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Thesis for the Master of Management in Finance and Investments

Topic: The Capital Structure and its impact on firm value of JSE Securities Exchange Listed Companies

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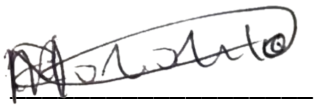
WITS BUSINESS SCHOOL

at the

UNIVERSITY OF THE WITWATERSRAND

DECLARATION

I, Neo Mohohlo, declare that the research work reported in this dissertation is my own, except where otherwise indicated and acknowledged. It is submitted to fulfill the requirements for the Masters of Management in Finance and Investment degree at the University of the Witwatersrand, Johannesburg. This thesis has not, either in whole or in part, been submitted for a degree or diploma to any other institution or university for a similar qualification.



N.R Mohohlo

27 March 2013

Date

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Abstract

The capital structure theory was pioneered by Modigliani and Miller (1958). In their study, Modigliani and Miller (1958) argued that capital structure was irrelevant to firm value. There is also significant theory on the capital structure of firms and its determinants.

Using a panel of non-financial firms listed on the JSE Securities Exchange, we investigate the relevance of capital structure on firm value and investigate the capital structure of firms in South Africa. The results of the analysis on the relevance of capital structure on firm value indicated that there is no statistically significant relationship between firm value and the capital structure of firms. This analysis was conducted for the general sample of firms in the study, within industries and by firm size, however, the results were consistent throughout all the analysis.

The results of the capital structure and its determinants analysis indicated that South African firms followed a pecking order theory. The results also indicated that profitability, size, asset tangibility and tax shield has a statistically significant relationship to gearing or the firm's capital structure. The analysis of the South African firms' capital structure indicated that firms in South Africa tend to use more long-term debt than short-term debt. The leverage ratios also differed among industries with the Health care industry having the highest levels of leverage and the Technology industry having the lowest levels of leverage.

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1 Chapter one - Introduction

1.1 Background Literature

There is a considerable number of theories and research on the effect of capital structure on firm value, size and profitability. The capital structure of the firm refers to the sources of funding used to finance a firm's investments. This refers to the choice between equity financing and debt financing. According to Modigliani and Miller (1958), the value of the firm, that is, its stock price, does not depend on the capital structure of the firm. This theory by Modigliani and Miller is based on a set of simplifying assumptions. These assumptions include no taxes, no transaction costs and no information asymmetry. The theory says that the total market value of all financial assets issued by a firm is determined by the risk and return of the firm's real assets, not by the mix of issued securities (Byström, 2007).

The main idea behind Modigliani and Miller's theory is that a rational investor can create any capital structure on his/her own. Therefore, the firm should not focus much on its capital structure. "If the investor is highly indebted, the risk and return of the firm's stock (to the investor) will simply be the same as if the firm was highly levered" (Byström, 2007). This substitution called homemade leverage and the finding that a more leveraged firm doesn't only yield higher returns to the investor but also a higher risk, is the crux of Modigliani and Miller's theory.

There is a theory that states the value of the firm, in a world with corporate taxes, is positively related to its debt. This theory, which is known as the trade-off theory, states that profitable firms will tend to use more debt in order to capture the tax shield offered by debt financing of investments. According to this theory, in an all-equity firm, only shareholders and tax authorities have claims on the firm. The value of the firm is owned by the shareholders and the portion going to taxes is just a cost. The value of the levered firm has three claimants, namely: the shareholders, debt holders and tax recipients (Government). Therefore, the value of the levered firm is the sum of the value of the debt and the value of the equity. In these instances, value is maximised with the structure paying the least in the form of taxes (Hillier, et al., 2010).

Other theories on capital structure include the pecking order theory and the market timing theory. According to the pecking order theory firms prefer internal finance and if external finance is required, firms issue the safest security first. That is, they start with debt, then possibly hybrid securities then equity as a last resort (Myers, 1984). This assumes that a firm's debt ratio will be reflective of its cumulative requirements for external finance. In contrast to the trade -off and pecking order theories of capital structure, Baker and Wurgler (2002) found that firms with low levels of leverage raised capital when their market valuations were high as measured by the market-to -book ratio whereas firms with high levels of leverage raised capital when their market valuations were low. This theory is known as the market timing capital structure theory.

According to research by Kurshev and Strebulaev (2005), it has been established that large firms in the United States tend to have higher leverage ratios than smaller firms. International evidence suggests that in most, though not all countries, leverage is also cross-sectionally positively related to size. Intuitively, firm size should be relevant or related to leverage for a number of reasons. Firstly, in the presence of fixed costs of raising external funds, large firms have cheaper access to outside financing. Also large firms are more likely to diversify their sources of financing. Secondly, size may also be a proxy for the probability of default because it is often assumed that it is more difficult for larger firms to fail or liquidate. Firm size may also be a proxy for the volatility of firm assets because small firms are more likely to be growing firms in industries that are rapidly expanding and intrinsically volatile. Another reason for the significance of firm size is the extent of the wedge in the degree of information asymmetry between insiders and the capital markets which have a tendency to prefer larger firms by virtue of a greater scrutiny they face from the ever – suspicious investors (Kurshev and Strebulaev, 2005).

Gwatidzo and Ojah (2009), one of the most encompassing studies that have been conducted on African markets including South Africa, found that companies in these markets tend to follow a modified pecking order. Their study looked at five African markets (Ghana, Kenya, Nigeria, South Africa and Zimbabwe) collectively. In their study, Gwatidzo and Ojah (2009) tested for capital structure dependence on variables such as asset tangibility, corporate tax, profitability, size and firm age. In terms of Gwatidzo and Ojah's (2009) finding, is that what happens in South Africa which has sophisticated institutional and physical capital markets

infrastructure? Is the legal environment encompassing clearly stated and enforced laws? Are the courts effective in forcing borrowers to honour business contracts?

