which would not be as severely impacted by the debt crisis and would probably not experience as sharp a decline as other industries such as housing and financial services. TDBV and TLBV were relatively constant, experiencing a slight drop in 2008 due to the debt crisis.

Figures 11-14 below present the frequency of the different leverage ratios during the period examined.

Figure 11: TDBV frequency – non-metal and mining sample

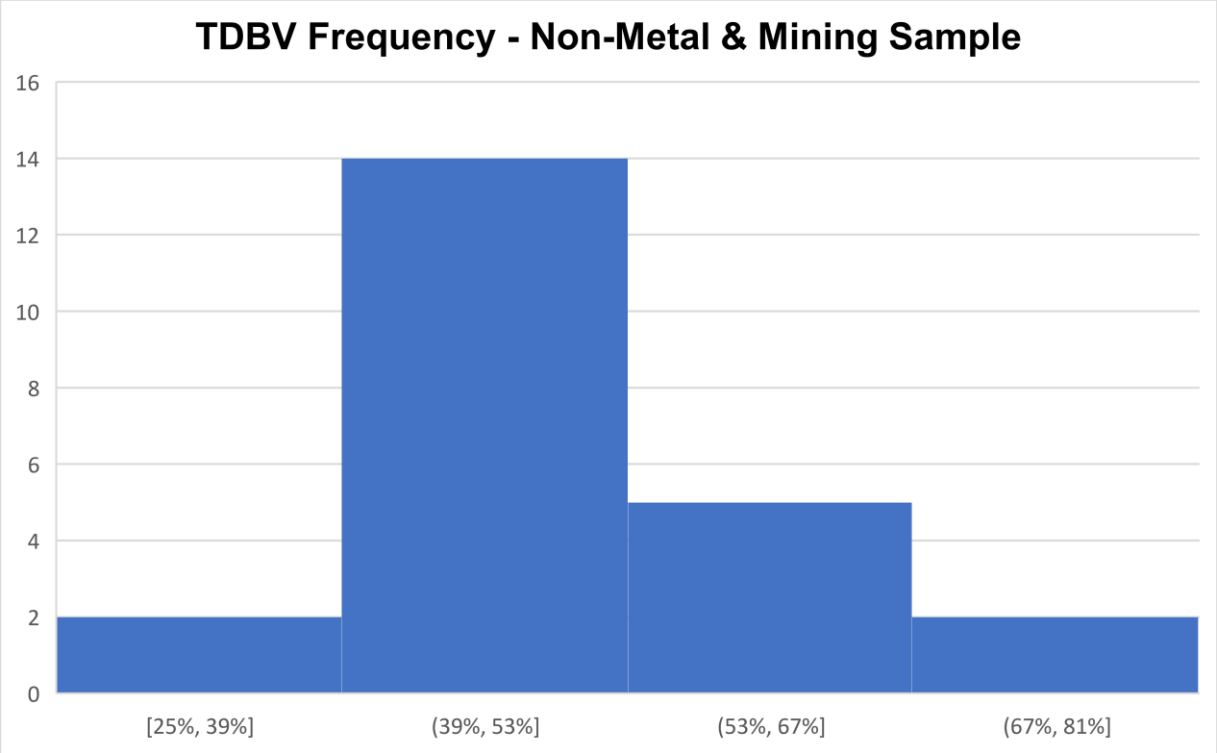


Figure 12: TLBV frequency – non-metal and mining sample

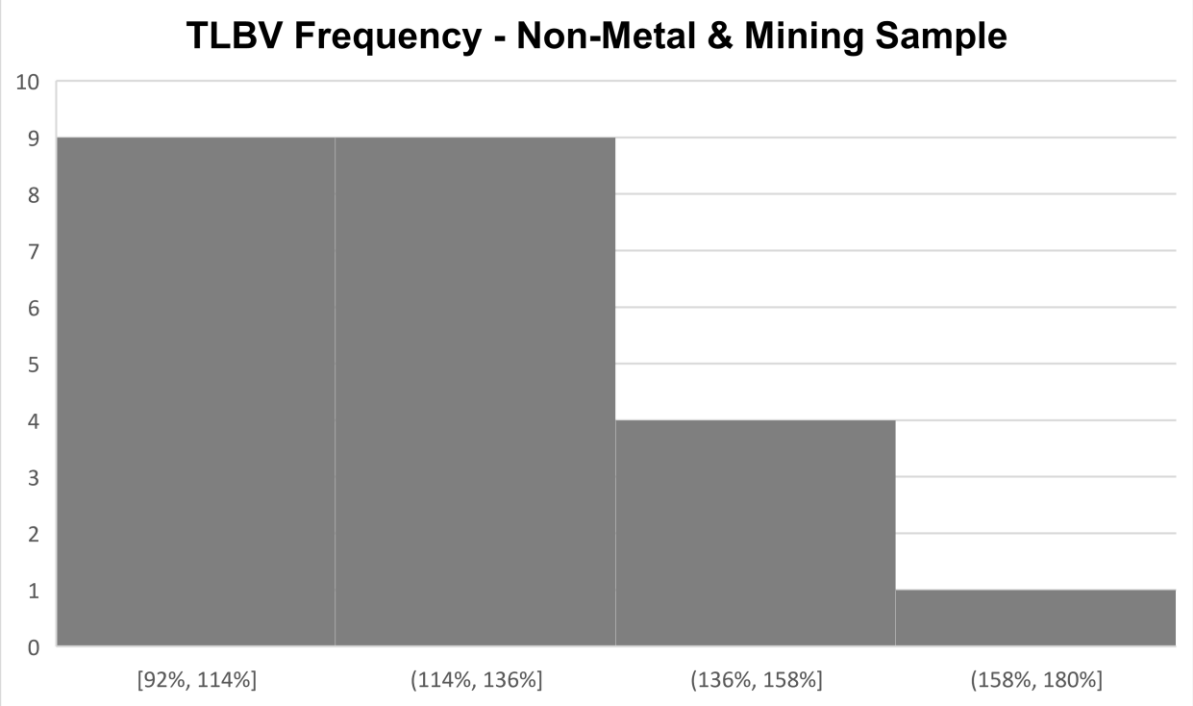


Figure 13: TDMV frequency – non-metal and mining sample

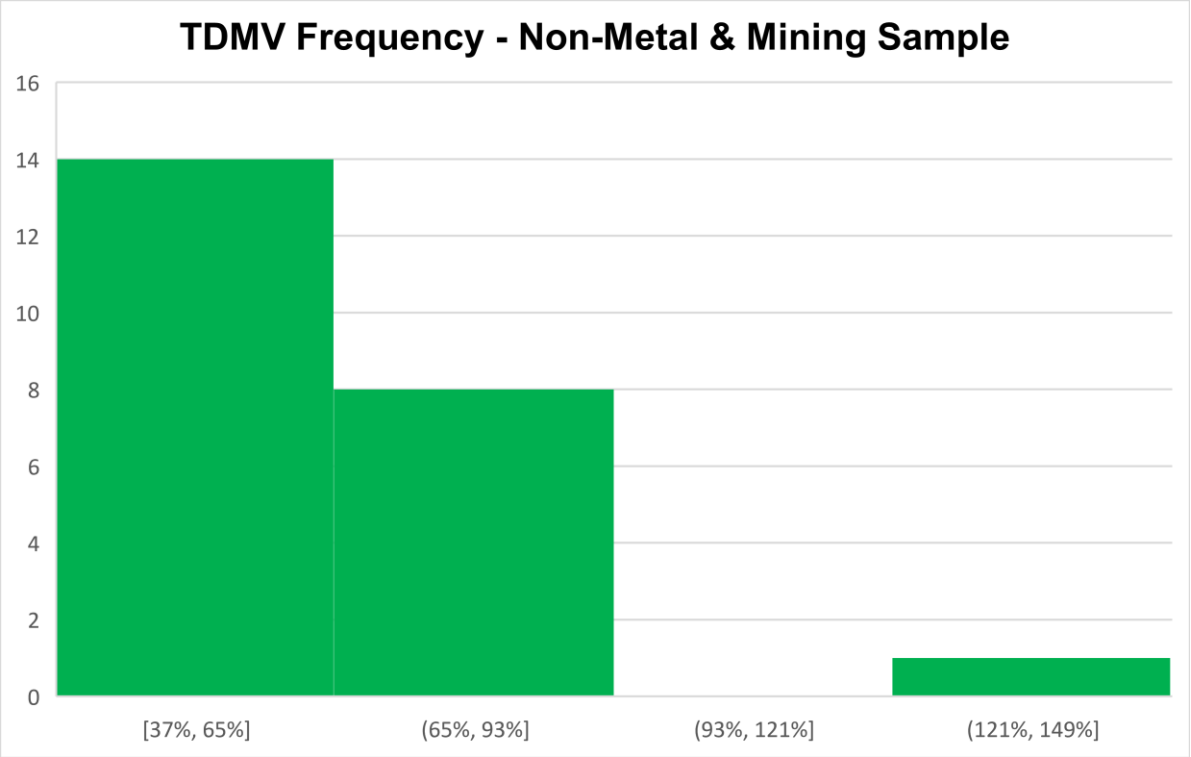
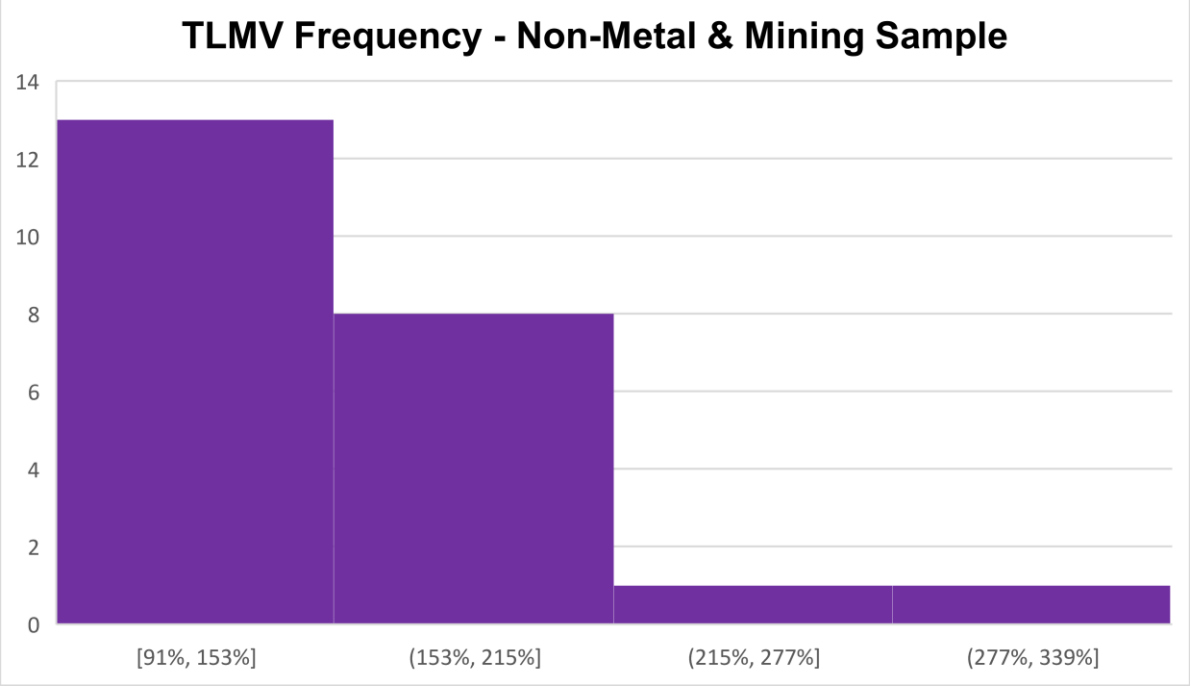


Figure 14: TLMV frequency – non-metal and mining sample



The above results show the range for both the book and market value leverage ratios, with the book value ratios being more dispersed between the different groupings and

having a smaller range to work with. This is consistent with the fact that book value ratios are less volatile. They do not react as much to market fluctuations as the market-related ratios, which have a larger range to work with, as well as having a bigger tail. In all scenarios, the total liability ratios are significantly higher than the total debt ratios, implying that these companies are using more of their non-interest-bearing liabilities to fund their activities.

Figure 15: Interest-bearing debt – non-metal and mining sample

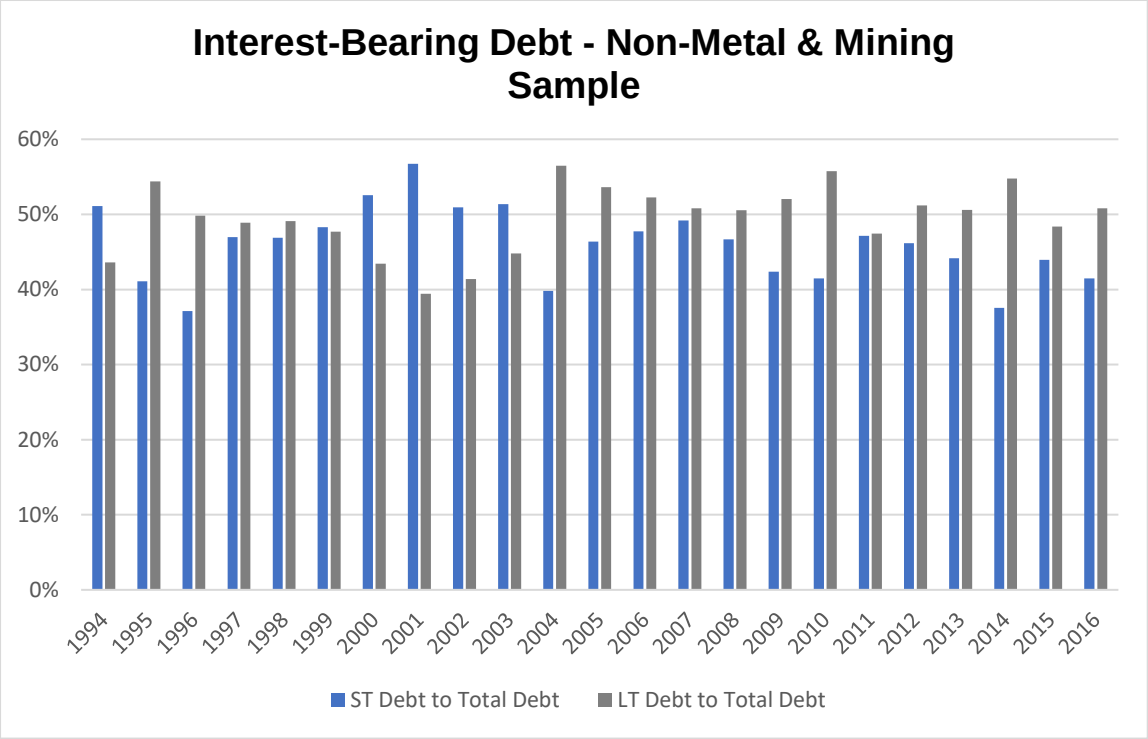
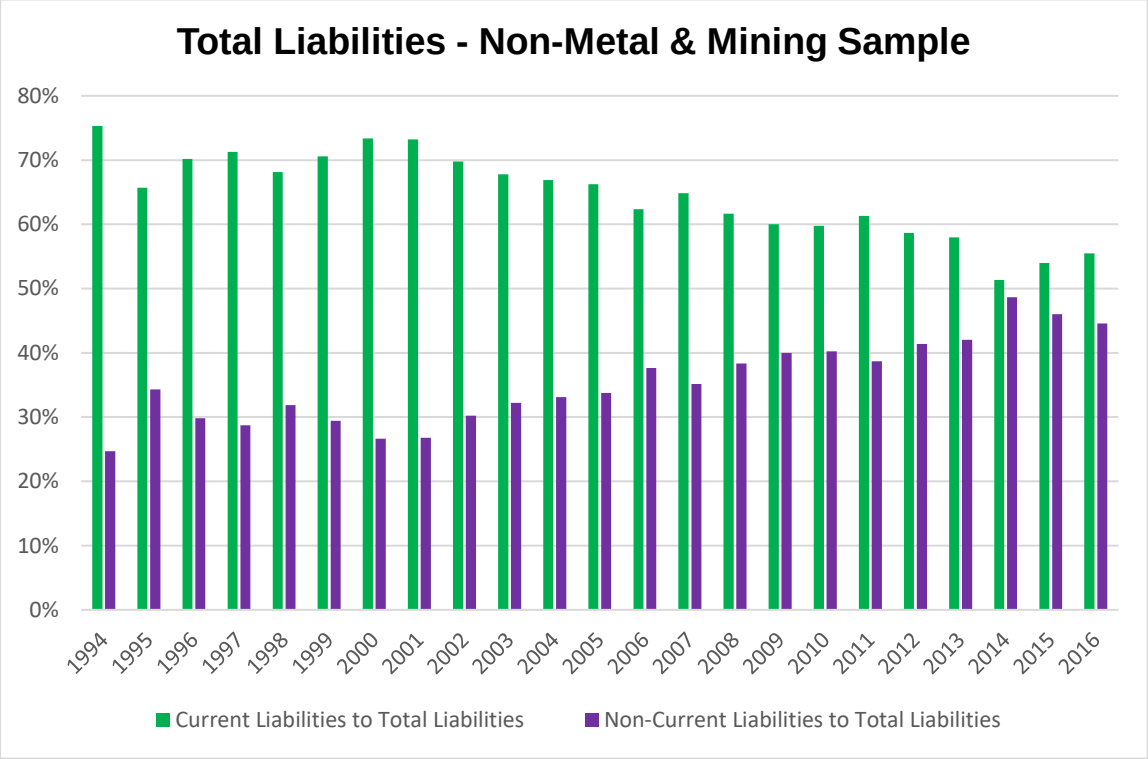


