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**TITLE**

The impact of capital structure on firm performance: Evidence from South African mining sector

**ABSTRACT**

Capital structure has been an area of interest by many researchers since the Modigliani and Miller (M&M) (1958) proposition which states that in a world of perfect capital markets and no taxes, a firm's financial structure will not influence the cost of capital. This paper investigates the impact of capital structure on firm performance by investigating various financial performance proxies on small to medium capitalization mining firms listed on the Johannesburg Stock Exchange (JSE).

This paper analyses the impact of capital structure on firm performance by investigating 10 small to medium capitalized mining companies listed on the JSE over a period of 10 years. The study defines small to medium capitalized mining companies, as companies that have a market capitalization of less than R25 billion. This study examines this relationship through return on equity, return on assets and the price earnings ratio.

This study found that there appeared to be a significant negative relationship between capital structure and return on equity, whereas there appears to be an insignificant relationship with the return on assets and price earnings ratio.

**1. INTRODUCTION**

This paper will investigate the impact of capital structure on firm performance by investigating various financial performance proxies on small to medium capitalization (hereafter, small to mid-cap) mining companies listed on the JSE over a 10-year period

(2002-2011). The study defines small to medium cap as firms that have a market capitalization of less than R25 billion.

South Africa is a world leader in mining and is famous for its abundance of mineral resources, accounting for a significant proportion of world production and reserves, and South African mining companies are key players in the global industry (Baxter 2011).

It is however observed that finance managers use different combinations of debt and equity to finance business operations and this is widely known as capital structure. The mining industry's contribution is of great significance in the country for example, it creates one million jobs (500 000 direct and 500 000 indirect) (Baxter 2011). Additionally, the industry accounts for about 18% of GDP (8.6% direct, 10% indirect and induced). Baxter (2011) also states that the mining industry is a critical earner of foreign exchange at more than 50%. The industry accounts for 20% of investment (12% direct), it also attracts significant foreign savings (R1.9-trillion or 43% of value of JSE).

Capital structure has been an area of interest by many researchers since the Modigliani and Miller (M&M) (1958) proposition which states that in a world of perfect capital markets and no taxes, a firm's financial structure will not influence the cost of capital. This area has been investigated by multiple authors; however there is little research on the small cap mining industry in the South African context. This paper therefore seeks to analyze the impact of capital structure on the performance of small cap mining firms listed on the JSE. More specifically the present study proposes to analyze the impact of capital structure on firm performance by investigating 10 small to medium capitalization mining firms listed on the JSE over a period of 10 years. The study defines small to medium cap as firms that have a market capitalization of less than R25 billion.

The limitations of the study is that the sample is from different sectors of the mining industry which are affected by different structures and risks specifically for that specific business sector for example gold, platinum, copper and general mining. In addition a sample of 10 mining firms is not a fair representation of listed small to mid-cap mining firms. Utilizing ratios for the study also provide additional complexity because some accounting indicators are subject to manipulation hence use of actual financial data from the company financial statements could produce different results. Furthermore, other variable should be considered as control variables, such as business risk or age of the firms.

## **2. LITERATURE REVIEW**

This section is divided into two main parts, namely review of seminal literature and review of related literature. The review on seminal literature describes four finance theories and the review of related literature describes certain scenarios of how capital structure has an influence on firm performance.

### **2.1 REVIEW OF SEMINAL LITERATURE**

When managers attempt to maximize the value of a firm, a part of this process should lead to achieving an optimal capital structure. Capital structure represents the proportion in which various long-term capital components (debt and equity) are employed. Over the years these decisions have been recognized as one of the most important decisions that a firm has to take into account. This is because of the fact that capital structure affects the cost of capital, net profit margin, earnings per share, dividend payout ratio and the liquidity position of the firm (Dhankar & Boora 1996). These variables coupled with a number of other factors determine the value of the firm, hence capital structure is a vital determinant of firm performance

The relationship of the capital structure decisions with the firm performance was investigated and explained through a number of theories mainly the Modigliani and Miller irrelevancy theory, pecking order theory, trade off theory, and the agency theory.