1.2 Problem Statement

How well do firms in South Africa understand the dominant capital structure in their sector and general economy? The problem is that not knowing the average cost of external funds will lead firms to make inadequately informed capital budgeting decisions. For a firm to grow it has to embark on value adding projects; hence effective capital budgeting is indispensable.

One of the ways for enhancing the effectiveness of the capital budgeting process is to estimate cash flows from the projects and the cost of capital. If a company does not have a good sense of what the dominant capital structure is in the market, it will not have a good sense of what the appropriate cost of external capital should be, whether debt or equity.

Even though there have been many studies on capital structure, the bulk of these studies focused on developed capital markets. The literature on capital structure and its effect on firm value is still very thin in the African context.

1.3 Purpose Statement

Apart from trying to shed sufficient light on the dominant capital structure in South Africa, this study attempts to answer the question of: what is the role of capital structure in firm valuation? In addition, the role of other market and economic variables like taxation will be assessed using a regression model and data drawn from financial markets.

To date, Gwatidzo and Ojah (2009) conducted one of the few most comprehensive studies in Africa on capital structure. This study is therefore intended to build upon the work that has been conducted so far and to contribute to the body of literature with the following questions as guidelines:

- Is capital structure irrelevant as per MM I?
- What is the capital structure (debt-to-equity) of firms per industry in South Africa?
- How persistent is the equity-debt capital structure?
- What factors determine the equity-debt structure divide?
- What is the debt structure in terms of funding between long term and short term debt?

- How persistent is the long term-short term structure?

1.4 Significance of study

Limited research exists on the capital structure of firms in Africa, as a result we know little about how these firms make capital structure decisions (Gwatidzo and Ojah, 2009).It is, therefore, necessary to deliberate on the capital structure of firms in Africa.

Firms in Africa operate within a different environment as compared with firms in developed countries mainly due to the differences in institutional infrastructure. Capital markets in Africa are characterised by inefficiency, they are small and thinly traded (Singh, 1999). In contrast, capital markets in developed economies are characterised by well-functioning and efficient stock markets and well developed credit markets. It is therefore inappropriate to claim that the findings that come out of studies done on developed economies apply to developing economies such as the African market.

This research may prove useful in filling the research gap that exists in the literature and increase our understanding of the capital decisions taken by firms in South Africa.

1.5 Data and Methodology

1.5.1 Data

The research analysis will be carried out on the firms listed on the JSE Securities Exchange (JSE), excluding financial firms. Financial firms are excluded because their capital structure is different from that of non-financial firms, as their capital structure, sources and allocation of funds are dictated by regulations including mainly the capital adequacy ratio and reserve requirement. The distinction between the deposit type debt and the outright debt of financial firms is blurred, which also makes the capital structure of these firms difficult to distinguish. The study will focus on listed firms because of the availability of data as listed firms have several data sources above and beyond their financial reports. The data that will be used for the analysis will be largely financial data, drawn mainly from the Bloomberg database. Bloomberg is the preferred source of the required financial data relating to the firms on the JSE because it is a relatively all-encompassing data base of global information, however, McGregorBFA was also used as a source of data. The financial data compiled and used for the analysis will be in panel data form.

1.5.2 Methodology

Regression analysis will be used in answering the research questions. "Regression analysis is a statistical tool for the investigation of relationships between variables [whereby]… the investigator assembles data on the underlying variables of interest and employs regression to estimate the quantitative effects of the causal variables upon the variable that they influence" (Sykes, 2003). The data collected on the JSE listed firms will be analysed using econometric techniques and a tool pack called E-views. Relevant economic theories and empirical studies will be examined in order to build the most appropriate structure for assessing the hypothesized relationships.

1.6 Outline of the Study

The outline of the research paper will be as follows. Section 2 will elaborate the relevant literature. Section 3 will detail the research questions and hypothesis. Section 4 will outline the methodology in detail, elaborating on the data, techniques employed and the model. Section 5 will contain the presentation and analysis of the results from the empirical analysis and Section 6 will draw conclusions on the findings of the research or make inferences for possible future research.

2 Chapter two - Literature review

2.1 Introduction

Capital structure decisions can have important implications for the value of the firm and its cost of capital (Firer et al, 2008). Inadequate capital structure decisions can lead to a large cost of capital thereby lowering the net present value (NPV) of the firm's investment projects making the investment projects unacceptable i.e the underinvestment problem. Efficient capital structure decisions will lower the firm's cost of capital and increase the NPV of the firm's investment projects leading to more projects being suitable to accept thereby increasing the value of the firm.

Capital structure is a very significant decision for firms to make so that they can maximize returns to their various stakeholders. Furthermore the correct capital structure is important to the firm as it will aid in dealing with the competitive environment within which the firm operates. According to Modigliani and Miller (1958) an 'optimal' capital structure exists when the risks of going bankrupt is offset by the tax savings of debt. When this optimal capital structure is realised, a firm would be able to maximise returns to its stakeholders that are higher than returns that would be attained from a firm whose capital consists of equity only i.e an all equity firm.

Despite the importance that capital structure can play in adding value to the firm, decades worth of theoretical literature and empirical testing have not been able to give guidance to practitioners with regards to the choice between debt and equity in their capital structures (Frank & Goyal, 2009). It is rather baffling to try to logically understand capital structure literature because different capital structure theories are frequently utterly opposed in their predictions while sometimes they may be in agreement but have opposing views about why the outcome has been predicted. It is for this reason that Myers (2001) stated that there is no universal theory of capital structure, only conditional ones. Factors that are of significance in one context may be of substantial insignificance in another.