Figure 16: Total liabilities – non-metal and mining sample



Looking at the preferred term structure of debt in Figures 15 and 16, the companies in the sample appear to roughly balance out the usage of debt between short and long term. On average, the companies slightly favoured long-term debt throughout most of the period, with short term debt briefly overtaking long term in both 1994 and 2000-2003. Current vs non-current liabilities have the largest gap from 1994 with current liabilities dominating, and converging towards 2014, where after the two part ways with current liabilities remaining the dominant usage of total liabilities.

As noted in Chapter 2, Apartheid government sanctions, a lack of foreign investment and low government savings resulted in a shortage of funding and a corresponding increase in short term interest rates from 10% in 1994 to 16% in 1996. This created a drop in usage as markets flocked to more affordable rates. In addition, as investors gained confidence in the South African economy, the sovereign risk credit spread declined, lowering the long-term government bond rates as seen in Figure 6. This led longer-term debt to become more appealing to companies over time, with a gradual increase in the long term debt usage over the short term.

4.2.2 Non-Metal & Mining Sample – Correlation and Significant Results

The correlation analysis has been documented in a correlation matrix in Appendix A-1, while the regression models, separated by each leverage ratio, have been summarised in this appendix. The results of the correlation and significance analysis are summarised below. Statistical significance has been documented at the 5% and 1% level.

- Company size (SIZE) was positively correlated to TDBV and TLBV, and negatively correlated to TDMV and TLMV. TDBV was found to have a statistically significant relationship with SIZE at the 0.05 level, and TLBV, TDMV and TLMV have a statistically significant relationship with SIZE at the 0.01 level. This ratio incorporates the market measure of equity and market perception towards company size may drive this relationship.
- Tangibility (TANG) was positively correlated to all leverage ratios, with a statistically significant relationship found with TDBV (p= 0.01), and no statistical significance with the remaining ratios. This confirms the theory that higher levels of tangible assets allow for more collateral for lenders to allow for lower interest rate offerings.
- Profitability (PROF) was negatively correlated to all leverage ratios apart from TLBV, with a statistically significant relationship with TLBV and TLMV (p=0.01). The mixed results follow two contradicting theories, the first being the theory that, with higher profitability, the corresponding retained earnings will increase and, as per the pecking order theory, this internal financing is prioritised over any external debt financing. The alternative theory for TLBV supporting a positive correlation is that, with higher profitability, the company can cover the interest on its debt, making it less risky for lenders, who are then more willing to provide them with inexpensive credit.
- Growth (GROW) was negatively correlated to TDMV and TLMV, and positively correlated to TDBV and TLBV, with a statistically significant correlation to TLMV (p=0.05). The negative relationship with the book value leverage ratios supports the theory that higher growth expectations means equity financing would be

preferred today, to save the availability of debt financing for future investments into the growth projects. However, the market value leverage ratios following the theory of higher growth opportunities would result in more debt being used today for future projects.

- The cost of debt (CORD), as measured by the South African prime interest rate, was positively related to all of the leverage ratios, with no statistical significance in any ratio.
- Corporate tax rate (TAX) was negatively correlated to TDBV and positively correlated to the remainder of the leverage ratios. No statistical significance was found in any ratio.

The capital structure determinants showed the greatest statistical significance towards TDBV; in other words the capital structure determinants were best able to predict the variability in total debt to book value of equity. Further, size displayed significant correlation towards each of the leverage ratios, while cost of debt and tax showed no statistical significance with any ratio.

The relationship between leverage and determinants and growth and tangibility, support the trade-off theory. Whereas the positive relationship with profitability, and the negative relationship for TDMV and TLMV between size and leverage supports the pecking order theory. The relationship between the tax rate and leverage support neither theory. For the total sample, the findings broadly support the trade-off theory.

Appendix B-1 is a summary of the following, correlation between the four leverage ratios and six capital structure determinants, the regression model for each of the leverage ratios and the descriptive statistics.

4.3.1 Metal and Mining – Trend Analysis

Figure 17: Book value leverage ratios – metal and mining sample

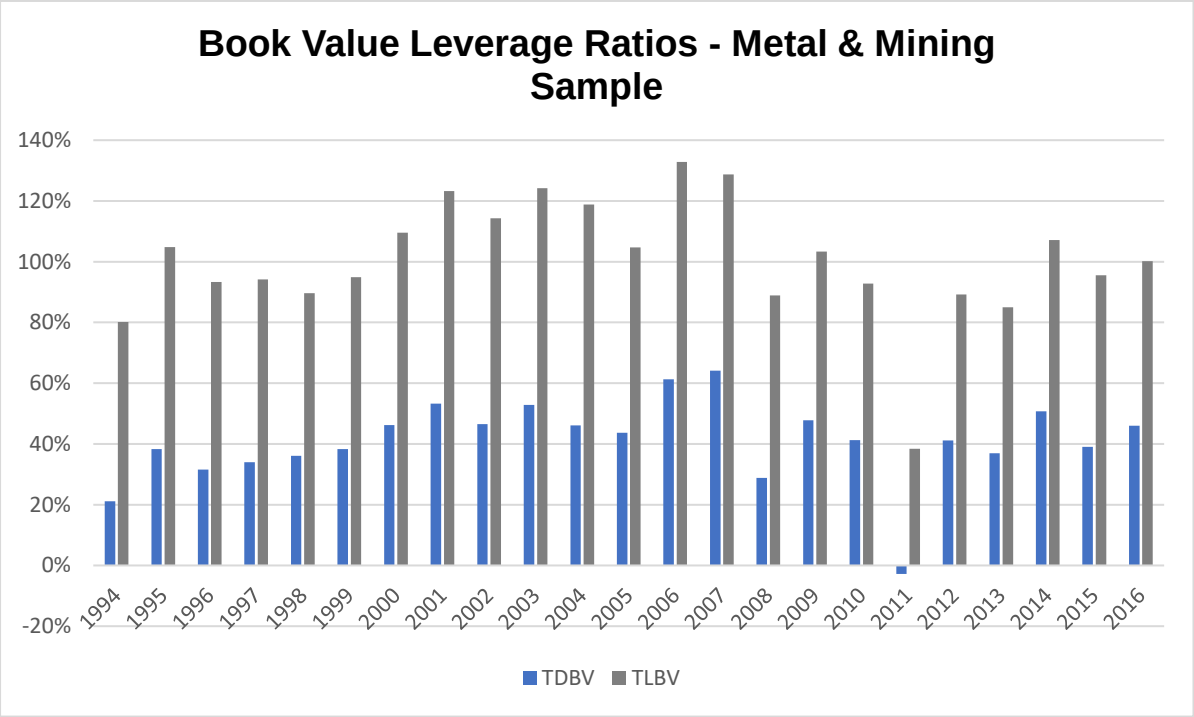


Figure 18: Market value leverage ratios – metal and mining sample

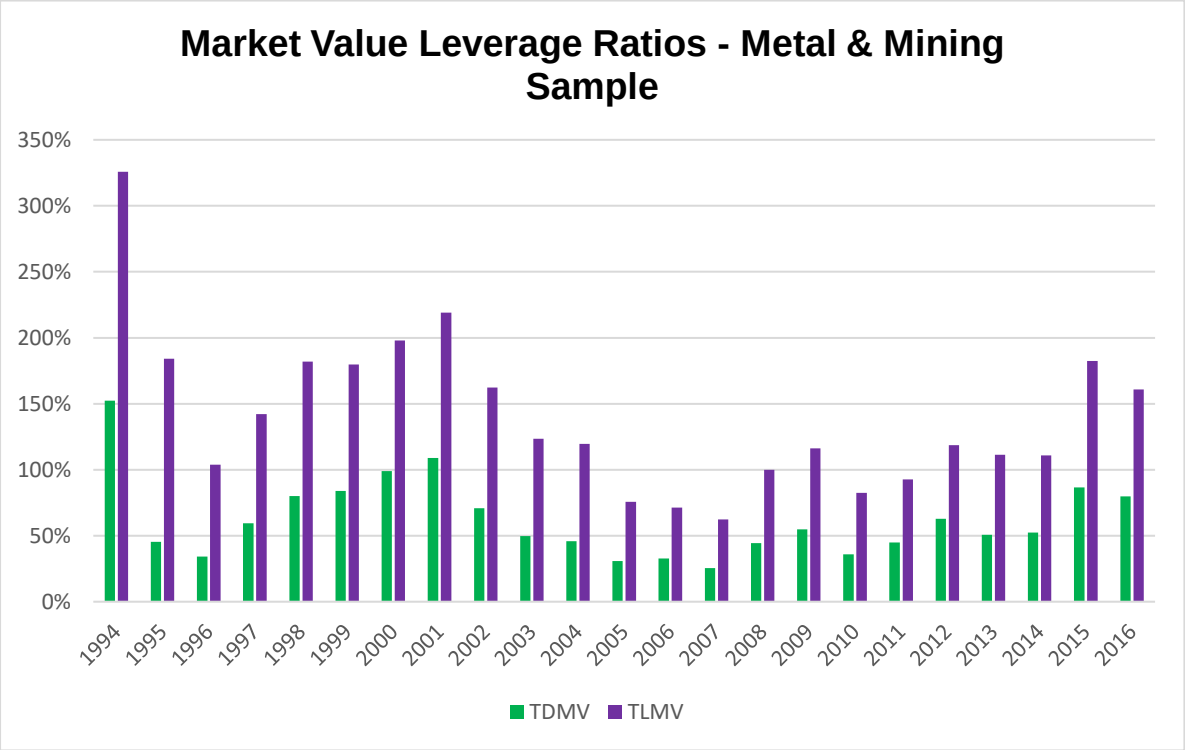
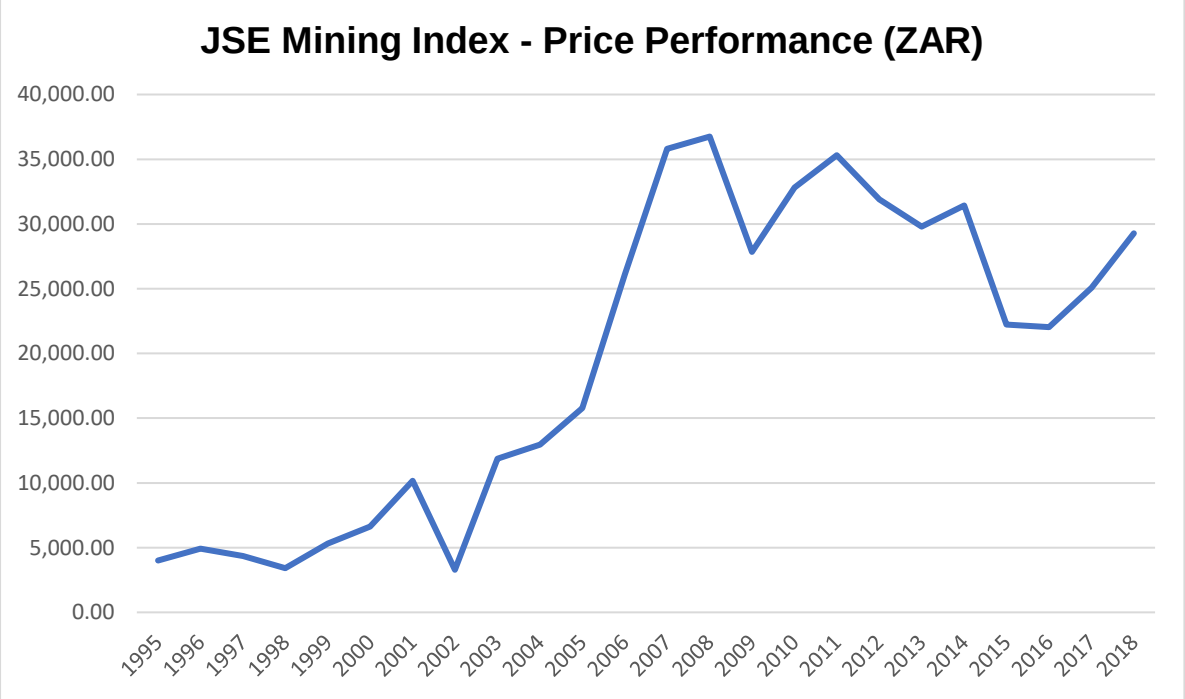


Figure 19: JSE mining index – price performance (ZAR)



The mining sample consisted of 43 companies listed on the JSE from the later part of 1994 and listing to 2016. Figures 17 and 18 depict the change in leverage ratios from 1994 to 2016 for all 43 companies. The graph shows that the ratios with market value move together and the ratios with book value move together, showing the influence the equity portion has on the ratios. TDMV and TLMV experienced a sharp decline from 1994 to 1996 before fluctuating and reaching peaks in both 1998 and 2000 before gradually declining until 2007. The Mine Health and Safety Act was promulgated in 1996, which has substantially improved the safety of mining since 1994.

As noted in Chapter 2, the globalisation of South African trade markets in 1994 post-Apartheid led to a rise in trade and a corresponding increase in the market value of the mining companies. This did not last long, as the slump in commodity prices as a consequence of the Asian Crisis began in 1997-1998. The increase in market values in 1999 was a result of the European Central Bank announcing the importance of gold as an important commodity investment. This would lead to an increased need for production, with a corresponding rise in debt as mining companies needed to meet the requirements of investors. The 2001 commodity boom then resulted in another spike in the market and allowed mining companies to raise more funds to further increase production.

The decline in all leverage ratios was in line with the economic events in the new millennium. Many mines reached the end of their useful lives and companies began downscaling. This allowed the mining companies the opportunity to extinguish any related loans, decreasing the debt usage within the market. This also allowed for certain companies to ‘start fresh’ and find more innovative methods of improving productivity. The resulting positive market sentiment increased the market value of mining, further reducing the market value related leverage ratios.