### 2.1.1 The Capital Structure Irrelevancy Theory

Modigliani and Miller (1958) presented the so called irrelevance theory which states that the way in which a firm finances its assets (through a mix of debt and equity) is irrelevant when determining the value of a firm when the firm operates in perfect capital markets as defined by them. A perfect capital market is one where:

- The shares of different firms are homogenous and are therefore perfect substitutes for one another;
- All shares are traded under perfect market conditions;
- Investors are in agreement about the expected future for all shares; and
- The cost of debt is the same regardless of the issuer of the debt.

Modigliani and Miller (1958).

Modigliani and Miller (1958)'s irrelevance theory's assumptions are clearly unreasonable but gives a clear indication of the factors that do affect the value of a firm dependent on its capital structure (Megginson, Smart & Graham 2010:418). In an attempt to address some of the criticisms of the theory the trade-off theory was proposed.

### 2.1.2 The Trade-Off Theory

According to Modigliani and Miller (1963), the tradeoff theory was issued as an extension of Modigliani and Miller (1958), in which they stated that the tax deductibility of debt would prevent arbitrage from making the value of all firms proportional to expected returns generated by the physical assets. Based on the tradeoff theory, the value of the levered firm will be equal to the value of the unlevered firm plus the value of tax shield due to a firms debt, at the firm's corporate income tax rate (Cheng & Tzeng 2011). The dynamic trade-off model is based on the idea that firms cannot instantaneously achieve their target leverage, the firms then rather adjust their realized debt-equity ratios over time (Susmel & Zhao 2008).

In order to make the financial decisions of a firm, the tradeoff theory will address the issue by comparing the cost and benefit of debt that is derived from the optimal capital structure such as tax advantage of debt, the alleviation of free cash flow agency costs, the cost of financial distress as well as the agency costs of stakeholders (Devinaga & Kim 2011).

The primary benefit of debt is therefore the fact that interest payments incurred on the repayment of debt is deductible from the income tax. However debt has some disadvantages that include the increased probability of bankruptcy if a firm fails to meet its financial obligations (Cheng & Tzeng 2011). This leads to a trade-off between the benefits of an increase in debt to an increase in bankruptcy costs. The optimal capital structure is therefore at the point where, for any increase in debt the increased bankruptcy costs would outweigh the tax benefits (Cheng & Tzeng 2011).

### **2.1.3 Pecking Order Theory**

The pecking order theory of capital structure is among the most influential theories of corporate leverage (Frank & Goyal 2003). The pecking order theory was first postulated by Myers and Majluf (1984). According to the pecking order theory firms follow a hierarchy in financing their operations with a preference of internal over external finance and for debt over equity (Shyam-Sunder & Myers 1999). The pecking order states that firms tend to use internal equity, then debt and only then they use external equity (Myers 1984). However in the pecking order there is no well-defined optimal debt ratio. The trade-off benefits of debt financing and financial distress costs are assumed to be the second order importance (Murangi 2009).

### **2.1.4 Agency Cost Theory**

This area of research was initiated by Jensen and Meckling (1976) who identified two types of conflicts: those between shareholders and managers and those between debt holders and equity holders. The conflicts between shareholders and managers occur since managers hold

less than hundred percent of the residual claim hence they do not capture the entire gain from these activities, but they do bear the entire cost of these activities by forgoing expenditures that will benefit them personally. Therefore managers may over indulge in personal pursuits at the expense of maximizing the value of the firm (Rayan 2009). The agency costs in terms of interest conflicts between stakeholders could deal with the incentive problems that could arise from the separation of ownership and control (Devinaga & Kim 2011). This separation of power may present managers with an inducement to maximize their wealth at the expense of shareholders.

### 2.2 REVIEW OF RELATED LITERATURE

Despite all the theories mentioned above one might contemplate that the topic of capital structure and firm performance has been thoroughly researched, yet it is still unclear what actually drives capital structure choices and its impacts on firm performance. Capital structure literature has shown inconsistent results among researchers.

Some studies have shown that capital structure has significant impact on firm performance, of those that showed a positive impact are Hung, Albert and Eddie (2002), Omorogie and Erah (2010), Srivastava (2011) and also Siddiqui and Shoaib (2011). On the contrary, some studies concluded that the relationship between capital structure and firm performance is negative, the likes of, Shoaib (2007) and Onaolapo and Kajola (2010). The other dimension of the above-mentioned relationship is a combined effect (both positive and negative), Abor (2005), Tian and Zeitun (2007) and also Saeedi and Mahmoodi (2011) found this. However, Ebaid (2009) finds the relationship to be insignificant. This shows the complexity of the issue at hand, four possible outcomes, no impact, positive relationship, negative and both positive and negative. With these mixed and conflicting results, the quest for an answer to the relationship between capital structure and firm performance has remained unresolved.