There is a number of theories relating to the capital structure and its effect on firm value and its performance. Modigliani and Miller (1958) were the leading authors to landmark the topic of capital structure and they argued that capital structure was irrelevant in determining the value of the firm and its future performance. Many other studies including,

Lubatkin and Chatterjee (1994) have argued that there exists a relationship between capital structure and firm value.

In more recent studies, authors have displayed that they are less concerned about how capital structure affects the firm value. They, however, place more emphasis on how capital structure impacts the ownership/governance structure thereby influencing top management of the firms to make strategic decisions (Hitt, Hoskisson & Harrison, 1991). These decisions will in turn impact on the overall performance of the firm (Jensen, 1986).

2.2 Defining capital structure

The notion of financial management can be defined as a managerial activity, which is highly concerned about controlling and planning of firm's financial resources, (Pandey & Bhat, 2007). Furthermore, the functions of finance encompass a diverse area. These functions comprise choices on investments, choices on financing, choices on dividends, and choices on liquidity. This paper encompasses aspects with respects to the financing decision of a company i.e deciding on how to obtain funds in order to fulfil the firm's needs of investments.

The study of capital structure centres around the mix between debt, equity and the range of other hybrid instruments used to finance the investments of the firm. Capital structure is therefore concerned with the right hand side of the balance sheet (Myers, 2002). All items on the right hand side of the balance sheet, excluding current liabilities, are sources of capital employed to finance the real assets required to conduct the business of the firm (Dreyer, 2009). Below is a simplified graphical depiction of the capital structure.

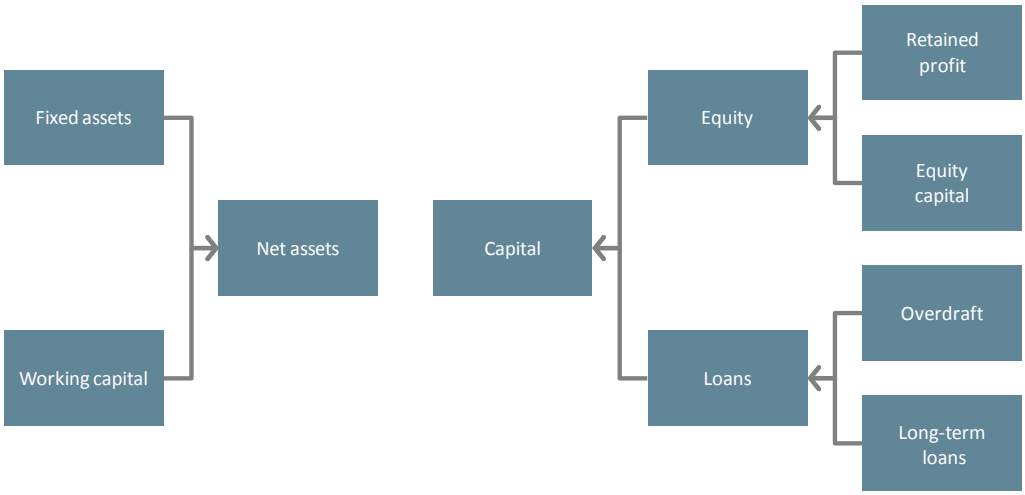


Figure 1: APPLICATION AND SOURCES OF FUNDING (An adoption from Ward & Price, 2006 pgs. 24 - 24)

The equity holders are the owners of the firm and bear most of the risk associated with the business venture since they normally only have a residual claim to the assets of the firm (Dreyer, 2009). According to Gitman (2003) equity holders are rewarded for their investment primarily through the appreciation of the value of their common equity and in some instances through the receipt of dividends.

Debt holders are compensated through interest payments and usually insist on some form of collateral as security for the loans they provide. Debt holders may also protect their interest through the establishment of loan covenants. They also have first claim on the assets of a firm and bear less risk than the equity holders. Debt is therefore a generally cheaper funding option to equity (Gitman, 2003).

If you want to evaluate the performance of the firm it is important to consider all interest bearing borrowings as loan capital regardless of whether they are short term or long term loans (Ward & Price, 2008). Firms manage their capital structure by issuing new debt and equity and by settling old debt or repurchasing issued shares.

2.3 Defining firm value

It is frequently stated that the goal of financial management is to maximise the wealth of the shareholders or owners of the firm. According to Firer et al (2008) the goal of financial management is to maximise the current value per share of the existing shares. However,

owners only have a residual claim to the assets of the firm and are only paid once every other stakeholder with a legitimate claim to the firm's assets has been paid. Since the lenders, employees and suppliers all have a superior claim on the firm's assets, it stands to reason that if the owners' wealth is maximised then all the other claimants will stand to gain.

It ought to be noted that profit maximisation and wealth maximisation are not synonymous terms. A firm can engage in a variety of activities that may increase short-term profit that are either not translated into cash flows like selling to customers with a low probability of paying or engaging in other activities which are not profitable and sustainable.

The timing and magnitude of cash flows and their associated risk are therefore the key drivers of the firms share price and the wealth maximisation of the owners of the firm (Firer et al, 2008).

To attain the goal of shareholder wealth maximisation, financial managers are confronted with two imperative financial decisions, the investment and financing decisions. The investment decision or capital budgeting is the process of planning and managing a firm's long-term investments and identifying investment opportunities that are worth more to the firm than they cost to acquire (Firer et al, 2008). The financing decision or capital structure decision refers to the specific mixture of long-term debt and equity the firm uses to finance its operations (Firer et al, 2008).