When the 2008 financial crisis happened, although investors flocked towards safe-haven assets, especially gold in its purest form, the mining market was not spared. This resulted in a decline in production as manufacture of mining resources declined, causing the market value for all mining companies to drop, as well as a forced reduction in debt raised. The dip in book value leverage ratios in 2011 was as a result of the end of the commodity boom. Mining companies consequently reduced their debt

spending to alleviate pressures of the drop in prices, a significant driver in success of the mining industry.

Figures 20 to 23 below present the frequency of the different leverage ratios under the period examined.

Figure 20: TDBV frequency – metal and mining sample

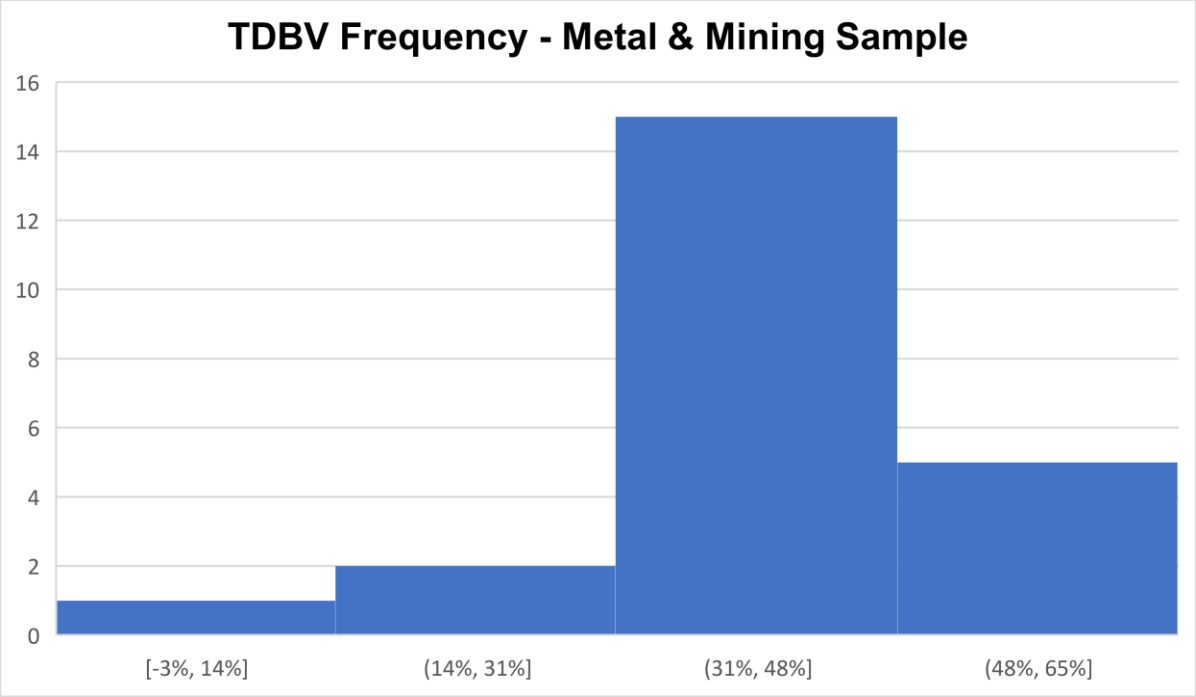


Figure 21: TLBV frequency – metal and mining sample

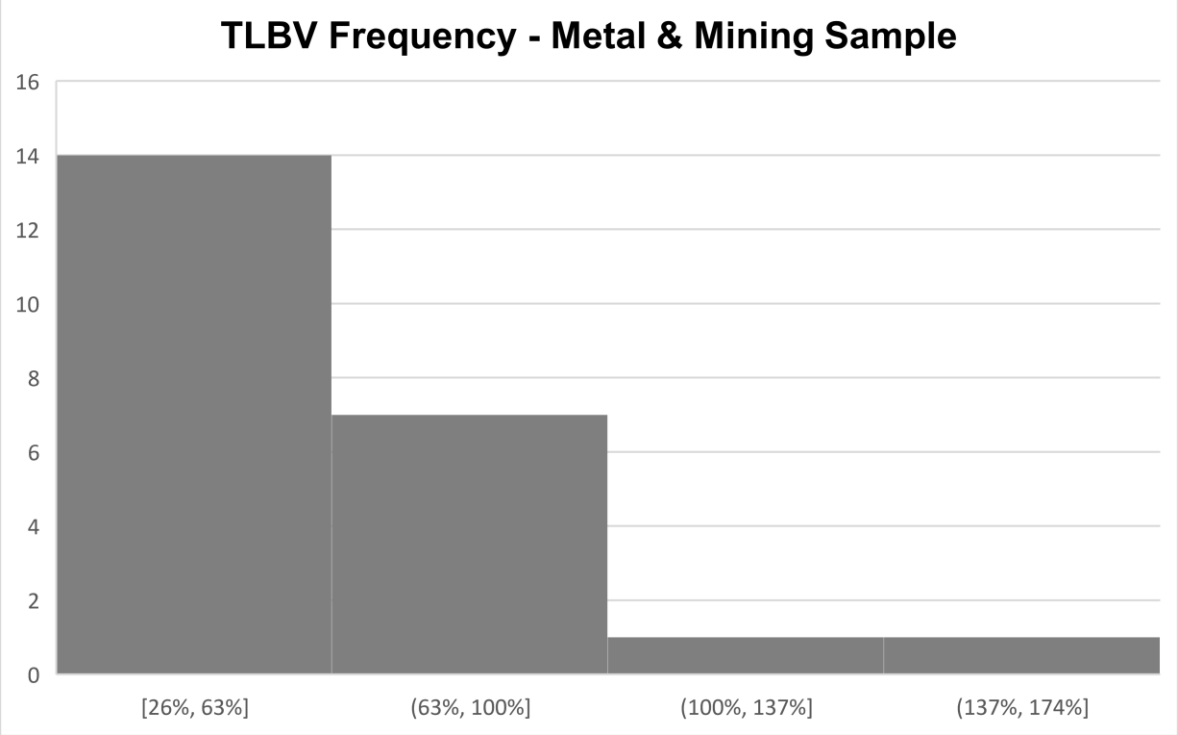


Figure 22: TDMV frequency – metal and mining sample

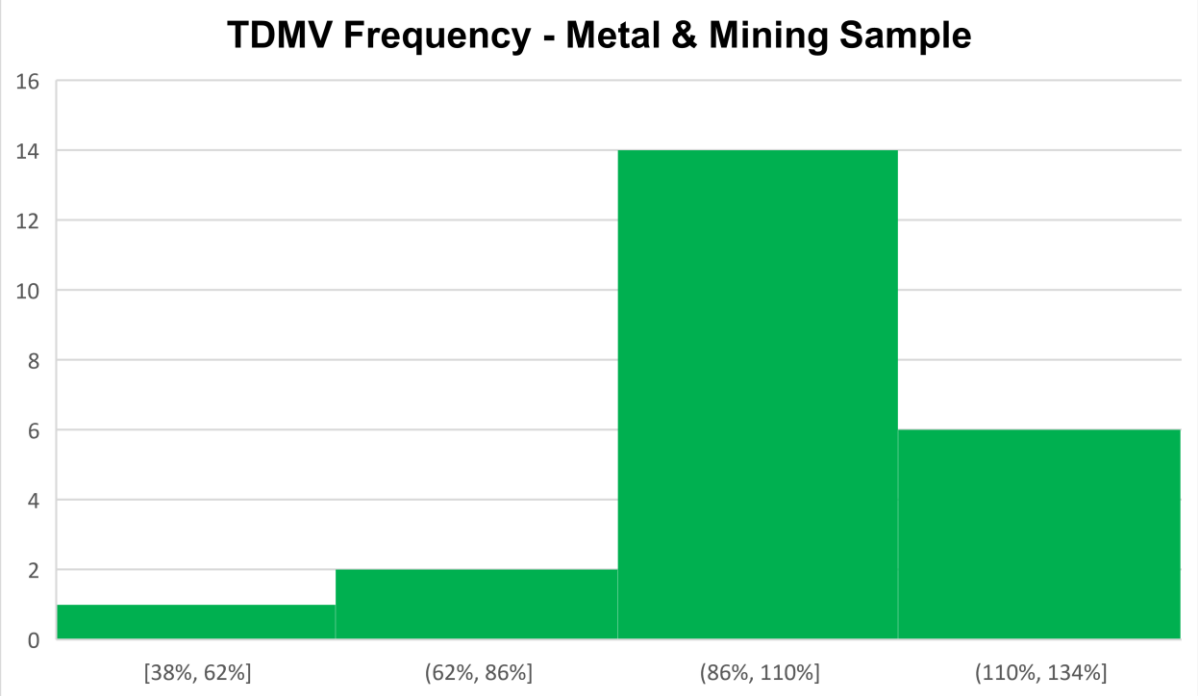
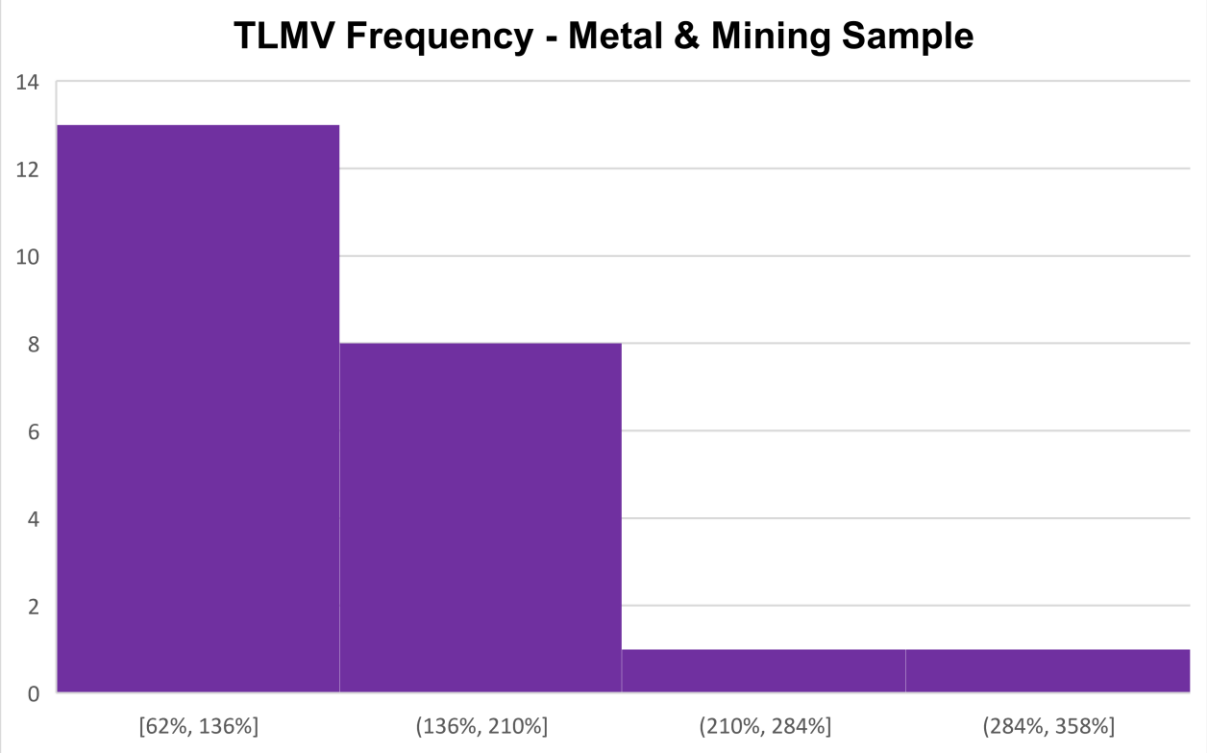


Figure 23: TLMV frequency – metal and mining sample



The above results show the range for both the book and market value leverage ratios, with the book value ratios being more dispersed between the different groupings and having a smaller range to work with. This is consistent with the fact that book value ratios are less volatile as they do not react as much to market fluctuations as the market-related ratios, which have a larger range to work with. In all scenarios, the total interest-bearing debt ratios are significantly higher than the total liability ratios, implying that these companies are using more of their interest-bearing liabilities to fund their activities.

Figure 24: Interest-bearing debt – metal and mining sample

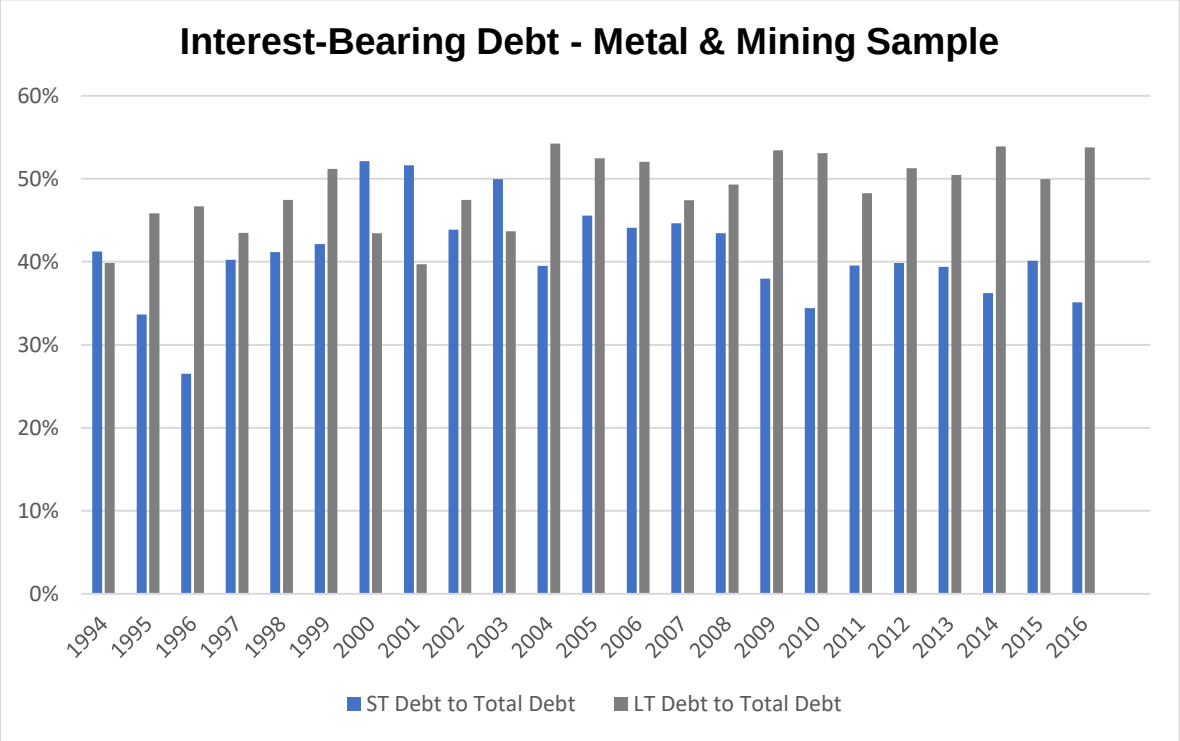
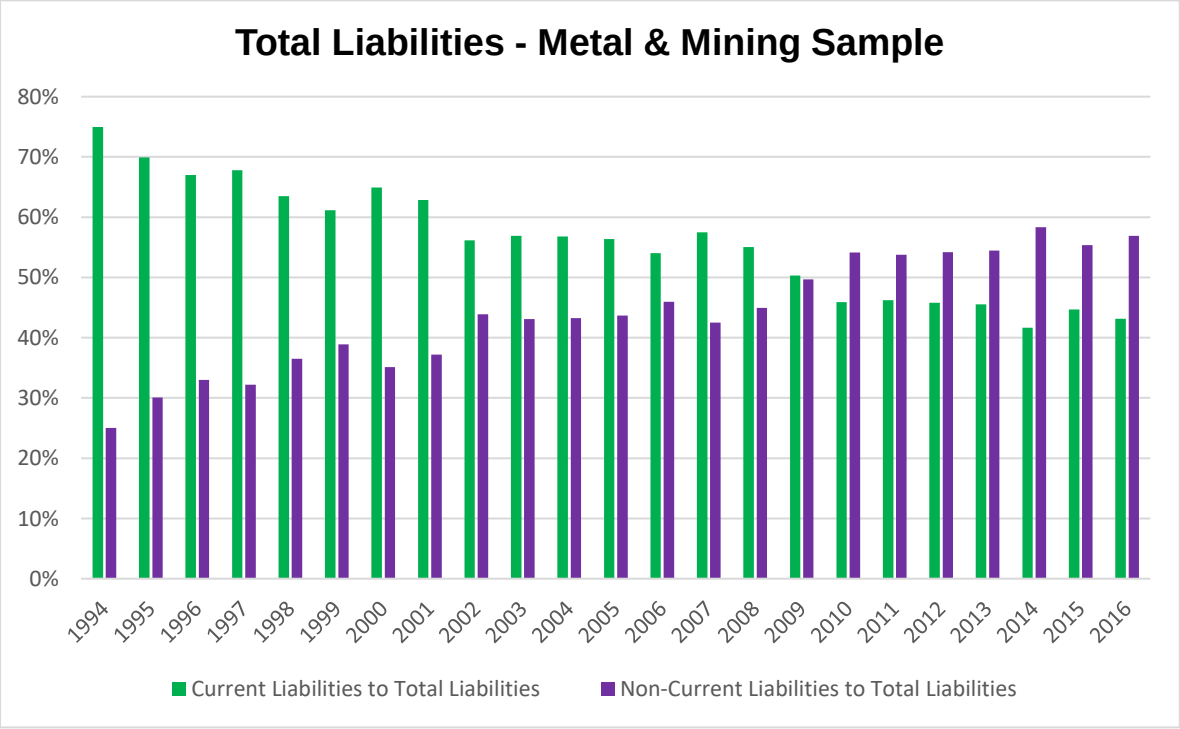