### **2.2.1 No Influence: Capital Structure and Firm Performance**

Ebaid (2009) empirically investigated the impact of capital structure choice on firm performance based on a sample of non-financial Egyptian listed firms between 1997 and 2005. Ebaid (2009) used three accounting performance measures (ROA, ROE and gross profit margin). The empirical tests indicate that capital structure (especially, short-term debt (STD) and total debt to total assets (TTD) impacts negatively the firm's performance measured by ROA. On the other hand capital structure (STD, long-term debt (LTD), and TTD) have no significant impact on firm's performance measured by ROE or measured by GM. These results led Ebaid (2009) to conclude that capital structure choice, in general terms, has weak-to-no influence on the financial performance of listed firms in Egypt.

### **2.2.2 Positive Influence: Capital Structure and Firm Performance**

Hung et al. (2002) examined the inter-relationship between profitability, cost of capital and capital structure among property developers and contractors in Hong Kong. Hung et al. (2002) established that profitability, cost of capital and capital structure are interrelated. The study also found differences between the sectors investigated, that is, the high gearing of contractors in general is not due to high level of debts but high cost of equity, itself a consequence of low profitability and perceived high risk. Lenders were more cautious in lending money to construction firms than firms in other sectors (Hung et al. 2002). This may have had an impact on the composition of the capital structure contractors were willing to use which in turn may have impeded on the results of the study.

Additionally, Berger and Bonaccorsi di Patti (2002) proposed a new approach to testing the impact of capital structure on firm performance by using profit efficiency and by also testing how close a firm's profit is to a benchmark of a best practice firm facing the same exogenous conditions. In addition, Berger and Bonaccorsi di Patti (2002) employed a simultaneous equation that accounts for reverse casualty from performance to capital structure. An increase

in leverage as represented by a 1 percentage point decrease in the equity capital ratio yielded a predicted increase in profit efficiency of about 6 percentage points, or a gain of about 10% in actual profits at the sample mean (Berger & Bonaccorsi di Patti 2002).

### **2.2.3 Negative Influence: Capital Structure & Firm Performance**

Other researchers established a negative relationship between firm performance and capital structure. In their paper, Onaolapo and Kajola (2010) examined the impact of capital structure on firm's financial performance using 30 listed non-financial firms in Nigeria between 2001 and 2007. In particular they wished to answer the question, does capital structure affect financial performance of firms? Onaolapo and Kajola (2010) aspired to answer the above question by looking at different measures of financial performance namely; asset turnover, size, age, asset tangibility, industry sector to which the firm belongs and growth opportunity. Onaolapo and Kajola (2010) revealed that asset turnover, size, asset tangibility and industry sector were major determinants of financial performance. The only factor that the study distinguished as not a major determinant was the age of the firm. The study established a significantly negative relationship between capital structure and firm performance.

### **2.2.4 Combined Influence: Capital Structure & Firm Performance**

Contrary to previously mentioned findings Abor (2005), Tian and Zeitun (2007), Saeedi and Mahmoodi (2011) found a combined effect (i.e. both negative and positive relationship). Tian and Zeitun (2007) investigated the effect which capital structure has had on corporate performance using a panel data sample representing of 167 Jordanian companies during 1989-2003. Tian et al. (2007) employed different measures of capital structure such as short-term debt, long-term debt, and total debt to total assets in order to investigate the effect of the debt structure on corporate performance. As performance measures, Tian et al. (2007) used ROA, Tobin's Q and market to book value ratio (MBVR) and profitability. Firm's capital



structure appeared to be a significant determinant of corporate performance and another important finding was that short-term debt (STD) has a negative and significant impact on the performance measure ROA (Tian et al. 2007).