The financing decision, therefore, compels the financial manager to decide on whether to fund projects that the firm undertakes through retained earnings, debt or equity or other hybrid funding instruments. The funding mixture chosen will affect both the risk and value of the firm (Firer et al, 2008).

2.4 Capital structure theories

There are a number of capital structure theories but for the purposes of this study we will review only the three most prevalent theories, the trade-off theory, the pecking order theory and the market timing theory.

To start off the section we will look at the Modigliani and Miller (1958) theory of capital structure irrelevance.

2.4.1 Modigliani and Miller's capital structure irrelevance

The departure point for virtually all discussions on capital structure theory is Modigliani and Miller's capital structure irrelevance theory first published in 1958 (Dreyer, 2010). According to Modigliani and Miller (1958) financing doesn't matter in perfect capital markets. The value of the firm is maximised by the quality and productivity of the assets in which the firm has invested.

Consider the market-value balance sheet below:

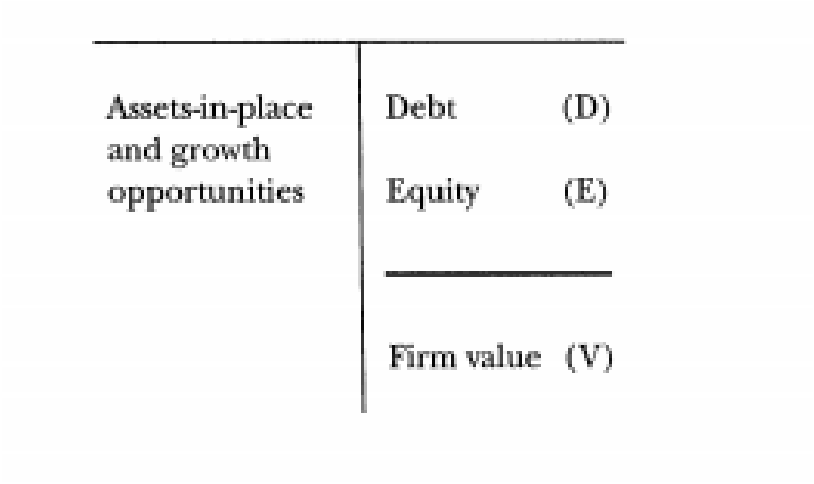


Figure 2: MARKET-VALUE BALANCE SHEET (Myers, 2001 pg.85)

The market values of the firm's debt and equity, D and E, add up to total firm value V and Modigliani and Miller's (1958) Proposition 1 says that V is a constant, regardless of the proportions of D and E, provided that the assets and growth opportunities on the left-hand side of the balance sheet are held constant (Myers, 2001).

The Modigliani and Miller's (1958) Proposition 1 as captured in the equation below also states that (Firer et al, 2008):

$$V_L = V_U \qquad (1)$$

Where:

V_L= the value of the levered firm

V_U= the value of the unlevered firm

The expression above states that the value of the levered firm (V_L) is equal to the value of the unlevered firm (V_U) (Firer et al, 2008).

According to Firer et al (2008) this implies that:

- A firm's capital structure is irrelevant.
- A firm's weighted average cost of capital (WACC) is the same no matter what mixture of debt and equity is used to finance the firm.

It is of importance to note that this capital structure irrelevance theory by Modigliani and Miller only holds under the assumption of perfect capital markets. These perfect capital markets are defined by Modigliani and Miller as follows:

- Homogeneous shares of different firms which are perfect substitutes of each other
- All shares being traded under the perfect capital market conditions
- Known expected future returns on all shares by investors
- Irrespective of the issuer the cost of debt is the same

In concluding their seminal paper Modigliani and Miller (1958) stated that these and other drastic simplifications had been necessary in order to come to grips with the capital structure problem, and having served their purpose they could now be relaxed in the direction of greater realism and relevance.

2.4.2 The trade-off theory

Modigliani and Miller (1963) delivered a correction of their 1958 seminal paper and stated that "The deduction of interest in computing taxable corporate profits will prevent the arbitrage process from making the value of all firms in a given class proportional to the expected returns generated by their physical assets" (Modigliani & Miller, 1963).

The correction restated the Proposition 1 equation to be expressed as (Firer et al, 2008):

$$V_L = V_U + T_C \times D \qquad (2)$$

Where:

V_L= the value of the levered firm

V_U= the value of the unlevered firm

T_C= the corporate tax rate

D = the amount of debt

The above expression states that the value of the levered firm (V_L) is equal to the value of the unlevered firm (V_U) plus the present value of the interest tax shield (Firer et al, 2008).

The principal value of debt is the fact that interest payments earned on the repayment of debt is deductible from corporate income tax. Debt, however, does have shortcomings that include an increased probability of bankruptcy if the firm failed to service its obligations, the agency costs earned by the lender to monitor the activities of the firm and the fact that managers have better prospects of the firm than the investors do (Gitman, 2003).

The trade-off theory rationalises reasonable debt ratios. It says that the firm will borrow up to the point where the marginal value of tax shields on additional debt is just offset by the increase in the present value of possible costs of financial distress (Myers, 2001). According to Fama and French (2005) this optimal capital structure is attained when the marginal benefit of an extra unit of debt is offset by the marginal cost of an extra unit of debt.

Meyers (2001) also states that, a value-maximizing firm should never pass up interest tax shields when the probability of financial distress is remotely low. As according to Gitman (2003) it is widely accepted that the value of the firm is maximised when its cost of capital is minimised.