Figure 25: Total liabilities – metal and mining sample



Figures 24 and 25 provide a representation of the preferred term structure of debt. As displayed in these figures, holdings of long-term debt were consistently larger than those of short-term debt, other than for a brief time in 2001 and 2003. Non-current liabilities were also considerably larger than current liabilities. Initially, in 1994, current liabilities were considerably larger than non-current, converging in 1999, with non-current significantly overtaking current from 2007 onwards.

4.3.2 Mining Sample – Correlation and Significant Results

The correlation analysis has been documented in a correlation matrix in Appendix B-2, accompanied by the regression models, separated by each leverage ratio. The results of the correlation and significance analysis are summarised below. Statistical significance has been documented at the 5% and 1% levels.

- Company size (SIZE) was positively correlated to all four leverage ratios. TLBV was found to have a statistically significant relationship with size (p=0.05), and TLMV was found to have a statistically significant relationship with size (p=0.01).
- Tangibility (TANG) was positively correlated to all leverage ratios, with statistically significant relationships found with TDMV and TLMV (p=0.01). These ratios incorporate the market measure of equity and market perception towards tangibility of assets may drive this relationship, as market sentiment appears to conform to the idea that higher tangibility means more collateral available for debt funding. Alternatively, the negative relationship between debt and book value leverage ratios supports the argument that fixed assets have lower information asymmetries and thus have companies rely on equity financing.
- Profitability (PROF) was negatively correlated to TDBV and TLBV, and positively correlated to TDMV and TLMV, with no statistically significant relationships with the leverage ratios. The negative relationship with book value is consistent with the pecking order theory of higher profitability leading to higher retained earnings, which would increase the use of internal financing.

However, the positive correlation with market value implies that the market perception of higher profitability may allow companies to borrow at a lower rate.

- Growth (GROW) was negatively correlated to TDBV and TLBV, and positively correlated to TDMV and TLMV, in addition, a significant correlation existed with TLMV (p=0.01). The negative relationship with the book value leverage ratios supports the theory that higher growth expectations means equity financing would be preferred today, to save the availability of debt financing for future investments into the growth projects. However, the market value leverage ratios follow the theory of higher growth opportunities resulting in more debt being used today for future projects.
- The cost of debt (CORD), as measured by the South African prime interest rate, was positively related to all leverage ratios, with no statistical significance in any ratio.
- Corporate tax rate (TAX) positively related to all leverage ratios. No statistical significance was found in any ratio.

The capital structure determinants showed the greatest statistical significance to TDMV and TLMV, in other words, the capital structure determinants were best able to predict the variability in total debt to market value of equity and total liability to market value of equity. Further, tangibility displayed the highest level of significant correlation to the leverage ratios, while profitability, cost of debt and tax showed no statistical significance with any ratio.

The relationship between leverage and determinants, size, tangibility, TDBV and TLBV of growth, and TDMV and TLMV of profitability, support the trade-off theory. Whereas the negative relationship for TDBV and TLBV between profitability and leverage, and TDMV and TLMV positive correlation between growth and leverage supports the pecking order theory. The relationship between the tax rate and leverage support neither theory. For the total sample, the findings broadly support the trade-off theory.

Appendix B-2 provides a summary of the following, correlation between the four leverage ratios and six capital structure determinants, the regression model for each of the leverage ratios and the descriptive statistics.

4.4 Mining Delisted Sample – Trend Analysis

As discussed in Chapter 2, the metal and mining sector has experienced difficulties from holding approximately a third of the market share in previous years, to 8% in 2016 (Kane-Berman, 2017; Mining Africa, 2017). Although much of this was due to the expansion of the services and manufacturing sectors growing faster than metal and mining, certain companies were not able to withstand the decline in market share, as well as the economic downturns from 1994 to 2016. As shown in Table 7, there were 124 recorded delisted companies within the metal and mining sector which can be split into takeover and losses experienced (i.e. profitability). The remainder of the "other" delisted companies are those that did not have sufficient information to classify them into either "takeover" or "profitability" or were due to JSE regulation contraventions. Due to this study being in relation to leverage ratios, only the delisted due to profitability were analysed, as this was most likely to impact leverage changes. The delisted descriptions were taken from Iress, and with certain delisted companies not having detailed reasoning behind why they delisted, many were listed as "privatised". On examining the historical profits, these companies seemed to have delisted due to profitability, and therefore the study assumed these companies fell under the "profitability" category. This led to 90 companies being categorised as delisted due to profitability.

Due to a lack of available financial information from certain delisted companies, the leverage ratios were only considered for companies with available information, which narrowed the analysis down to 28 companies. With a lack of information for certain companies, the leverage results were skewed and created significant outliers which were removed to ensure the results represented the appropriate trends. Furthermore, this lack of information led to certain companies having available information only up to a year or two before the delisting. This allowed this information to be assumed current and still relevant to this study, with Figure 10 demonstrating the actual delisting years in comparison to the available information in Figures 11 to 24. To further understand the reasons behind the delisting, they can be broken down into four significant periods:

1994 – 1999:

This period saw a surge in delisted companies, with 74 of the 124 delisting, 61 of which were due to profitability. As noted in Chapter 2, the Asian Crisis led to a drastic drop in the gold price, which then dropped the profits of all mining companies. This drop was further impacted with the spike in interest rates which made it difficult for the less profitable companies to keep up with their interest payments. Figure 11 supports this trend with the book value leverage ratios increasing up until 1999, implying that the book value declined (i.e. loss in profitability) or the liabilities grew exponentially. Figure 12 supported this with an increase in the market value leverage ratios – those of which were already extremely low. In the same period, Figure 13 shows a reduction in interest-bearing debt to almost nil – the entirety of which was in long-term debt. This is consistent with the fact that short term debt rose during this period, causing companies to shift to relatively cheaper (or non-interest bearing) debt. Throughout the entire period between 1994 and 2016, the total liabilities were seen to favour current liabilities over non-current, until 2013 where non-current liabilities largely exceeded current liabilities.

2000 – 2005:

In this period, 34 companies delisted, 22 of which were due to profitability. The large number of delisting's in 2000 and 2001 are in line with the delayed impact of the Asian Crisis before they could experience the benefits of the commodity boom that began in 2001. The 2003 and 2004 results are interesting, as the assumed result for this period would be a drop in delisted companies due to the surge in commodity prices from 2001. This is reflected in the mining index prices, as shown in Figure 19. However, there still appeared to be eight delisting's between 2003 and 2004. These delisted companies are considered as an isolated event as there is no market-related explanation.

As noted in Figure 11, the book value leverage ratios declined from 2000 as they recovered from the Asian Crisis, delisting was still experienced during this period, even once the ratios recovered. 2005 stands out as the results from 2005, 2006 and 2007 were included in this year as the latest results. A significant drop in leverage ratios

was found – reflecting a negative book value and in line with the fact that the delisting's were due to profitability issues.

2006 – 2010:

This period saw only five delisted companies, four of which were due to profitability and occurred before the 2008 financial crisis. With many investors flocking to safe haven assets, including gold, the mining companies would have been able to withstand the 2008 financial crisis. This is in line with the lack of delisting's during the period.

2011 – 2016:

The remainder of the delisted companies were between 2011 and 2016, with 11 delisting, only three of which were related to profitability. As the commodity boom ended in 2011, these three companies fell victim to the drop in commodity prices, which led to their demise in 2013 and 2016.

Table 6: Reason for delisting

Reason for Delisting	
Profit	90
Takeover	8
Other	26
Total	124

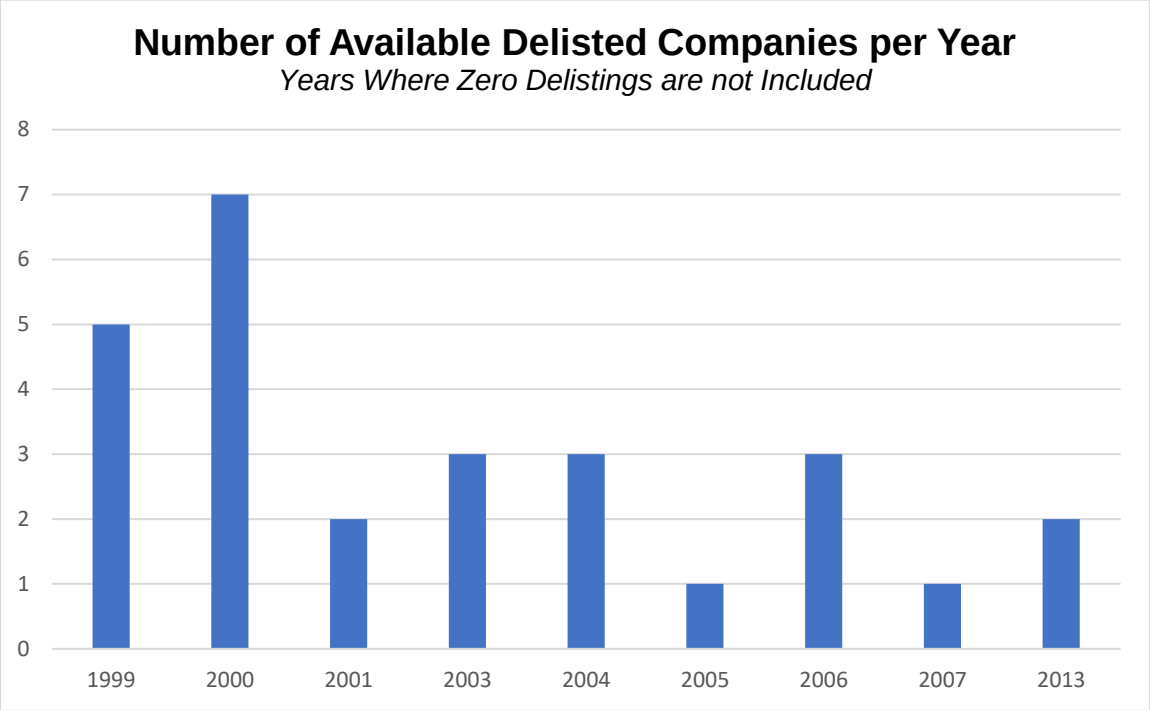
Table 7: Number of delisted metal and mining companies between 1994 and 2016

Year	Number of delisted metal & mining companies between 1994 and 2016 *Years Where Zero Delistings are not Included*
1994	5
1995	6
1996	14
1997	14
1998	20
1999	15
2000	10
2001	7
2002	4
2003	9
2004	3
2005	1
2006	3
2007	2
2008	0
2009	0
2010	0
2011	0
2012	0
2013	3
2014	3
2015	1
2016	4
Total	124

Table 8: Number of delisted companies due to profitability between 1994 and 2016

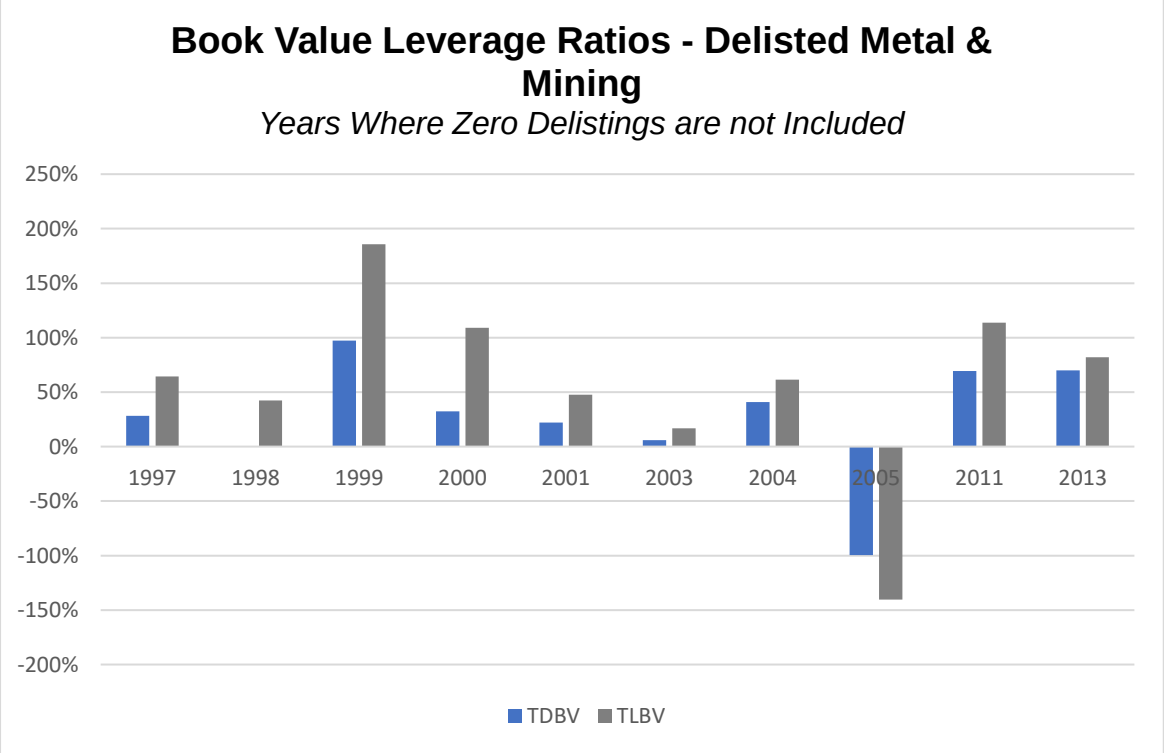
Year	Number of delisted companies due to profitability between 1994 and 2016 *Years Where Zero Delistings are not Included*
1994	3
1995	4
1996	12
1997	14
1998	17
1999	11
2000	8
2001	4
2002	1
2003	5
2004	3
2005	1
2006	3
2007	1
2008	0
2009	0
2010	0
2011	0
2012	0
2013	2
2014	0
2015	0
2016	1
Total	90