Tsangyao, Kuei-Chiu, Yao-Men and Chia-Hao (2009) findings are consistent with those of Tian et al. (2007). Tsangyao et al. (2009) collected financial data from firms in Taiwan between 1994 and 2005. Tsangyao et al. (2009) paper used savings on net worth value ratio, net worth on loan ratio, net profit margins, and current ratio and loan growth rate as proxy variables. Tsangyao et al. (2009) found two contradicting results; firstly, they found that with a good capital structure a unit increase in loans led to a 2 units increase in net profit margins. Secondly, with an already poor capital structure an increase in loans led to a decrease in net profit margin. In their paper, Tsangyao et al. (2009) divided their data collection into northern, central and southern Taiwan; they also found that there appeared to be no relationship between capital structure and firm performance in firms situated in southern Taiwan.

Moreover, Saeedi and Mahmoodi (2011) studied the relationship by sampling 320 firms listed on the Tehran Stock Exchange over the period 2002-2009. Saeedi and Mahmoodi (2011) employed four performance measures (ROA, ROE, EPS, and Tobin's Q) as dependent variable and three capital structure measures (long-term debt, short-term debt and total debt ratios) as independent variable. Saeedi and Mahmoodi (2011) results indicated that firm performance, which was measured by EPS, was positively related to capital structure. These findings were consistent with Berger and Udell (2006) who revealed a positive relation between firm performance and capital structure.

### 2.2.5 Capital Structure & Firm Performance in Africa

In Africa Oke and Afolabi (2011) also tried to clarify the relationship by studying a sample of five firms over the period 1999-2007. Oke and Afolabi (2011) used debt financing, equity financing and debt-equity ratio as independent variables, they used Profitability index as a measure firms' performance. The findings of the study showed a positive relationship between firms' performance and equity financing, a positive relationship between firms' performance and debt-equity ratio and a negative relationship between firms' performance and debt financing (Oke & Afolabi 2011).

More appropriately to this paper, Abor (2007) studied the relationship on small and medium-sized enterprises (SMEs) in Ghana and South Africa. Abor (2007) extended Abor (2005) where the researcher investigated the relationship between capital structure and profitability of listed firms on the Ghana Stock Exchange (GSE) over a five-year period (1998-2002). The results revealed significantly positive relationship between short-term debt divided by total capital (SDA) and ROE. However, the results showed a negative relationship between long-term debt divided by total capital (LDA) and ROE. With regard to the relationship between total debt and profitability, the regression results showed a significantly positive association between total debt divided by total capital (DA) and ROE.

In the recent past Al-Qudah (2011) examined the determinants of capital structure of Jordanian listed mining and extraction industries, during the period 2005-2008 by sampling 11 firms listed on the Amman stock exchange. Al-Qudah (2011) employed three capital structure measures namely; total debt ratio (total debt/total asset), short-term debt ratio (short-term debt/total assets) and long-term debt ratio (long-term debt/total assets). Profitability, firm size, tangibility, non-debt tax shield and growth of the firm were identified as possible determinants of capital structure (Al-Qudah 2011). Al-Qudah (2011) found that profitability had a negative and substantial effect on Jordanian mining and extraction industries capital

structure. Tangibility and size had a positive and highly significant impact on capital structure, the former has negative significant impact on short-term debt ratio while the latter has a positive insignificant impact on total debt (Al-Qudah 2011).

In South Africa Kasozi (2009) studied “The capital structure practices of listed firms in South Africa”. Although Kasozi (2009) deviated from this study which desires to study the impact of capital structure on firm performance on small to medium capitalized firms in South Africa. Kasozi (2009) on the other hand examined whether finance theory is aligned with practice by testing two conventionally recognized theories of capital structure choice (the trade-off theory and the pecking-order theory) against the financing practices of a multi-industry sample consisting of 123 large local and non-financial firms listed consistently on the JSE during the period 1995-2005. Kasozi (2009) highlights that general mining and construction and materials had the highest amount of book value debt during the period 1995 and 2005, but also achieved the highest profitability in the process.

The reasons for the discrepancy between finance theories and practices vary and this discrepancy may be attributed to the legal underpinnings of finance as embodied in the differing laws and institutions of each country and to differences in each country’s economic system (Kasozi 2009). Other reasons for discrepancy set out by Tian et al. (2007) are effects of external shocks (Gulf War), the affray between conventional commercial banking and Islamic banking in Jordan together with biased policy to offer short-term loans.

Abor (2007) extracted a sample of 360 firms (160 Ghanaian firms and 200 South African firms) with only 68 listed firms. The mix between listed and unlisted firms does not normally have the same regulatory framework as listed firms.