Below is a modified zero growth dividend model used to determine the value of the firm (Gitman, 2003):

$$V = EBIT \times (1 - T)/K_a \quad (3)$$

Where:

V = the value of the firm

EBIT= earnings before interest and taxes

T = tax rate

EBIT x (1-T) = after tax operating earnings available to debt and equity holders

K_a = weighted average cost of capital (WACC)

It can be concluded from the expression above that if the earnings of the firm (EBIT) are held constant, the value of the firm (V) will be maximised when the average cost of capital (K_a) is minimised (Dreyer, 2010).

2.4.2.1 The advantages of debt

Debt has a number of advantages for shareholder wealth maximisation some of which are discussed below:

2.4.2.1.1 Interest tax shield

Because interest payments can be deducted from the basic corporate profits tax but not dividends, it lowers the expected tax liability to add debt to a firm's capital structure and thereby increases its after-tax cash flow (Barclay & Smith, 2005). According to Opler et al (1997) the value of the tax shield provided by debt in a given year is a function of the interest amount paid by the firm and its marginal tax rate. For a firm that expects increased future earnings it is advisable to consider taking on more debt in order to shield earnings from taxes.

2.4.2.1.2 Reduced agency costs

In the simple form of the agency cost problem, financial managers may not act in the best interest of shareholders particularly when excessive free cash flows are present electing to spend cash on things like corporate empire building, perks, making overpriced acquisitions or simply failing to operate efficiently (Dreyer, 2010). For the cases discussed above both debt and the payment of dividends can be used as ways of disciplining managers (Graham & Harvey, 2001).

2.4.2.1.3 Controlling overinvestment

Lowered levels of debt can lead to overinvestment. Overinvestment is a phenomenon that occurs when the operating cash flow is not reinvested profitably within the firm by financial managers. This may be as a result of unprofitably investing in the firm's core businesses, or worse, diversifying by acquiring unfamiliar business.

Debt can provide an effective solution to this phenomenon through contractually obliged interest and principal payments which squeezes out excess capital (Barclay & Smith, 2005). This could also be achieved through paying out the excess free cash to shareholders as a dividend and incurring debt to fund the capital projects of the firm. Debt can also force

financial managers to be more thorough when evaluating the firm's capital plans and their implications before they undertake them.

2.4.2.2 The disadvantages of debt

Debt has a number of disadvantages for shareholder wealth maximisation some of which are discussed below:

2.4.2.2.1 The cost of financial distress

Interest tax deductibility of debt is one of the main propositions made by the trade-off theory. However, if the firm had to undergo a period of operating at reduced levels of profitability the value of the interest tax shield will be reduced to zero. The burden of the interest expense will in this case only serve increase the financial distress experienced by the firm (Dreyer, 2010).

2.4.2.2.2 Agency costs

Agency costs can be defined as costs that arise due to conflict of interest and this conflict of interest can be between the shareholders and managers of a firm or between the debt holders and equity holders of a firm (Harris & Raviv, 1991).

Manager- Shareholder: Ryen et al (1997) state that the two main areas of manager-shareholder conflict arise when managers fail to best represent the interests of shareholders through underleveraging thereby forgoing substantial shareholder value and overspending. This unwillingness by managers to leverage the firm to its optimal levels may be due to the fact that more debt would increase the total risk of the firm.

Equity holder-Debtholder: There is a number of ways in which equityholders can increase their wealth through the exploitation of debtholders after a bond issue. This could be done through underinvestment which entails rejecting positive NPV projects if their benefits accrue only to debtholders, issuing new debt that is of a higher priority than the existing debt, floating debt for low risk projects and using the free cash for high risk projects, and at the extreme, through an increased dividend rate risk the chance of liquidating the firm.

In such instances, debtholders can protect themselves through the inclusion of covenants in their debt agreements. These covenants can, however, lead to problems with production, underinvestment and the financing of the firm (Ryen et al, 1997).

2.4.2.2.3 Underinvestment

According to Barclay and Smith (2005)even in situations that are less extreme than bankruptcy, highly leveraged firms are more likely than their less leveraged counterparts to forgo valuable investment opportunities when faced with the prospect of the inability to service their financial obligations. This underinvestment problem can be heightened by the conflict that can arise among the other claimants of the firm such as shareholders who may feel that their investment will be directed towards restoring the financial position of the firm's bondholders instead of creating wealth for them within the firm. In this instance, the cost of the new equity could be so excessive that managers might rationally forgo both the capital plans and the investment opportunities (Myers, 1997; Barclay & Smith, 2005).

Ryen et al (1997) also observed that besides passing up positive net present value (NPV) projects that would maximise the value of the firm, managers would forgo investing adequate effort in developing and maintaining company-specific human capital.

2.4.2.3 The dynamic trade-off theory

In the traditional/static trade-off theory firms select a target leverage level by weighting the benefits (which include the tax deductibility of interest and the reduction of the free cash flow problem) and costs (which include the expected financial distress costs and the costs arising from the agency conflict between shareholders and bondholders) of an additional unit of debt (Ovtchinnikov, 2010). Below is a graphical illustration of the static trade-off theory.