Figure 26: Number of available delisted companies per year



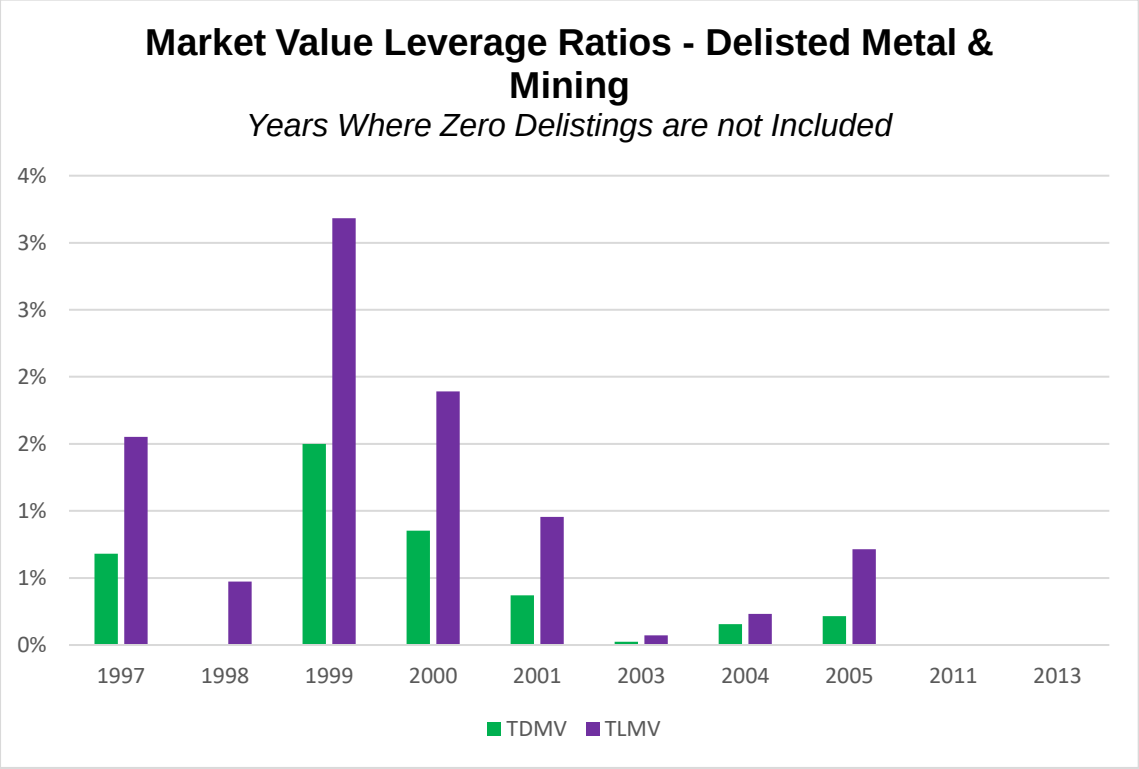
(Refer to page 75 for availability of data)

Figure 27: Book value leverage ratios – delisted metal and mining



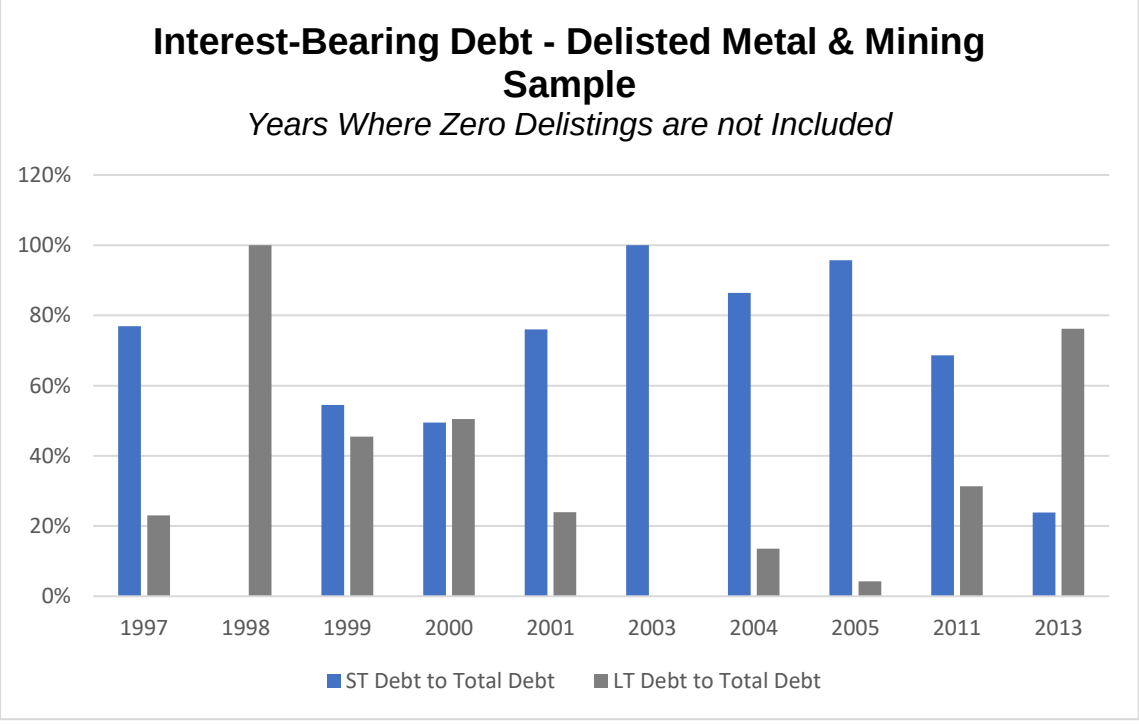
(Refer to page 75 for availability of data)

Figure 28: Market value leverage ratios – delisted metal and mining



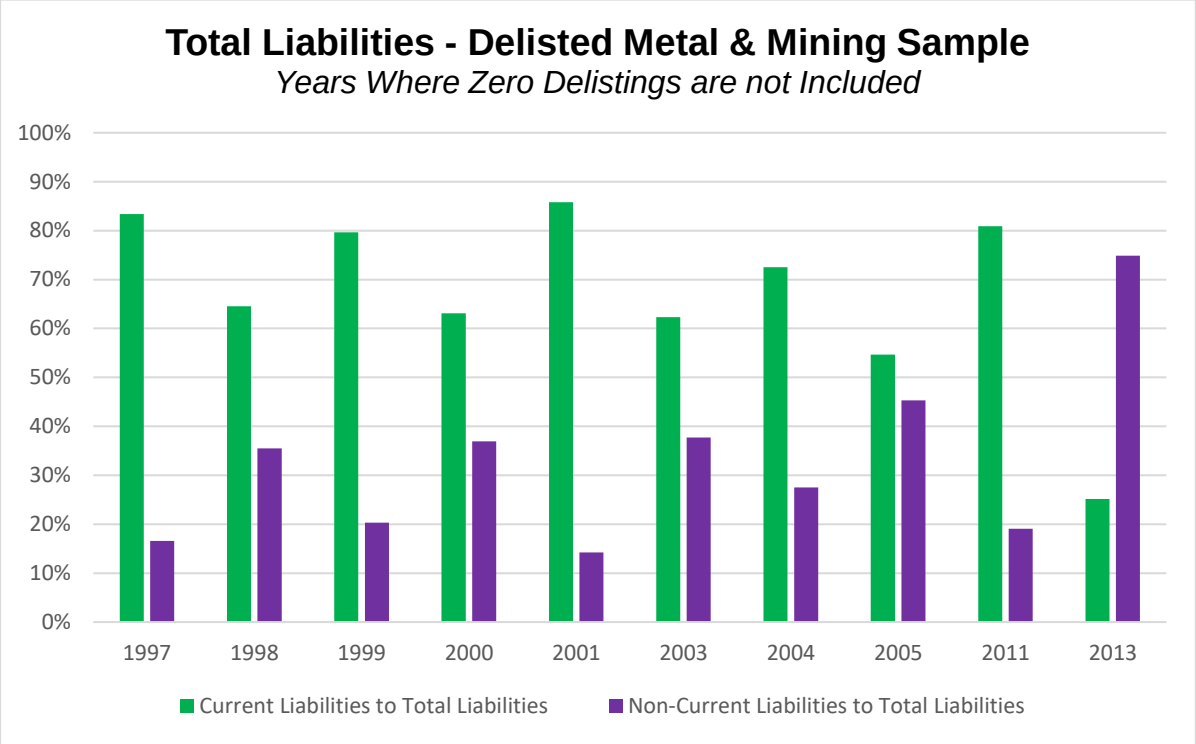
(Refer to page 75 for availability of data)

Figure 29: Interest-bearing debt – delisted metal and mining sample



(Refer to page 75 for availability of data)

Figure 30: Total liabilities – delisted metal and mining sample



(Refer to page 75 for availability of data)

Observation on Debt Structure of Delisted Companies

This period shows that, in the different years, each company had a variation of debt structures, but were these structures appropriate for the events taking place in those years?

If this is broken down into the same yearly brackets as above, many of the companies in the 1994 to 1999 period favoured short term debt, with the exception of 1998 where debt was almost non-existent for those delisted companies. Since short term interest rates spiked, one could assume that the companies that continued to finance their debt through short-term financing could no longer afford the higher price of debt during the spike accompanied by the Asian Crisis. At the same time for each of these years, current liabilities outweighed non-current.

In 2000 to 2005, the companies that delisted appeared to use an exorbitant amount of short-term financing. This period should have seen more borrowing as companies

attempted to expand to keep up with demand. Perhaps it was the choice of borrowing that created the profitability pressures as short term debt continued to be a popular choice in borrowing. In comparison to the companies that continued to list during this period, that had a healthy mix of both short- and long-term debt.

Moving on to 2011 to 2016 (the next available information), while the world was recovering from the financial crisis of 2008, as well as the end of the commodity boom, 2011 results continued the pattern from prior years. After which 2013 delisted companies switched over to an increased use of long-term debt, as well as non-current liabilities. This choice of debt structure was more in line with the listed companies during this period. This made it possible that these companies (which delisted in 2016), simply fell victim to the drop in commodity prices, and were not necessarily linked to the debt structure choices.

Although this trend has been noted, further analysis of these results would be beyond the scope of this dissertation.

Chapter 5: Conclusion

The purpose of this paper was to determine whether changes in South Africa between 1994 and 2016 resulted in a change in the capital structure of corporates. The paper also incorporates the impact that capital structure determinants have on the capital structure and the ability to predict the changes in the leverage of these companies.

The study investigated a total of 81 companies listed on the JSE from the later part of 1994 to the listing date in 2016. This sample was spread across non-metal and mining (39) and metal and mining markets (42). The study then looked at delisted companies (124 during the period) that were separated into “takeover”, “profitability”, and “other”, with “other” including unknown reasons or regulatory issues. Profitability delisting’s included all companies that delisted due to profitability pressures. The total number of profitability companies that delisted with available information was 23. This work forms part of a larger study with other sectors being covered by different authors.

There were four leverage measures used in the study, total debt to book value of equity, total liabilities to book value of equity, total debt to market value of equity and total liabilities to market value of equity. The capital structure determinants included company size, asset tangibility, profitability, growth, the cost of debt and the corporate tax rate.

South Africa has survived through many global economic downturns during this period, namely the end of the Apartheid regime in 1994, the Asian Crisis in 1997-1998, the 2008 Financial Crisis, and the end of the commodity boom in 2011. With the assistance of BESA, the large decline in long-term interest rates, and the international capital market access post-Apartheid, there has been a significant increase in the use of debt from 1994 to 2016. The cost of lending declined drastically from 18.3% in 1998 to c.8.3% from 2010 to 2016, leading to borrowing becoming a more attractive option to corporates.

The analysis of the results confirmed the belief that the South African structural changes would increase the appeal, as well as inclination for South African corporates to increase their use of debt. This is more evident in larger companies, as the results

show that debt has a positive relationship to company size, and the bigger the company, the higher the debt.

The analysis in the study also revealed that companies moved towards longer-term debt over the years, as well as to non-current liabilities over current liabilities. This indicates that companies made use of a greater amount of long-term debt relative to total debt. This was apparent for the total sample and the mining sector.

The analysis of the capital determinants on leverage yielded the following results

- **Company Size:** this showed a positive relationship towards TDBV and TDMV for the non-metal and mining sample and a negative relationship with TLBV and TLMV. All ratios were statistically significant, with TDBV at the 0.05 level, and the remaining at the 0.01 level. Company size and leverage for the mining sector were found to be positively correlated, with statistically significant relationships with TLBV (p=0.05) and TLMV (p=0.01). Larger companies, on average, utilise larger amounts of debt in their capital structure. This is consistent with trade-off theory, as larger companies have increased diversification and thus lower chances of bankruptcy. This finding is consistent with the majority of studies reviewed in this paper, including Titman and Wessels (1988), Song (2005), Fan, Titman and Twite (2010), Evengy (2017), Slabbert (2018) and Philogene (2019). The above results indicate that the total sample is in support of the trade-off theory.

- **Asset Tangibility:** this showed a positive relationship with all leverage ratios for the non-metal and mining sample, with a statistically significant TDBV at the 0.01 level. Whereas the mining sector showed a positive relationship with all leverage ratios but found that only TDMV and TLMV has a statistically significant relationship (p=0.01). This positive relationship is consistent with the trade-off theory, which is supported by the majority of studies reviewed in this paper, including Titman and Wessels (1988), Rajan et al. (1995), Song (2005), and Fan, Titman and Twite (2010).

- **Profitability:** this was negatively correlated to all leverage ratios within the non-metal and mining sample other than TDMV, with a statistically significant relationship TLBV and TLMV (p=0.01). This follows the theory that with higher profitability, the corresponding retained earnings will increase, and as per the pecking order theory, this internal financing is prioritised over any external debt financing. This is consistent with the majority of previous studies, including Rajan et al. (1995), Song (2005), Fan, Titman and Twite (2010) and Evgeny (2017). Alternatively, in the metal and mining sector, profitability was positively correlated to only TDBV and TDMV, while TLBV and TLMV were found to be negatively correlated. There was no statistical significance with any ratio. The argument for the positive relationship with market value implies that the market perception of higher profitability may allow companies to borrow at a lower rate. This is consistent with previous studies, mainly Titman and Wessels (1988).

- **Growth:** the non-metal and mining sample displayed a negative relationship to TLBV and TLMV and a positive relationship to TDBV and TDMV. A statistically significant relationship was found with TLMV (p=0.01). Growth was negatively correlated with TDBV and TLBV ratios within the metal and mining sector but positively correlated with TDMV and TLMV, with a statistically significant relationship with TLMV (p=0.01). The negative relationship is consistent with the theory that, if a company is expecting to use more financing as the company grows, it will hold off on any debt financing today. This is consistent with previous research, including Titman and Wessels (1988) and Evgeny (2017). Positive findings are supported by the pecking order theory, indicating that companies with higher growth opportunities have greater financing needs, therefore utilising more debt. This is consistent with peer-related studies, Slabbert (2018) and Philogene (2019).

- **Cost of Debt:** this is positively related to all leverage ratios, with no statistical significance in any ratio for the non-metal and mining sample. For the metal and mining sector, it was found that all ratios are positively related to all leverage ratios. Interestingly, this is not consistent with any prior studies but is likely in line with the theory that higher cost of debt results in higher tax benefits.

- **Corporate Tax Rate:** this is negatively correlated to TDBV and positively correlated to the remainder of the leverage ratios. No statistical significance was found in any ratio. However, within the mining sector, it is positively related to all ratios.