Onaolapo and Kajola (2010), Pratomo and Ismail (2007), Al-Qudah (2011) and Nguyen and Ramachandran (2006) concluded that size had significant impact on the relationship between

capital structure, this study will mitigate this external factor by looking at similar sized (i.e. small to medium capitalization firms). Another impeding factor is the availability and reliability of financial data (Nguyen & Ramachandran 2006). This study will only consider listed firms since the information is more credible. The impending study desires to mitigate some of the obvious external factors that may have distorted researchers' closure on the relationship between capital structure and firm performance by investigating the relationship on small to medium capitalization mining firms listed on the JSE.

There is a significant amount of studies that have been conducted regarding capital structures found in different markets and industries. It is clear from the literature that contradicting results have been found; therefore this study will particularly be focusing on the impact of the capital structure on firm performance in the South African mining sector.

### **3. SAMPLE AND METHODOLOGY**

The paper will investigate the impact of capital structure on firm performance by investigating various financial performance proxies on small to medium capitalization mining firms listed on the Johannesburg Stock Exchange (JSE) over a 10-year period (2002-2011). The study defines small to medium cap as firms that have a market capitalization of less than R25 billion.

The research will be carried out through two main stages namely Document Analysis data collection method and an empirical study. Document Analysis is a systematic procedure for reviewing or evaluating documents both printed and electronic (Bowen 2009). This will help establish firms that fall within the category of small to medium cap. Additionally the firms have to be listed prior the year 2002 in order to fall in the scope of the study period namely; years 2002-2011.

Furthermore, the study focused on firms that were only listed on one exchange, that is, the JSE. This will reduce biases that may affect the research, that is, location of where the firm can obtain funding may have an impact on the hypothesis of capital structure and firm performance. The research will then ensue to evaluate financial statements of various firms in the selected sample in order to be able to compute numerous financial performance ratios. The financial statements were extracted from McGregor BFA. As a form of quantitative research it requires researchers to draw upon various sources of evidence so as to ensure accuracy as well as to ensure validation and credibility (Yin 1994). Thus, the sample consists of small to medium cap mining firms listed that are only listed on the JSE;

Table 1 below lists these companies.

**Table 1: Sample**

<b>Name of Company</b>	<b>Market Capitalization (in millions of Rands)</b>	<b>Date listed</b>
Buildmax Limited	234.22	1996
Goliath Gold Mining Limited	589	1934
JCI Limited	605	1897
Merafe Resources Limited	2169	1988
Northam Platinum Limited	12808	1987
Sentula Mining Limited	1320	1993
Simmers and Jack Mines limited	25	1924
South African Coal Mining Holdings Limited	113	1996
Thabex Limited	9	1997
Trans Hex Group Limited	297	1981

### 3.1 EMPIRICAL MODEL AND PROXIES VARIABLES

In order to investigate the impact of capital structure the study applied multiple linear regression analysis. A regression analysis is concerned with the study of the dependence of one variable, the dependent variable on one or more other variables, the explanatory (or independent) variables with a view to estimating and/or predicting the mean or average value of the former in terms of the known or fixed (in repeated sampling) values of the latter (Gujarati & Porter 2009).

This study makes use of panel data which is a mixture of both time series and cross section data, panel data involves data at one point in time that is surveyed over a period of time (Gujarati & Porter 2009). In this case capital structure and firm performance are recorded annually and surveyed over a period of 10 years. This is in accordance with Al-Qudah (2011) who uses panel data to investigate the determinants of capital structure of Jordanian mining and extraction industries. Using ordinary least squares the model is estimated by the following equation:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e, \text{ (Gujarati \& Porter 2009).}$$

Where  $Y$  represents a dependant variable and  $X_1$ ,  $X_2$  and  $X_3$  represent independent variables,  $e$  represents the error term in the model.