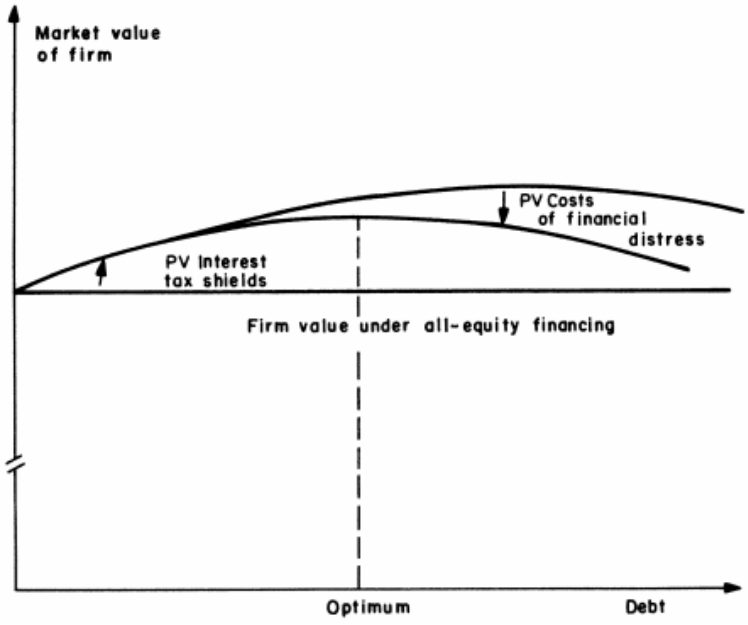


Figure 3: THE STATIC TRADE-OFF THEORY OF CAPITAL STRUCTURE (Myers, 1984 pg.577)

Unlike the static trade-off theory, which implicitly assumes that firms always stay at target leverage by continuously adjusting leverage to the target, the dynamic version recognizes that financing frictions make it suboptimal for firms to continuously adjust leverage to the target. Under the dynamic trade-off theory, firms weigh the benefit of adjusting against the adjustment cost and make leverage adjustments only when the benefit outweighs the cost (Ovtchinnikov, 2010).

The above implies that should the market conditions become adverse, a firm may spend some time away from its target capital structure and only return back to them when conditions are favourable. The level of speed at which a firm reverts back to its target capital structure will depend on whether the firm is above or below the target leverage ratio. This may be due to the fact that, when a firm operates at a level of debt significantly above the industry mean, the cost of financial distress increases markedly and rebalancing the capital structure becomes a significantly more meaningful task (Cai & Ghosh, 2003).

According to Myers (1984) the explanation of the dynamic trade-off theory regarding frictions that prevent firms from remaining at or near their target capital structure is not fully satisfactory as it is not stated to be of first order concern in the static trade-off theory. Costs cannot be so large that they could force managers to take lengthy deviations from their target levels of optimal capital structure, greater analysis should be spent on understanding and explaining these frictions rather than refining the static trade-off theory (Myers, 1984).

2.4.3 Pecking order theory

In the pecking order theory there is no well-defined target of the debt-equity mix, because there are two kinds of equity, internal and external, one at the top of the pecking order and one at the bottom for each firm's observed debt ratio reflects its cumulative requirements for external finance(Myers, 1984). The pecking order arises if the costs of issuing risky securities such as transactions costs and the costs created by management's superior information about the value of the firm's risky securities overwhelm the costs and benefits proposed by the trade-off model (Fama & French, 2005).

According to the pecking order theory, firms will first finance new investments with retained earnings, then with safe debt, then risky debt and finally, but only under duress, with outside equity in order to lessen adverse selection costs (Fama & French, 2005). Below is a graphical illustration of the pecking order theory.

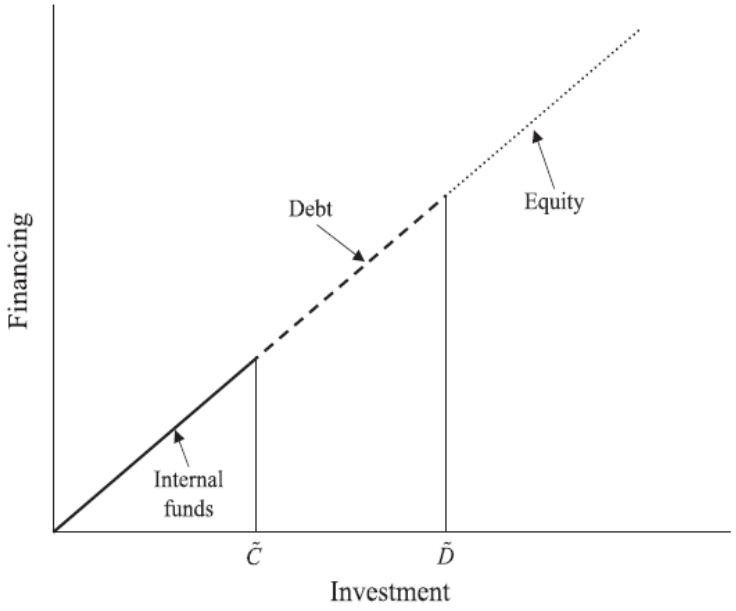


Figure 4: THE FINANCING HIERACHY OF THE PECKING ORDER (Leary & Roberts, 2010 pg.334)

Although the pecking order theory is based on the adverse selection based on information asymmetry, it has been proven that information asymmetry does not need to exist for a financing hierarchy to arise. It has, however, been shown that other factors such as incentive conflicts could generate a pecking order behaviour (Leary & Roberts, 2010). Titman and Wessels (1988) also found that transaction costs may also be an important factor in the pecking order behaviour and this is substantiated by the fact that short-term debt ratios are negatively related to firm size. This variance in financing practice probably reflects the high transaction costs that small firms face when they issue long-term debt or equity (Titman & Wessels, 1988).

It is usually thought of the cost of external finance as that of administration and underwriting and in other cases the under-pricing of new securities, however, asymmetric information creates the possibility of costs related to rejecting positive net present value (NPV) projects. One such incentive cost could be the reflection on the shareholders of a

firm that the managers are not adequately representing the interest of the shareholders through their excessive risk averse. Managers may on the other hand feel that they have more information on the cost and benefits of debt than shareholders when choosing to pass up on new investment opportunities when the earnings of the firm or investment project are volatile (Lewellen, 2006).