The delisting sample focused purely on trend analysis. The patterns identified between the number of delisted companies in the metal and mining sector due to profitability issues and the economic events during the periods 1994-1999, 2000-2005, 2006-2010 and 2011-2016. The results showed that the largest number of delisting's was experienced during the Asian Crisis and the rise in interest rates between 1994 and 1999. The results also indicated that the companies that used more short-term debt in relation to long-term debt were more likely to require delisting due to profitability issues.

An area for further study would be to investigate the leverage ratios before, during and after the 2008 financial crisis. When measured using market value leverage ratios, capital structures during the equity collapse of this period would be significantly different. Managers hoping to stabilise these ratios would require a decrease in leverage ratios within their capital structure. This could include a rights issue with an issue of shares at a favourable price to the issuing company. The result would be a relief over the leverage ratios as equity increased, which would assist in the funding available through equity, which could assist in reducing debt. This further study could research how much leverage was reduced by during and after the financial crisis for the listed companies to survive.

An additional area for future research relates to page 82, where a trend was found between the debt structures and delisting within the metal and mining sector. The current results show that there was extensive use of short-term debt until 2010 which was then significantly overtaken by long-term debt between 2011 and 2016. These results were opposite to the successful mining companies that were still listed during the period of observation. It would be interesting to analyse the underlying reasons behind the debt structure trends and delisting of companies.

To conclude this study, it was found that the results offer support for the capital structure theories. Additionally, the findings show that South African companies have increased the amount of debt usage due to the increase in debt finance availability. This was also driven by lifting the sanctions against South African companies and the founding of the Bond market (BESA), further increasing the accessibility to capital and decreasing the cost of debt.

References

Abor, J. (2005). *The effect of capital structure on profitability : an empirical analysis of listed firms in Ghana*. 438–445. https://doi.org/10.1108/15265940510633505

Altman, E.I. & Hotchkiss, E. (2006). Corporate financial distress and bankruptcy: predict and avoid bankruptcy, analyze and invest in distress debt. *New York: John Wiley*, *3*.

Amadeo, K. (2019). Gold Price History from 30 B.C. to Today. Retrieved September 26, 2019, from The Balance website: https://www.thebalance.com/gold-price-history-3305646

Analytics, G. (2000). *A Perspective on the South African Mining Industry in the 21st Century*. (August).

Antin, D. (2013). *December 2013 Economy Report South Africa The South African Mining Sector : An Industry at a Crossroads*. (December), 1–22.

Baxter, R. (2008). The global economic crisis and its impact on South Africa and the country's mining industry. Retrieved May 27, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Lists/News and Publications/Attachments/51/Roger+Baxter.pdf

Blignaut J, Inglesi-Lotz. R, W. J. (2015). Sectoral electricity elasticities in South. Africa: Before and after the supply crisis of 2008. *African Journal of Science*, *111*(9–10).

Cassim, R. J. (2014). *THE VALUE OF FINANCIAL RATIO ANALYSIS IN PREDICTING THE FAILURE OF JSE LISTED COMPANIES the degree in Accountancy at the of the North-West University*. (November).

Charitou, A., Neophytou, E. & Charalambous, C. (2004). Predicting corporate failure: empirical evidence for the UK. *European Accounting Review*, *13*(3), 465–497.

Chibba, S. (2019). A history of mining in South Africa. Retrieved June 23, 2019, from South Africa website: https://www.southafrica.net/za/en/travel/article/a-history-of-mining-in-south-africa

Correia, C., Flynn, D., Uliana, E., and Wormald, M. (2011). Financial Management, 7th edition. In *Juta & Company* (7th ed.).

Deloitte. (2017). An overview of electricity consumption and pricing in South Africa An analysis of the historical trends and policies , key issues and outlook in 2017. *Eskom Holdings*, (February).

Editor. (2018). The Impact of Mining on the South African Economy and Living Standards. Retrieved February 23, 2020, from The Federation for a Sustainable Environment website: http://fse.org.za/index.php/item/593-the-impact-of-mining-on-the-south-african-economy-and-living-standards

Fan, J. P. ., Titman, S., & Twite, G. (2010). An International Comparison of Capital Structure and Debt Maturity Choices. *National Bureau of Economic Research*, *67*(6), 14–21.

Fosu, S. (2013). Capital structure, product market competition and firm performance: Evidence from South Africa. *The Quarterly Review of Economics and Finance*, *53*(2), 140–151.

Hovakimian A., Opler T., T. S. (2001). The Debt-Equity Choice. *Journal of Financial and Quantitative Analysis*, *36*, 1–24.

Ilyukhin, E. V. (2017). The Determinants of Capital Structure : Evidence from Russia. *Journal of Corporate Finance Research*, *14*(4), 54–69.

Jensen, M., & Meckling, W. (1976). Theory of the firm: Managerial behaviour, agency costs and ownership. *Strategic Management Journal*, *21*(4), 1215–1224. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=12243301&site=ehost-live

JSE. (2019). Debt Market. Retrieved May 28, 2019, from Johannesburg Stock Exchange website: https://www.jse.co.za/trade/debt-market

Kane-Berman, J. (2017). Mining in SA: Then, now, and into the future - IRR. Retrieved June 23, 2019, from Politics Web website: https://www.politicsweb.co.za/documents/mining-in-sa-then-now-and-into-the-future--irr

Karadeniz, E., Kandir, S.K., Balcilar, M., and Onal, Y. B. (2009). Determinants of capital structure: evidence from Turkish lodging companies. *International Journal of Contemporary Hospitality Management*, *21*(5), 594 – 609.

Kearney, L. (2012). Mining and minerals in South Africa. Retrieved June 23, 2019, from Brand South Africa website: https://www.brandsouthafrica.com/investments-immigration/business/economy/mining-and-minerals-in-south-africa

Kganyago, L. (2016). Governers Address to the Shareholders of the South African Reserve Bank at the ninety-sixth annual Ordinary General Meeting (AGM). Retrieved May 27, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Lists/Speeches/Attachments/474/Governor's Address AGM 2016.pdf

Lane, A., Guzek, J., & van Antwerpen, W. (2015). Tough choices facing the South African mining industry. *Journal of the Southern African Institute of Mining and Metallurgy*, *116*(6).

Llewellyn, D. (2014). *Financial innovation and a new economics of banking : Lessons from the financial crisis Reserve Bank Challenges for Monetary Policy-makers in Emerging Markets Challenges for Monetary Policy-makers in Emerging Markets South African Reserve Bank Conference* .

Marcus, G. (2010). Address by Governer Gill Marcus. Retrieved May 27, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Lists/Speeches/Attachments/61/address by governor gill marcus.pdf

Marcus, G. (2013). Ninety-Third annual Ordinary General Meeting (AGM). Retrieved May 28, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Lists/Speeches/Attachments/378/Governor's Address (93rd) - 2013-07-26.pdf

Mboweni, T. (2006). Deepening Capital Markets: The Case of South Africa. Retrieved May 26, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Lists/Speeches/Attachments/124/IMF-capital+markets-%0A7+nov06a.pdf

McNitt, L. (2012). A new type of colonialism? Retrieved June 30, 2019, from AgWeb website: www.agweb.com

Mining Africa. (2017). South African Mining – Unity in Diversity. Retrieved June 23, 2019, from Mining Africa website: https://www.miningafrica.net/mining-countries-africa/south-africa/

Mining for Schools. (2019). Brief history of gold mining in South Africa. Retrieved June 23, 2019, from Minerals Council website: https://www.miningforschools.co.za/lets-explore/gold/brief-history-of-gold-mining-in-sa

Modigliani, F. & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, *48(3)*(3), 261–297.

Mohammad, S., & Hamze, A. (2013). *Determinants of Capital Structure : UK Panel Data*. (July).

Myers, S. C. (1984). The Capital Structure Puzzle. *Journal of Finance*, *39*(3), 574–592.

Myers, S., & Majluf, N. (1984). Corporate Financing and Investment Decisions When Firms Have Information. *National Bureau of Economic Research*.

Neingo, P. N., & Tholana, T. (2016). Trends in productivity in the South African gold mining industry. *Journal of the Southern African Institute of Mining and Metallurgy*, *116*(3).

News24. (2014). SA's Recession: how did we get into this mess?

Philogene, B. R. (2019). *Change in Corporate debt levels in South Africa from 1994 to 2016*. (2019), 1–140.

Rajan, R. G., Brien, O., Diamond, D., Fama, E., Kaplan, S., Kashyap, A., & Miller, M. (1994). *Working Paper Seris What Do We Know About Capital Structures ? some Evidence From International Data*.

Reuters. (2014). UPDATE 2-Protracted platinum strike pushes South Africa towards recession.

Robinson, I. (2016). *The globalization of the South African mining industry*. 769–775.

S.J., K. (2009). The Capital Structure Practices of Listed Firms in South Africa. *University of South Africa*, *1*(1).

Shapiro, D. (2016). A big sell-off in commodity prices: David Shapiro – Sasfin. Retrieved February 22, 2020, from Moneyweb website: https://www.moneyweb.co.za/moneyweb-radio/safm-market-update/a-big-sell-off-in-commodity-prices-david-shapiro-sasfin/

Slabbert, G. R. (2018). *Change in Corporate debt levels in South Africa from 1994 to 2016 By*. (February), 1–122.

Smith, A. (1776). An Inquiry into the Nature and Causes of the Wealth of Nations. Reprint. *New York: Random House (Modern Library)*, *1937*.

Smith, G. P. (2010). What are the Capital Structure Determinants for Tax-Exempt Organisations? *The Financial Review*, *45*, 845 – 872.

Song, H.-S. (2005). *Capital structure determinants: An empirical study in Taiwan*. *5*(25). https://doi.org/10.5897/ajbm10.1334

South African Markets Insight. (2019). South Africa's mining industry in 2018. Retrieved June 23, 2019, from South African Markets Insight website: https://www.southafricanmi.com/sa-mining-2018-18feb2019.html

Stals, C. L. (1994). Governor's Address (74th) - 1994-08-23. Retrieved May 25, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Publications/Speeches/Detail-Item-View/Pages/Default.aspx?sarbweb=3b6aa07d-92ab-441f-b7bf-bb7dfb1bedb4&sarblist=a01d874c-c3f6-4b93-a9dc-c984cf8652cf&sarbitem=12

Stals, C. L. (1995). Governor's Address (75th) - 1995-08-23. Retrieved May 27, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Publications/Speeches/Detail-Item-View/Pages/Default.aspx?sarbweb=3b6aa07d-92ab-441f-b7bf-bb7dfb1bedb4&sarblist=a01d874c-c3f6-4b93-a9dc-c984cf8652cf&sarbitem=16

Stals, C. L. (1996). Governor's Address (76th) - 1996-08-27. Retrieved May 27, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Publications/Speeches/Detail-Item-

View/Pages/Default.aspx?sarbweb=3b6aa07d-92ab-441f-b7bf-bb7dfb1bedb4&sarblist=a01d874c-c3f6-4b93-a9dc-c984cf8652cf&sarbitem=15

Stals, C. L. (1997). Governor's Address (77th) - 1997-08-26. Retrieved May 27, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Publications/Speeches/Detail-Item-View/Pages/Default.aspx?sarbweb=3b6aa07d-92ab-441f-b7bf-bb7dfb1bedb4&sarblist=a01d874c-c3f6-4b93-a9dc-c984cf8652cf&sarbitem=13

Stals, C. L. (1999). Governor's Address (79th) - 1999-08-24. Retrieved May 27, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Publications/Speeches/Detail-Item-View/Pages/Default.aspx?sarbweb=3b6aa07d-92ab-441f-b7bf-bb7dfb1bedb4&sarblist=a01d874c-c3f6-4b93-a9dc-c984cf8652cf&sarbitem=17

Stals, C. L. (2000). Governor's Address (80th) - 2000-08-29. Retrieved May 27, 2019, from South African Reserve Bank website: https://www.resbank.co.za/Publications/Speeches/Detail-Item-View/Pages/Default.aspx?sarbweb=3b6aa07d-92ab-441f-b7bf-bb7dfb1bedb4&sarblist=a01d874c-c3f6-4b93-a9dc-c984cf8652cf&sarbitem=179

Stats SA. (2017). Mining: a brief history. Retrieved June 23, 2019, from Stats SA website: http://www.statssa.gov.za/?p=9720

Titman, S., & Wessels, R. (1988). The Determinants of Capital Structure Choice. *The Journal of Finance*, *XLIII*(1), 1–19.

Tong, G. & Green, C. J. (2005). No TitlePecking order or trade-off hypothesis? Evidence on the capital structure of Chinese companies. *Applied Economics*, *37*(19), 2179–2189.

Xhaferi, S., & Xhaferi, B. (2015). Alternative Theories of Capital Structure. *European Scientific Journal*, *11*(7), 327–343.

Zeitun, R., & Tian, G. G. (2007). *Does ownership affect a firm ' s performance and default risk in Jordan ? 7*, 66–82.

Appendices

Appendix A - 1: Sample of listed stocks: non- metal and mining

Share Name	JSE Ticker	Industry
York Timber Holdings Limited	YRK	Forestry & Paper
Astrapak Limited	APK	General Industrials
Hosken Consolidated Investments Ltd	HCI	General Industrials
AP Industrial Holdings Limited	KAP	General Industrials
Mpact Limited	MPT	General Industrials
Nampak Limited	NPK	General Industrials
Reunert Limited	RLO	General Industrials
Transpaco Limited	TPC	General Industrials
E Media Holdings Limited	EMH	Personal Goods
Imbalie Beauty Limited	ILE	Personal Goods
Accentuate Limited	ACE	Chemicals
AECI Limited	AFE	Chemicals
African Oxygen Limited	AFX	Chemicals
Bowler Metcalf Limited	BCF	Chemicals
Omnia Holdings Limited	OMN	Chemicals
Rolfes Holdings Limited	RLF	Chemicals
Spanjaard Limited	SPA	Chemicals
Bell Equipment Limited	BEL	Industrial Engineering
Howden Africa Holdings Limited	HWN	Industrial Engineering
PSV Holdings Limited	PSV	Industrial Engineering
Erin Energy Corporation	ERN	Oil & Gas Producers
Exxaro Resources Limited	EXX	Oil & Gas Producers
Keaton Energy Holdings Limited	KEH	Oil & Gas Producers
Oando Plc	OAO	Oil & Gas Producers
Buildmax Limited	BDM	Oil Equipment, Services & Distribution
Alaris Holdings Limited	ALH	Aerospace & Defense
Metair Investments Limited	MTA	Automobiles & Parts
Capevin Holdings Limited	CVH	Beverages
Distell Group Limited	DST	Beverages
Sabmiller Plc	SAB	Beverages
Sappi Limited	SAP	Forestry & Paper
The Bidvest Group Limited	BVT	General Industrials
Winhold Limited	WNH	General Industrials
Sasol Limited	SOL	Oil & Gas Producers
Compagnie Financiere Richemont SA	CFR	Personal Goods
Mondi Limited	MND	Forestry & Paper
Mondi Plc	MNP	General Industrials
Efora Energy Limited	EEL	Oil & Gas Producers
Steinhoff International Holdings NV	SNH	Personal Goods