#### 3.1.1 Dependant variables

Return on assets (ROA), return on equity (ROE) and price to earnings ratio (P/E) where used to quantify firm performance. Tian and Zeitun (2007) also used ROA and ROE in their respective studies. Onaolopo and Kajola (2010) point out that there is no unique measure of firm performance in literature. However, Onaolopo and Kajola (2010) indicated that they chose ROA and ROE because they are important accounting-based and widely accepted

measures of financial performance. Since ROA and ROE are accounting based measures this study also includes price earnings ratio (P/E) in order to supplement the above-mentioned ratios as it gives an indication of the market views. This is closely in line with Abu-Rub (2012) who used ROA, ROE, EPS as well as Tobin's Q to develop a proxy for dependant variables. Thus, ROA, ROE and P/E represent the dependent variable proxies. These proxies are calculated as follows:

- $ROE = \frac{\text{NET INCOME}}{\text{SHAREHOLDER'S EQUITY}}$
- $ROA = \frac{\text{NET INCOME}}{\text{TOTAL ASSETS}}$
- $P/E = \frac{\text{MARKET VALUE PER SHARE}}{\text{EARNINGS PER SHARE}}$

### 3.1.2 Independent variables

Independent variables are used to predict dependent variables, that is, ROA, ROE and P/E. Al- Qudah (2011) and Loprev and Kwanum (2012) used total debt/total assets, short-term debt/total assets and long-term debt/total assets in order to approximate capital structure proxy. On the other hand, Abu-Rub (2012) used long-term debt/total assets, total debt/total assets and total debt/total equity. This study will use debt/equity as a proxy for capital structure; debt/equity is calculated as follows:

- $DEBT/EQUITY = \frac{\text{TOTAL DEBT}}{\text{TOTAL SHAREHOLDER EQUITY}}$

Thus, the equation used to predict the relationship between capital and firm performance modifies to:

$$Y_{ROE} = \beta_0 + \beta_1 (debt/assets) + e, \quad (1)$$

$$Y_{ROA} = \beta_0 + \beta_1 (debt/assets) + e, \quad (2)$$

$$Y_{P/E} = \beta_0 + \beta_1 (debt/assets) + e. \quad (3)$$

Given the above-mentioned equations, the study proceeds to find the impact of capital structure on firm performance.

### 3.2 HYPOTHESIS TESTING

Some studies have shown that capital structure has an insignificant impact on firm performance, when Ebaid (2009) empirically investigated the impact of capital structure choice on firm performance based on a sample of non-financial Egyptian listed firms from 1997 to 2005. He found the relationship to be insignificant. It is from this empirical literature evidence the hypotheses were constructed namely;

<sup>1</sup>H<sub>0</sub>= There is no significant relationship between capital structure and ROE

<sup>1</sup>H<sub>1</sub> = There is a significant relationship between capital structure and ROE

<sup>2</sup>H<sub>0</sub> = There is no significant relationship between capital structure and ROA

<sup>2</sup>H<sub>1</sub> = There is a significant relationship between capital structure and ROA

<sup>3</sup>H<sub>0</sub> = There is no significant relationship between capital structure and P/E

<sup>3</sup>H<sub>1</sub> = There is a significant relationship between capital structure and P/E

## 4. EMPIRICAL RESULTS

### 4.1 DESCRIPTIVE STATISTICS

In order to estimate the equation and to test the hypothesis Statistica software package was used. However, the data had large amounts of anomalous observations or outliers. An outlier is an observation that is much different (either very small or very large) in relation to the observations in the sample (Gujarati and Porter 2009). Gujarati and Porter (2009) further point out that the inclusion or exclusion of such observations, especially if the sample size is



small it can substantially alter the results of the regression analysis. In this case observations of the debt/equity ratio that were less than -10 and greater than 10 for debt/equity were excluded. Similarly, observations of the return variables less than -100 and greater than 100 for dependent variables were also excluded from the regression analysis. This reduced our overall observations from 100 to 78 for the correlation matrix (see Table 2), the observations were also reduced for the regression analysis (i.e.) ROE, ROA and P/E observations reduced from 100 to 83, 93 and 89 observations respectively (see Table 3). Table 2 below shows the output of the correlation analysis.