Although a firm might have initiated a pecking order, it may sometimes choose to not follow the pecking order so that it can maintain a spare debt capacity or hold internal earnings in favour of debt if it is believed that it will be essential to fund profitable future investment opportunities (Ryen et al, 1997).

The other reason why firms might choose to maintain a spare debt capacity would be to maintain their credit ratings. Spare debt capacity also enhances the firm's ability to endure periods of poor performance and allows for the execution of a recovery plan (Shivdasani & Zenner, 2005).

2.4.4 The market timing theory

Equity market timing refers to the practice of issuing shares at a high price (when their valuations are higher relative to book value and past market valuations) and repurchasing them at low prices (when their market valuations are lower). As a result observed capital structures are a function of the past market valuations of securities instead of a desire to attain an optimum capital structure or as a consequence of following a pecking order (Baker & Wurgler, 2002).

According to Baker and Wurgler (2002) four outcomes of their empirical studies support their market timing hypothesis, and they are as follows:

- An analysis of past financing decisions show that firms tend to issue equity instead of debt when their share price is higher relative to the book value and previous market values and they tend to repurchase the shares when their current market values are lower than past values
- Analyses of long-run stock returns following corporate finance decisions suggest that timing the equity market is successful for firms on average (Dreyer, 2010)
- Earnings forecasts and realisations around equity issues suggest that firms issue equity where there is investor market optimism about future earnings prospects (Dreyer, 2010)

- Two thirds of Chief Financial Officers (CFOs) admit to market timing in anonymous surveys (Dreyer, 2010)

According to DeAngelo et al (2010) most firms with attractive market timing opportunities tend to fail to issue stock. One probable reason for this failure to issue stock is the investor rationality that would influence the managers to disguise their attempts to sell overvalued stocks. Rational investors would almost instantly recognise any attempts to sell off overvalued stocks and as a result would reduce the price they are willing to pay for the stock. As indicated by Baker and Wurgler (2002) one other explanation could be that managers are simply unable to time the market. This seems to resonate with the recent events where prominent financial institutions repurchased their shares at higher prices after the 2008 financial meltdown (DeAngelo, DeAngelo & Stulz, 2010).

DeAngelo et al (2010) have concerted to the view that firms issue stocks primarily to fund the firm's short-term liquidity needs and market timing only plays an ancillary role in making the decision.

2.5 The capital structure landscape

An abstract overview of the elements that impact or influence capital structure decisions are graphically depicted below:

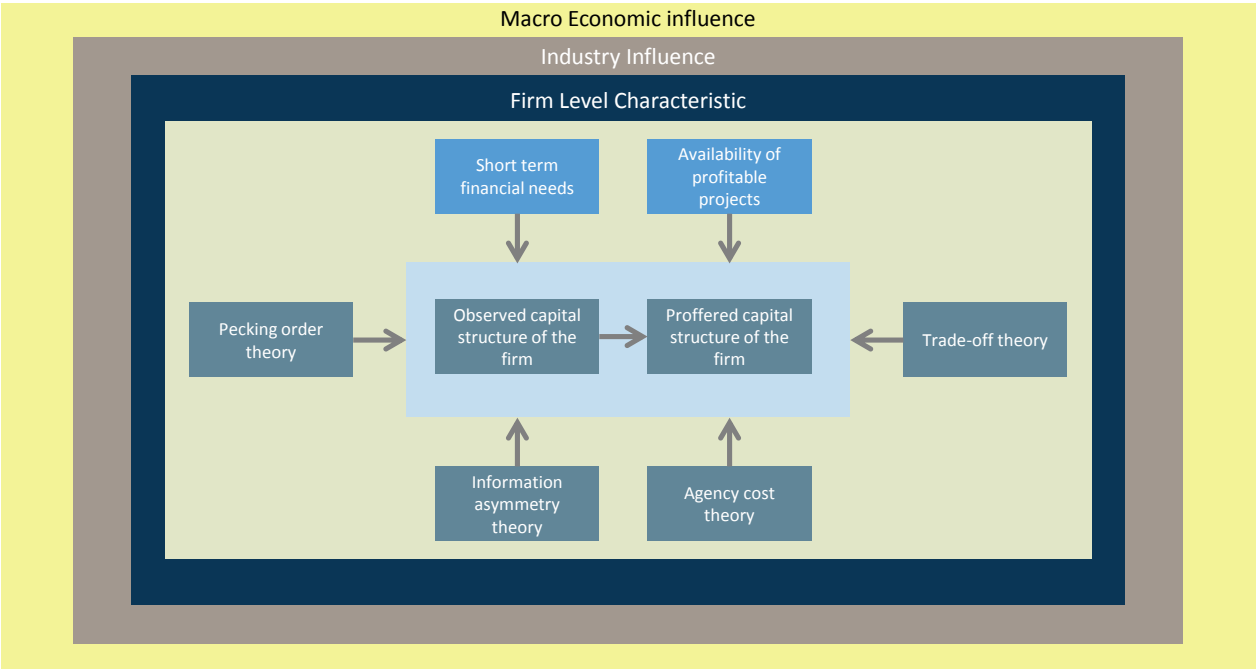


Figure 5: CONCEPTUAL CAPITAL STRUCTURE LANDSCAPE (Adaptation from Dreyer, 2010)

As indicated in the figure above, in the centre lies the optimal capital structure range for a firm. The perceived capital structure may or may not be in this optimal capital range. A firm experiencing financial distress or one without any debt in its capital structure are examples of firms that are not within their optimal capital structure range (Dreyer, 2010).