Appendix A – 2: Sample of metal and mining listed stocks

Share Name	JSE Ticker	Industry
African Rainbow Minerals Limited	ARI	Industrial Metals & Mining
Andulela Investment Holdings Limited	AND	Industrial Metals & Mining
Arcelormittal South Africa Limited	ACL	Industrial Metals & Mining
BSI Steel Limited	BSS	Industrial Metals & Mining
Chrometco Limited	CMO	Industrial Metals & Mining
Eastern Platinum Limited	EPS	Industrial Metals & Mining
Hulamin Limited	HLM	Industrial Metals & Mining
Jubilee Platinum Plc	JBL	Industrial Metals & Mining
Lonmin Plc	LON	Industrial Metals & Mining
Master Drilling Group Ltd	MDI	Industrial Metals & Mining
Merafe Resources Limited	MRF	Industrial Metals & Mining
Pan African Resources Plc	PAN	Industrial Metals & Mining
Petmin Limited	PET	Industrial Metals & Mining
Rockwell Diamonds Incorporated	RDI	Industrial Metals & Mining
Tawana Resources NL	TAW	Industrial Metals & Mining
Cargo Carriers Limited	CRG	Industrial Metals & Mining
Grindrod Limited	GND	Industrial Metals & Mining
Onelogix Group Limited	OLG	Industrial Metals & Mining
Santova Limited	SNV	Industrial Metals & Mining
Trencor Limited	TRE	Industrial Metals & Mining
Anglogold Ashanti Limited	ANG	Mining
Atlatsa Resources Corporation	ATL	Mining
Bauba Platinum Limited	BAU	Mining
Buffalo Coal Corp	BUC	Mining
Central Rand Gold Limited	CRD	Mining
DRDGOLD Limited	DRD	Mining
Harmony Gold Mining Company	HAR	Mining
Kibo Mining Plc	KBO	Mining
Northam Platinum Limited	NHM	Mining
Oakbay Resources And Energy	ORL	Mining
Randgold & Exploration Company	RNG	Mining
Royal Bafokeng Platinum Limited	RBP	Mining
Sibanye Gold Limited	SGL	Mining
Tharisa Plc	THA	Mining
Trans Hex Group Limited	TSX	Mining
Wesizwe Platinum Limited	WEZ	Mining
Hwange Colliery Company Limited	HWA	Mining
Resource Generation Limited	RSG	Mining
Assore Limited	ASR	Industrial Metals & Mining
BHP Billiton Plc	BIL	Industrial Metals & Mining
Anglo American Platinium Limited	AMS	Mining
Anglo American Plc	AGL	Mining
Gold Fields Limited	GFI	Mining
Impala Platinum Holdings Limited	IMP	Mining
Kumba Iron Ore Limited	KIO	Industrial Metals & Mining
Glencore Plc	GLN	Mining

Appendix A – 3: Sample of metal and mining delisted stocks

Share Name	Ticker
South African Coal Mining Hldgs Ltd	SAH
Delrand Resources Limited	DRN
Pamodzi Gold Limited	PZG
Aquarius Platinum Limited	AQP
Metmar Limited	MML
Infrasors Holdings Limited	IRA
Palabora Mining Company Limited	PAM
Witwatersrand Cons Gold Resources	WGR
Gold One International Limited	GDO
First Uranium Corporation	FUU
Uranium One Inc	UUU
Thabex Limited	TBX
Barplats Investments Limited	BPL
Western Areas Limited	WAR
Concor Limited	CNC
Gencor Limited	GMF
Assmang Limited	ASG
Mathomo Group Limited	MTO
Messina Limited	MES
Aflease Gold And Uranium Resources	AFL
Eersteling Gold Mining Company Ld	ESL
Avgold Limited	AVG
Southern Mining Corporation Limited	SMC
Free State Dev & Investment Corp Ld	FRE
Barnato Exploration Limited	BNX
African Rainbow Minerals Gold Ltd	AOD
Otr Mining Limited	OTR
Union Mines Limited	UNN
Thebe Financial Services Limited	TBE
Accord Technologies Limited	ACR
Century Carbon Mining Ltd	CNY
President Steyn Gold Mines Limited	PGD
Jci Gold Limited	JCG
Noble Minerals Limited	NBL
Fe Squared Holdings Limited	FEQ
The Griqualand Exploration And Finance Company Ltd	GEF
Lonmin Plc	LON
Clyde Industrial Corporation Limited	CLY
Consolidated African Mines Limited	CAMO
Kroondal Platinum Mines Limited	KPM
De Beers Consolidated Mines Ltd/Centenary Depositary Ag	DBR

Vogelstruisbult Metal Holdings Limited	VOG
Anglo American Properties Limited	ARO
Gold Fields Of South Africa Limited	GFS
East Rand Proprietary Mines Limited	ERA
Scharrighuisen Holdings Limited	SCG
Mhangura Copper Mines Limited	MCM
Tweefontein United Collieries Limited	TWE
Randfontein Estates Limited	RFN
Duiker Mining Limited	DUK
Witwatersrand Gold Mining Company Limited	WKN
Ocean Diamond Mining Holdings Limited	ODM
Gem Diamond Mining Corporation Limited	GEM
Fraser Alexander Limited	ALR
Metkor Group Limited	MTK
St. Helena Gold Mines Limited	STH
Maranda Mines Limited	MAR
Bateman Industrial Corporation Limited	BTR
Kalahari Goldridge Mining Company Limited	KGL
West Rand Consolidated Mines Limited	WRC
Anglovaal Industrial Holdings Limited	AIH
Anglovaal Insurance Holdings Limited	AVN
Gold Fields Namibia Limited	GNM
Amalia Gold Mining And Exploration Company Limited	AML
Anglo American Gold Investment Company Limited	AMG
Anglo American Investment Trust Limited	AIT
Minorco Societe Anonyme	MNR
Gold Fields Limited.	GFL
Anglo American Industrial Corporation Limited	AMI
Haggie Limited	HAG
Anglo American Coal Corporation Limited	AMC
Avmin Limited	AVM
P.G.M Investments Limited	PGM
Gazankulu Gold Holdings Limited	GAZ
Knights Gold Mining Co. Limited	KNT
Primrose Gold Mines Limited	PRG
The Northfields Gold Mine Limited	NRF
Anglovaal Holdings Limited	AVH
Trans-Natal Coal Corporation Limited	TNC
Evander Gold Mines Limited	EVR
Eastvaal Gold Holdings Limited	ESV
East Rand Gold And Uranium Company Limited	ERG
Elandsrand Gold Mining Company Limited	ELA
Free State Consolidated Gold Mines Limited	FRG

H.J. Joel Gold Mining Company Limited	JOE
Southvaal Holdings Limited	SVL
Western Deep Levels Limited	WDL
Lindum Reefs Gold Mining Company Limited	LDM
Beatrix Mines Limited	BET
Kloof Gold Mining Company Limited	KLO
Oryx Gold Holdings Limited	ORX
Carrig Diamonds Limited	CAR
Deelkraal Gold Mining Company Limited	DLK
Blyvooruitzicht Gold Mining Company Limited	BLY
Buffelsfontein Gold Mines Limited	BUF
Anglo American Platinum Corporation Limited	APS
Consolidated Mining Corporation Limited	CSM
Lebowa Platinum Mines Limited	LPT
Potgietersrust Platinums Limited	PRS
Rand Mines Limited	RDM
Consolidated Modderfontein Mines Limited	MDR
The Grootvlei Proprietary Mines Limited	GVL
Lydenburg Exploration Limited	LDX
Messina Investments Limited	MVT
Anglo-Transvaal Collieries Limited	AVC
Eastern Transvaal Consolidated Mines Limited	ETC
Hartebeestfontein Gold Mining Company Limited	HBN
Loraine Gold Mines Limited	LOR
West Witwatersrand Gold Holdings Limited	WSW
Bracken Mines Limited	BRA
Leslie Gold Mines Limited	LES
Winkelhaak Mines Limited	WIN
South East Rand Gold Holdings Limited	STG
Unisel Gold Mines Limited	UNL
Zandpan Gold Mining Company Limited	ZAN
Lydenburg Platinum Limited	LYD
Southern Platreef Mining Company Limited	SLT
South Roodepoort Main Reef Areas Limited	SRO
Rhombus Vanadium Holdings Limited	RHV
Knights Gold Mining Company Limited	KNH
Doornfontein Gold Mining Company Limited	DOR
Rex Mining Corporation Limited	RXC
Rand Leases (Vogelstruisfontein) Gold Mining Co Ltd	RLS
Revere Resources Sa Limited	RVR
South Deep Exploration Company Limited	SDE
Vlakfontein Gold Mining Company Limited	VLA
Quagga Holdings Limited	QUA

Orange Free State Investments Limited	OSL
Welkom Gold Holdings Limited	WEL
Digoco Mining Limited	DGC

Appendix B - 1: Correlation and regression results: non-metal and mining sample

Table 9: Correlation between dependent variable and determinants for non-metal and mining sample

Correlation - non-metal & mining sample										
	TDBV	*TDMV*	*TLBV*	*TLMV*	*SIZE*	*TANG*	*PROF*	*GROW*	*TAX*	*CORD*
TDBV	1.00	0.32	0.87	0.23	0.11	0.18	-0.03	0.06	-0.02	0.00
TDMV	0.32	1.00	0.27	0.94	-0.01	0.05	-0.22	-0.04	0.04	0.05
TLBV	0.87	0.27	1.00	0.28	0.11	0.04	0.02	0.03	0.03	0.04
TLMV	0.23	0.94	0.28	1.00	-0.01	0.00	-0.16	-0.08	0.08	0.09
SIZE	0.11	-0.01	0.11	-0.01	1.00	0.18	0.28	0.77	-0.21	-0.20
TANG	0.18	0.05	0.04	0.00	0.18	1.00	0.02	0.11	0.10	0.08
PROF	-0.03	-0.22	0.02	-0.16	0.28	0.02	1.00	0.16	0.06	0.09
GROW	0.06	-0.04	0.03	-0.08	0.77	0.11	0.16	1.00	-0.28	-0.26
TAX	-0.02	0.04	0.03	0.08	-0.21	0.10	0.06	-0.28	1.00	0.74
CORD	0.00	0.05	0.04	0.09	-0.20	0.08	0.09	-0.26	0.74	1.00

Table 10: Regression results - TDBV

(a) Dependent Variable: TDBV

(b) Predictors: (constant), SIZE, TANG, PROF, GROW, CORD, TAX

Regression Statistics	
Multiple R	0.2114
R Square	0.0447
Adjusted R Square	0.0363
Standard Error	0.7076
Observations	693

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	16.0698	2.6783	5.3491	0.0000
Residual	686	343.4844	0.5007		
Total	692	359.5542			

Model	*Unstandardised coefficients*		*t Stat*	*P-value*
	B	*Std. Error*		
TDBV (constant)	0.5450	0.5064	1.0763	0.2822
SIZE	0.0685	0.0314	2.1812	0.0295
TANG	0.6268	0.1458	4.2992	0.0000
PROF	-0.2817	0.1841	-1.5299	0.1265
GROW	-0.0339	0.0410	-0.8285	0.4077
TAX	-1.9318	1.7882	-1.0803	0.2804
CORD	0.9585	1.0161	0.9433	0.3458

Table 11: Regression results - TLBV

(a) Dependent Variable: TLBV

(b) Predictors: (constant), SIZE, TANG, PROF, GROW, CORD, TAX

Regression Statistics	
Multiple R	0.1193
R Square	0.0142
Adjusted R Square	0.0099
Standard Error	6.3963
Observations	1374.0000

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	807.0286	134.5048	3.2876	0.0032
Residual	1367	55927.6189	40.9127		
Total	1373	56734.6475			

Model	*Unstandardised coefficients*		*t Stat*	*P-value*
	B	*Std. Error*		
TLBV (constant)	0.3347	0.8736	0.3831	0.7018
SIZE	0.1415	0.0542	2.6105	0.0092
TANG	0.2119	0.2515	0.8422	0.4000
PROF	-2.0876	0.3177	-6.5707	0.0000
GROW	-0.1291	0.0707	-1.8265	0.0682
TAX	0.0836	3.0854	0.0271	0.9784
CORD	2.2597	1.7531	1.2890	0.1978

Table 12: Regression results - TDMV

(a) Dependent Variable: TDMV

(b) Predictors: (constant), SIZE, TANG, PROF, GROW, CORD, TAX

Regression Statistics	
Multiple R	0.1457
R Square	0.0212
Adjusted R Square	0.0127
Standard Error	1.3208
Observations	693

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	25.9671	4.3278	2.4809	0.0221
Residual	686	1196.6935	1.7445		
Total	692	1222.6606			

Model	*Unstandardised coefficients*		*t Stat*	*P-value*
	B	*Std. Error*		
TDMV (constant)	0.5465	0.9451	0.5782	0.5633
SIZE	0.2003	0.0586	3.4153	0.0007
TANG	0.1045	0.2721	0.3840	0.7011
PROF	-0.1750	0.3437	-0.5090	0.6109
GROW	-0.1469	0.0765	-1.9207	0.0552
TAX	0.4204	3.3378	0.1260	0.8998
CORD	1.4443	1.8966	0.7615	0.4466

Table 13: Regression results - TLMV

(a) Dependent Variable: TLMV

(b) Predictors: (constant), SIZE, TANG, PROF, GROW, CORD, TAX

Regression Statistics	
Multiple R	0.2305
R Square	0.0531
Adjusted R Square	0.0448
Standard Error	2.7099
Observations	693

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	282.5641	47.0940	6.4132	0.0000
Residual	686	5037.5001	7.3433		
Total	692	5320.0641			

Model	*Unstandardised coefficients*		*t Stat*	*P-value*
	B	*Std. Error*		
TLMV (constant)	0.6031	1.9392	0.3110	0.7559
SIZE	0.4078	0.1203	3.3894	0.0007
TANG	-0.3868	0.5583	-0.6928	0.4887
PROF	-3.5772	0.7052	-5.0726	0.0000
GROW	-0.4567	0.1569	-2.9103	0.0037
TAX	2.8869	6.8483	0.4215	0.6735
CORD	6.0961	3.8912	1.5666	0.1177

Table 14: Descriptive statistics – non-metal and mining sample

Descriptive statistics – non-metal and mining sample						
	N	Average	Min	Max	Std Dev	Range
TDBV	23	47.96%	24.69%	72.98%	11.15%	48.29%
TDMV	23	61.63%	37.02%	138.42%	22.73%	101.41%
TLBV	23	119.97%	91.62%	165.03%	17.84%	73.41%
TLMV	23	151.08%	90.96%	282.45%	50.63%	191.49%
SIZE	23	620.30%	551.47%	657.33%	37.22%	105.86%
TANG	23	31.92%	27.79%	35.57%	2.50%	7.78%
PROF	23	8.79%	0.46%	15.57%	3.80%	15.10%
GROW	23	629.84%	574.06%	683.67%	36.24%	109.61%
TAX	23	29.96%	28.00%	35.00%	2.51%	7.00%
CORD	23	13.32%	8.50%	23.00%	4.17%	14.50%

Appendix B - 2: Correlation and Regression Results: Metal and Mining Sample

Table 15: Correlation between dependent variable and determinants for metal and mining sample

Correlation - mining sample										
	TDBV	TDMV	TLBV	TLMV	SIZE	TANG	PROF	GROW	TAX	CORD
TDBV	1.00	0.11	0.96	0.10	0.06	0.06	0.00	0.03	0.00	0.02
TDMV	0.11	1.00	0.10	0.92	0.04	0.27	-0.02	-0.04	0.04	0.03
TLBV	0.96	0.10	1.00	0.11	0.08	0.03	0.01	0.03	0.00	0.02
TLMV	0.10	0.92	0.11	1.00	0.04	0.24	-0.01	-0.10	0.09	0.05
SIZE	0.06	0.04	0.08	0.04	1.00	0.21	0.21	0.69	0.02	0.02
TANG	0.06	0.27	0.03	0.24	0.21	1.00	0.03	0.13	0.02	0.01
PROF	0.00	-0.02	0.01	-0.01	0.21	0.03	1.00	0.15	0.06	0.04
GROW	0.03	-0.04	0.03	-0.10	0.69	0.13	0.15	1.00	-0.22	-0.19
TAX	0.00	0.04	0.00	0.09	0.02	0.02	0.06	-0.22	1.00	0.74
CORD	0.02	0.03	0.02	0.05	0.02	0.01	0.04	-0.19	0.74	1.00