**Table 2: Correlation matrix**

Variables	Debt/Equity	ROE	ROA	P/E
<b>Debt/Equity</b>	1.000000			
<b>ROE</b>	-0.466148*	1.000000		
<b>ROA</b>	-0.103481	0.820450*	1.000000	
<b>P/E</b>	-0.114317	0.307804*	0.307170*	1.000000

*Note: \*Marked correlations are significant at  $p < .05000$ ,  $N=78$ , Exclude condition:  $v1 > 10$  or  $v1 < -10$  or  $v2 > 100$  or  $v2 < -100$  or  $v3 > 100$  or  $v3 < -100$  or  $v4 > 100$  or  $v4 < -100$*

Al- Qudah (2011) mentions that in general, independent variables having correlation of 0.60 and more should not be included in the regression analysis. Table 2 shows that ROE and ROA have a correlation of 0.82 between them which is greater than 0.60. Contrary to Al- Qudah (2011), this study will include ROE and ROA due to the fact that they are both dependant variables, that is, the study is not trying to predict one in terms of the variable. Furthermore, the correlation matrix shows that there is minimal correlation between dependant and independent variables in this study. The highest correlation between dependant and independent variables is -0.103 between debt/equity and ROA. This is a good

sign preceding the regression analysis. The results in the table above are not in line with those of Abu-Rub (2012) who found a very strong positive correlation (87%) between debt/equity and ROE, the results above show a negative relationship of -0.466 between the two variables. Furthermore, ROA and P/E are also negatively related to debt/equity.

#### 4.2 REGRESSION ANALYSIS

**Table 3: Regression results**

Independent variables	Constant ( $\beta_0$ )	Coefficient ( $\beta_1$ )	$\rho$	t-stat	R <sup>2</sup>	Number of observation
ROE	7.38	-0.47	0.00008	-4.77	0.217	83
ROA	0.14	0.034	0.744	0.327	0.0011	93
P/E	3.24	-0.083	0.433	-0.788	0.0069	89

Note:  $\beta_1$ =coefficient of debt/equity.  $B_1$  is significant at  $\rho < 0.05$ . Exclude condition:  $v1 > 10$  or  $v1 < -10$  or  $v2 > 100$  or  $v2 < -100$  or  $v3 > 100$  or  $v3 < -100$  or  $v4 > 100$  or  $v4 < -100$ .

##### 4.2.1 The impact of capital structure on ROE

The results in table 3 show that there is a significant impact of capital structure on ROE.  $\rho$  - value is defined as the lowest significance level at which a null hypothesis can be rejected in this if  $\rho < 0.05$  we reject the null hypothesis (Gujarati and Porter 2009). In this case, we reject the null, that is, there is no significant relationship between capital structure and ROE. Thus, there appears to be a significant relationship between capital structure and ROE (i.e.  $\rho = 0.00008$ ). R-squared measures the goodness of fit; that is, how well the sample regression line fits the data (Gujarati and Porter 2009). In this case R-squared = 0.217 this implies that 21.7% of the variation in ROE is explained by capital structure. The results further show that ROE is negatively related to capital structure (coefficient = -0.47). This implies that a percentage point increase in debt/equity, will lead to a decrease of 2.128% in ROE. Thus,

there is a negative significant relationship between capital structure and ROE. These findings are consistent with Berger and Bonaccorsi di Patti (2006) findings. Precisely, Berger and Bonaccorsi di Patti (2006) found that an exogenous decrease in the inverse measure of leverage by one percentage point at the sample mean implies an increase in ROE of about 6%. This is however in contradiction with Ebaid (2009) who found that capital structure has no significant impact on ROE.

### **4.2.2 The impact of capital structure on ROA**

The results in table 3 show that there is an insignificant relationship between capital structure and ROA. The  $p$ -value  $> 0.05$ , 0.744 to be precise. R-squared implies that only 0.11% of variations in ROA are explained by changes in capital structure. Abu-Rub (2012) also found that there is no significant relationship between capital structure and ROA. These findings are however not in line with those found by Ebaid (2009) who found a negative relationship between debt/assets and ROA. Furthermore, Saeedi and Mahmoodi (2011) found that there is a negative relationship between long-term debt and ROA. Saeedi and Mahmoodi (2011) findings are consistent with those of Tian et al. (2007) who also found a significant negative relationship between capital structure and firm performance. Since, ROA measures management's ability to utilize the firm's assets to generate revenue, the researchers in this study expected to find a significant positive relationship in line with Abu-Rub (2012) due to the fact that higher leverage may lead managers to use utilize the firm's assets more efficiently since now they have an extra obligation to meet (i.e.) debt holders can force a firm into bankruptcy.

This is in line with agency cost theory, which states that conflicts exist between shareholders and managers and between debt holders and equity holders (Jensen & Meckling 1976). Since in this case capital structure appears to have an insignificant relationship on ROA, managers may be reluctant to change the capital structure, for instance, increasing debt in overall

capital structure and mainly focusing on efficient use of assets in order to generate superior returns. This is however not in line with capital theory which states that, the value of the levered firm will be equal to the value of the unlevered firm plus the value of tax deductibility of debt at the firm's corporate income tax rate (Cheng & Tzeng 2011). Thus, managers will opt to focus on efficient use of firms' assets (thus, decreasing likelihood of bankruptcy) at the expense of increasing overall firm value by adding debt to the overall capital structure.

### **4.2.3 The impact of capital structure on P/E**

Results in Table 3 show that there is an insignificant relationship between capital structure and P/E. The regression analysis returns a  $p$ -value of 0.433 which is greater than 0.05, thus we fail to reject the null hypothesis; capital structure does not appear to have an impact on P/E. These findings are consistent with Tian and Zeitun (2007). Tian and Zeitun (2007) further point out that the reason for the insignificance of P/E could be that the share price does not reflect the actual situation for the firm, that is, there may be other factors affecting a firm's performance other than the variable used in their study. Another reason could be that most investors still depend on the accounting measure of performance rather than the P/E measure due to the investor-favoured payment of dividends or the inactivity of the stock market (Tian et al. 2007).

The study also expected an insignificant relationship between capital structure and P/E merely due to the fact that the sampled firms retained 90% of their revenues over the period of the study. The only exception was Northam Platinum Limited that averaged just below 50% of retained earnings over the study period. Northam Platinum Limited has the largest market capitalization among sampled firms; this can be an indication that Northam Platinum Limited is content with its current market capitalization whereas the other firms retain their earnings in order to expand and gain market share. This is in line with the signalling theory

which states that managers have incentives to use various tools to send signals to the market about the difference that exist between them and weaker firms (Khan 2012).

In this case the high retained earnings percentage can imply one of two things namely; that the firms are using retained to purchase assets or liability reductions. Since, the mining industry is capital intensive and the majority of the sampled firms have low market capitalization relative to Northam Platinum Limited. The high profit retention percentage appears to be due to the high capital requirement of the industry and also the fact that firms desire to expand their market presence. This, however, is not sending a good signal to the market as internal firm activities do not appear to reflect on the market.

### **5. CONCLUSION**

One important financial decision firms are confronted with is the debt policy or capital structure choice, this decision is particularly crucial given the effect it has on the value of the firm (Abor 2005). The paper investigated the impact of capital structure on firm performance by examining various financial performance proxies on small to medium capitalization mining firms listed on the JSE over a 10-year period (2002-2011). Since there has been limited research on this topic in South Africa, this study bridges the gap relative to international studies. The study used debt/equity as a proxy for capital structure and ROE, ROA and P/E ratio as proxies for firm performance. The study found that there appears to be a significant negative relationship between capital structure and ROE, whereas there appears to be an insignificant relationship between capital structure and both ROA and P/E ratio.

These results are in line with Srivastava (2011) who investigated the effect ownership structure on corporate performance by sampling 98 of the most actively traded firms on the Bombay stock exchange in India. The findings indicate the presence of highly concentrated ownership structure in the Indian market. Srivastava (2011) results indicate that disseminated

ownership percentage influences certain dimensions of accounting performance indicators return on assets (ROA) and return on equity (ROE) but not stock market performance indicators such as price earnings ratio (P/E) and price to book value ratio (P/BV), which according to the study indicate that there might be other factors (economic, political, contextual) affecting firm's performance other than ownership structure.

### 5.1 LIMITATIONS AND RECOMMENDATIONS OF STUDY

Utilizing ratios for the study provided additional complexity because some accounting indicators are subject to manipulation hence use of actual financial data from the company financial statements could produce different results. Furthermore, other variable should be considered as control variables, such as business risk or age of the firms.

Regarding future line research, this study can be improved upon if the number of firms and performance measures are increased. This will allow future to perform an overall regression analyzing the impact of capital structure on firm performance and additionally performing per sector regression analysis. This will provide a much more rigorous analysis of the relationship between capital structure and firm performance in small to mid-cap mining firms. The study also recommends that managers should be careful when using debt as a source of finance since a negative relationship exists between capital structure and firm performance variables used in this study. Therefore manager should try to finance activities with retained earnings and use debt as a last option as supported by the peaking order theory.

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