Table 16: Regression results - TDBV

(a) Dependent Variable: TDBV

(b) Predictors: (constant), SIZE, TANG, PROF, GROW, CORD, TAX

Regression statistics	
Multiple R	0.0866
R Square	0.0075
Adjusted R Square	-0.0016
Standard Error	1.8392
Observations	662

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	16.7304	2.7884	0.8243	0.5512
Residual	655	2215.6337	3.3826		
Total	661	2232.3640			

Model	Unstandardised coefficients		*t Stat*	*P-value*
	B	*Std. Error*		
TDBV (constant)	0.8194	1.4366	0.5703	0.5686
SIZE	0.0626	0.0486	1.2877	0.1983
TANG	0.3756	0.2953	1.2722	0.2038
PROF	-0.0333	0.1009	-0.3302	0.7414
GROW	-0.0460	0.1013	-0.4541	0.6499
TAX	-2.5777	4.9921	-0.5164	0.6058
CORD	1.5701	2.8056	0.5596	0.5759

Table 17: Regression results - TLBV

(a) Dependent Variable: TLBV

(b) Predictors: (constant), SIZE, TANG, PROF, GROW, CORD, TAX

Regression statistics	
Multiple R	0.0885
R Square	0.0078
Adjusted R Square	-0.0012
Standard Error	2.6767
Observations	662

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	37.0863	6.1810	0.8627	0.5220
Residual	655	4692.7249	7.1645		
Total	661	4729.8112			

Model	Unstandardised coefficients		*t Stat*	*P-value*
	B	*Std. Error*		
TLBV (constant)	1.9014	2.0908	0.9094	0.3635
SIZE	0.1414	0.0708	1.9970	0.0462
TANG	0.0964	0.4297	0.2243	0.8226
PROF	-0.0092	0.1468	-0.0628	0.9500
GROW	-0.1416	0.1474	-0.9611	0.3369
TAX	-3.8831	7.2651	-0.5345	0.5932
CORD	1.8774	4.0831	0.4598	0.6458

Table 18: Regression results - TDMV

(a) Dependent Variable: TDMV

(b) Predictors: (constant), SIZE, TANG, PROF, GROW, CORD, TAX

Regression statistics	
Multiple R	0.2830
R Square	0.0801
Adjusted R square	0.0717
Standard error	1.6717
Observations	662

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	159.4219	26.5703	9.5077	0.0000
Residual	655	1830.4719	2.7946		
Total	661	1989.8938			

Model	Unstandardised coefficients		*t Stat*	*P-value*
	B	*Std. Error*		
TDMV (constant)	0.5741	1.3058	0.4397	0.6603
SIZE	0.0470	0.0442	1.0625	0.2884
TANG	1.9012	0.2684	7.0836	0.0000
PROF	-0.0568	0.0917	-0.6190	0.5361
GROW	-0.1760	0.0920	-1.9120	0.0563
TAX	2.0411	4.5375	0.4498	0.6530
CORD	-0.7223	2.5501	-0.2832	0.7771

Table 19: Regression results - TLMV

(a) Dependent Variable: TLMV

(b) Predictors: (constant), SIZE, TANG, PROF, GROW, CORD, TAX

Regression statistics	
Multiple R	0.2992
R Square	0.0895
Adjusted R Square	0.0812
Standard Error	2.7472
Observations	662

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	486.2060	81.0343	10.7370	0.0000
Residual	655	4943.3972	7.5472		
Total	661	5429.6032			

Model	Unstandardised coefficients		*t Stat*	*P-value*
	B	*Std. Error*		
TLMV (constant)	1.3151	2.1459	0.6128	0.5402
SIZE	0.1920	0.0727	2.6420	0.0084
TANG	2.8024	0.4411	6.3538	0.0000
PROF	-0.0527	0.1507	-0.3496	0.7268
GROW	-0.6109	0.1513	-4.0389	0.0001
TAX	9.1721	7.4566	1.2301	0.2191
CORD	-4.0317	4.1907	-0.9620	0.3364

Table 20: Descriptive statistics – non-metal and mining sample

Detailed Statistics - Delisted Mining						
	N	Average	Min	Max	Std Dev	Range
TDBV	22	59.28%	-158.39%	771.41%	174.04%	929.80%
TDMV	22	107.57%	0.16%	525.38%	151.46%	525.22%
TLBV	22	148.84%	-201.88%	821.39%	262.15%	1023.27%
TLMV	22	530.05%	16.55%	3798.70%	1020.07%	3782.15%
SIZE	22	376.30%	310.99%	477.37%	47.28%	166.38%
TANG	22	12.63%	7.07%	20.84%	3.84%	13.77%
PROF	22	-216.18%	-3864.33%	10.79%	822.47%	3875.12%
GROW	22	568.31%	500.42%	637.38%	28.74%	136.96%
TAX	22	30.05%	28.00%	35.00%	2.54%	7.00%
CORD	22	13.44%	8.50%	23.00%	4.22%	14.50%

Appendix C – 1: Summary of consolidation and significant results

Non-metal and mining sample	TDBV	TLBV	TDMV	TLMV
SIZE	Positive *(0.05)*	Negative *(0.01)*	Positive *(0.01)*	Negative *(0.01)*
TANG	Positive *(0.01)*	Positive	Positive	Positive
PROF	Negative	Negative *(0.01)*	Positive	Negative *(0.01)*
GROW	Positive	Negative	Positive	Negative *(0.01)*
CORD	Positive	Positive	Positive	Positive
TAX	Negative	Positive	Positive	Positive

Metal and mining sample	TDBV	TLBV	TDMV	TLMV
SIZE	Positive	Positive *(0.05)*	Positive	Positive *(0.01)*
TANG	Positive	Positive	Positive *(0.01)*	Positive *(0.01)*
PROF	Positive	Negative	Positive	Negative
GROW	Positive	Negative	Positive	Negative *(0.01)*
CORD	Positive	Positive	Positive	Positive
TAX	Positive	Positive	Positive	Positive

Appendix D: Non-metal and mining sample results

Year	TDBV	TDMV	TLBV	TLMV	SIZE	TANG	PROF	GROW	TAX	CORD	ST Debt to TD	LT Debt to TD	CL to TL	NCL to TL
1994	25%	89%	111%	231%	566%	36%	0%	577%	35%	16%	51%	44%	75%	25%
1995	57%	66%	146%	174%	551%	34%	13%	574%	35%	19%	41%	54%	66%	34%
1996	43%	43%	124%	140%	558%	35%	12%	581%	35%	20%	37%	50%	70%	30%
1997	46%	60%	124%	164%	581%	35%	13%	589%	35%	19%	47%	49%	71%	29%
1998	44%	66%	110%	178%	563%	33%	11%	592%	30%	23%	47%	49%	68%	32%
1999	42%	75%	110%	201%	575%	35%	7%	599%	30%	16%	48%	48%	71%	29%
2000	48%	87%	115%	209%	594%	34%	10%	600%	30%	15%	53%	43%	73%	27%
2001	60%	138%	135%	282%	600%	35%	8%	602%	30%	13%	57%	39%	73%	27%
2002	43%	77%	116%	202%	626%	33%	11%	618%	30%	17%	51%	41%	70%	30%
2003	47%	54%	115%	149%	630%	32%	7%	617%	30%	12%	51%	45%	68%	32%
2004	40%	60%	115%	165%	628%	33%	11%	620%	30%	11%	40%	56%	67%	33%
2005	44%	37%	112%	97%	636%	32%	14%	624%	29%	11%	46%	54%	66%	34%
2006	73%	44%	165%	99%	653%	31%	16%	645%	29%	12%	48%	52%	62%	38%
2007	69%	37%	145%	91%	657%	32%	12%	651%	29%	14%	49%	51%	65%	35%
2008	56%	62%	136%	142%	637%	28%	10%	650%	28%	15%	47%	51%	62%	38%
2009	53%	67%	119%	143%	652%	30%	4%	653%	28%	11%	42%	52%	60%	40%
2010	42%	41%	103%	97%	653%	31%	5%	652%	28%	9%	41%	56%	60%	40%
2011	39%	43%	100%	98%	657%	30%	8%	659%	28%	9%	47%	47%	61%	39%
2012	46%	61%	106%	116%	647%	29%	10%	666%	28%	9%	46%	51%	59%	41%
2013	42%	41%	100%	94%	650%	29%	9%	672%	28%	9%	44%	51%	58%	42%
2014	66%	47%	144%	102%	643%	30%	5%	680%	28%	9%	38%	55%	51%	49%
2015	40%	49%	116%	135%	652%	28%	3%	684%	28%	10%	44%	48%	54%	46%
2016	38%	72%	92%	165%	656%	28%	5%	683%	28%	11%	41%	51%	55%	45%
Average	48%	62%	120%	151%	620%	32%	9%	630%	30%	13%	46%	49%	65%	35%
Min	25%	37%	92%	91%	551%	28%	0%	574%	28%	9%	37%	39%	51%	25%
Max	73%	138%	165%	282%	657%	36%	16%	684%	35%	23%	57%	56%	75%	49%
Std Dev	11%	23%	18%	51%	37%	2%	4%	36%	3%	4%	5%	5%	7%	7%
Range	48%	101%	73%	191%	106%	8%	15%	110%	7%	15%	20%	17%	24%	24%

Appendix E: Metal and mining sample results

Year	TDBV	TDMV	TLBV	TLMV	SIZE	TANG	PROF	GROW	TAX	CORD	ST Debt to TD	LT Debt to TD	CL to TL	NCL to TL
1994	17%	219%	48%	426%	570%	24%	10%	596%	35%	16%	31%	36%	75%	25%
1995	14%	18%	51%	197%	582%	29%	8%	604%	35%	19%	24%	35%	75%	25%
1996	18%	23%	54%	57%	583%	21%	7%	605%	35%	20%	13%	43%	63%	37%
1997	19%	59%	56%	114%	602%	24%	10%	617%	35%	19%	32%	37%	63%	37%
1998	26%	98%	63%	186%	600%	24%	8%	630%	30%	23%	34%	45%	57%	43%
1999	34%	95%	77%	153%	580%	19%	6%	629%	30%	16%	34%	56%	49%	51%
2000	44%	114%	102%	185%	599%	19%	4%	641%	30%	15%	52%	43%	54%	46%
2001	44%	71%	108%	137%	611%	23%	12%	650%	30%	13%	45%	40%	49%	51%
2002	51%	64%	112%	110%	638%	23%	12%	658%	30%	17%	35%	55%	38%	62%
2003	60%	45%	136%	92%	627%	18%	76%	647%	30%	12%	48%	42%	43%	57%
2004	54%	28%	124%	61%	630%	20%	10%	654%	30%	11%	39%	51%	44%	56%
2005	43%	23%	95%	50%	594%	20%	7%	646%	29%	11%	45%	51%	44%	56%
2006	49%	21%	98%	42%	567%	16%	-7%	652%	29%	12%	40%	52%	45%	55%
2007	59%	13%	112%	33%	532%	21%	-10%	652%	29%	14%	40%	44%	50%	50%
2008	-1%	25%	37%	54%	559%	22%	12%	666%	28%	15%	40%	48%	48%	52%
2009	42%	42%	87%	88%	569%	25%	-2%	665%	28%	11%	33%	55%	40%	60%
2010	40%	30%	82%	68%	578%	22%	3%	670%	28%	9%	27%	50%	32%	68%
2011	-45%	47%	-23%	87%	574%	23%	5%	672%	28%	9%	32%	49%	31%	69%
2012	37%	65%	74%	121%	590%	22%	1%	682%	28%	9%	34%	51%	34%	66%
2013	32%	59%	71%	128%	601%	23%	-4%	686%	28%	9%	35%	50%	34%	66%
2014	37%	57%	73%	119%	591%	21%	-1%	688%	28%	9%	35%	53%	33%	67%
2015	38%	122%	77%	226%	589%	22%	-27%	687%	28%	10%	37%	51%	36%	64%
2016	53%	87%	108%	157%	606%	23%	-2%	686%	28%	11%	29%	57%	32%	68%
Average	33%	62%	79%	126%	590%	22%	6%	651%	30%	13%	35%	48%	47%	53%
Min	-45%	13%	-23%	33%	532%	16%	-27%	596%	28%	9%	13%	35%	31%	25%
Max	60%	219%	136%	426%	638%	29%	76%	688%	35%	23%	52%	57%	75%	69%
Std Dev	23%	46%	34%	85%	24%	3%	18%	28%	3%	4%	8%	7%	13%	13%
Range	105%	206%	159%	393%	106%	13%	104%	92%	7%	15%	39%	22%	44%	44%

Appendix F - 1: Metal and mining delisted sample results – 1994 to 1999

Year	TDBV	TDMV	TLBV	TLMV	SIZE	TANG	PROF	GROW	ST Debt to TD	LT Debt to TD	CL to TL	NCL to TL
1997	28%	64%	1%	2%	626%	34%	9%	607%	77%	23%	83%	17%
1998	0%	42%	0%	0%	555%	3%	-265%	528%	0%	100%	65%	35%
1999	97%	186%	1%	3%	565%	17%	21%	536%	54%	46%	80%	20%
Average	42%	97%	1%	2%	582%	18%	-78%	557%	44%	56%	76%	24%
Min	0%	42%	0%	0%	555%	3%	-265%	528%	0%	23%	65%	17%
Max	97%	186%	1%	3%	626%	34%	21%	607%	77%	100%	83%	35%
Std Dev	50%	77%	1%	1%	39%	16%	162%	44%	40%	40%	10%	10%
Range	97%	143%	1%	3%	71%	31%	286%	79%	77%	77%	19%	19%

Appendix F - 2: Metal and mining delisted sample results – 2000 to 2005

Year	TDBV	TDMV	TLBV	TLMV	SIZE	TANG	PROF	GROW	ST Debt to TD	LT Debt to TD	CL to TL	NCL to TL
2000	32%	109%	1%	2%	549%	24%	13%	558%	49%	51%	63%	37%
2001	22%	48%	0%	1%	447%	5%	-2%	532%	76%	24%	86%	14%
2003	6%	17%	0%	0%	600%	24%	3%	642%	100%	0%	62%	38%
2004	41%	61%	0%	0%	421%	30%	-21%	553%	86%	14%	72%	28%
2005	-100%	-140%	0%	1%	594%	14%	-1%	610%	96%	4%	55%	45%
Average	0%	19%	0%	1%	522%	19%	-2%	579%	82%	18%	68%	32%
Min	-100%	-140%	0%	0%	421%	5%	-21%	532%	49%	0%	55%	14%
Max	41%	109%	1%	2%	600%	30%	13%	642%	100%	51%	86%	45%
Std Dev	57%	95%	0%	1%	84%	10%	12%	46%	20%	20%	12%	12%
Range	141%	249%	1%	2%	179%	25%	34%	110%	51%	51%	31%	31%

Appendix F - 3: Metal and mining delisted sample results – 2006 to 2010

No available information

Appendix F - 4: Metal and mining delisted sample results – 2011 to 2016

Year	TDBV	TDMV	TLBV	TLMV	SIZE	TANG	PROF	GROW	ST Debt to TD	LT Debt to TD	CL to TL	NCL to TL
2011	69%	114%			261%	11%	-19%	428%	69%	31%	81%	19%
2013	70%	82%			657%	1%	-2%	742%	24%	76%	25%	75%
Average	70%	98%			459%	6%	-10%	585%	46%	54%	53%	47%
Min	-100%	-140%			39%	3%	-265%	44%	0%	0%	10%	10%
Max	70%	114%			657%	11%	-2%	742%	69%	76%	81%	75%
Std Dev	1%	22%			280%	7%	12%	222%	32%	32%	39%	39%
Range	170%	254%			619%	9%	263%	698%	69%	76%	71%	65%