A considerable number of firms with a target capital structure often spend a significant amount of time deviating from the target structure. This deviation from the target capital structure could be as a result of variations in equity valuations, market abrasions or varying investment opportunities. The firm is expected overtime to undertake activities that will revert the firm towards its target capital structure.

Directly outside the optimal capital structure range is a number of factors impacting on the decision about what would constitute an ideal capital structure of optimal capital structure range (Dreyer, 2010). This level consists of two types of elements. The first element is of a theoretical make that is assumed to impact the practitioners. The second element is of a practical make like the accessibility of investment opportunities and liquidity funding needs.

The level after the previous one entails firm specific elements like the level of maturity of the firm, the firm's level of profitability and its level of investment in physical and intangible assets.

The second outer most ring entails industry specific factors such as the volatility of the industry's revenues, its typical debt-to-equity ratios etc (Dreyer, 2010).

The last level is the macro –economic environment within which a firm operates including the legal and political factors affecting the firm and all circumstances within which the business has to thrive.

As it can be seen in the model above, the capital structure decision is not an autonomous one. It is of utmost importance to understand the landscape within which the capital structure decision has to be made in order to eliminate the use of unsound assumptions when making the decision.

2.6 Literature on the effect of capital structure on firm value

After four decades of intense scrutiny, capital structure effect on firm value continues to be a popular research topic in finance and accounting literature. The optimal capital structure,

pecking order, agency theory and signalling theories have all contributed very useful but sometimes mixed guidance to academics and practitioners seeking to understand what management's financing decisions do to the value of a firm (Oraluck & Mohamed, 2004).

A number of studies have been recently carried out on the effect of capital structure on firm value from countries such as Australia, Pakistan, Bangladesh, China and Nigeria. Their findings are presented below.

Australia:

If capital rationing is a difficult challenge faced by management of firms, then it would perhaps be right to assume that funders such as shareholders (when equity is offered) and the debt-providers (when debt is issued) are likely to be influenced by how they value a firm's capital structure in relation to the industry average capital structure at the time management goes out to the market for funding.

The Australian study looked at both debt and equity disclosures to observe and quantify value-enhancing and value-reducing capital structure changes of 10-50 per cent. The research design centred around the concept of relative capital structure by relating a firm's debt-equity ratio to that of the industry median in each year over a 13-year period (1991 – 2003).

The findings from the study indicated that the market reacts positively to announcements of financing events that lead to the firm's capital structure moving closer to their relative industry median debt-equity ratio. For firms changing the debt-equity ratios away from the median (value decreasing events) it lead to either less positive or negative abnormal returns. These are consistent with the idea of optimal capital structure, if relative capital structure is a proxy for optimal ratio. Thus, the market perceives the industry median as an appropriate capital structure benchmark in the Australian market (Oraluck & Mohamed, 2004).

Pakistan:

The Pakistan research examined the impact of capital structure on firms' financial performance in Pakistan of top 100 consecutive companies in Karachi Stock Exchange for a period of four years from 2006 to 2009. Exponential generalized least square regression was

used to test the relationship between capital structure and firms' financial performance (Muhammad et al, 2012).

The results showed that all the three variables of capital structure, Current Liabilities to Total Assets, Long Term Liabilities to Total Assets, Total Liabilities to Total Assets, negatively impacts the Earnings Before Interest and Taxes, Return on Assets, Earning Per Share and Net Profit Margin whereas the Price Earnings Ratio shows a negative relationship with Current Liabilities to Total Assets and a positive relationship is found with Long Term Liabilities to Total Assets where the relationship is insignificant with Total Liabilities to Total Assets. The results also indicate that Return on Equity has a insignificant impact on Current Liabilities to Total Assets and Total Liabilities to Total Assets but a positive relationship exists with Long Term Liabilities to Total Assets. These results, in general, lead to the conclusion that capital structure choice is an important determinant of financial performance of firms (Muhammad et al, 2012).

Bangladesh:

The Bangladesh paper attempts to test the influence of debt-equity structure on the value of shares given different sizes, industries and growth opportunities with the companies incorporated in Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE) of Bangladesh. For the robustness of the analysis samples were drawn from the four most dominant sectors of industry i.e. engineering, food & allied, fuel & power, and chemical & pharmaceutical to provide a comparative analysis. A strong positively correlated association is evident from the empirical findings when stratified by industry (Anup & Suman, 2010).

To see the relationship between capital structure and firm value in Bangladesh the reserch paper considered share price as proxy for value and different ratios for capital structure decision. The interesting finding of this paper suggests that maximizing the wealth of shareholders requires a perfect combination of debt and equity, whereas cost of capital has a negative correlation in this decision and it has to be as minimal as possible. This is also seen that by changing the capital structure composition a firm can increase its value in the market. Nonetheless, this could be a significant policy implication for finance managers, because they can utilize debt to form optimal capital structure to maximize the wealth of shareholders (Anup & Suman, 2010).

China:

The research paper examined the influence of managerial ownership on firm performance through capital-structure choices, using a sample of China's civilian-run firms listed on the Chinese stock market between 2002 and 2007. The empirical results demonstrate a nonlinear relationship between managerial ownership and firm value. Managerial ownership drives the capital structure into a nonlinear shape, but in an opposite direction to the effect of managerial ownership on firm value. The results of simultaneous regressions suggest that managerial ownership affects capital structure, which in turn affects firm value (Ruan et al, 2011).

It was also found that managerial ownership does not influence firm value significantly when capital structure is added into the equation. Managerial ownership significantly affects capital structure, and capital structure affects corporate performance directly. These results address the influence of managerial shareholding on capital structure, which in turn affects firm value. Furthermore, capital structure is endogenously determined by both firm value and managerial ownership in Chinese civilian-run listed companies between 2002 and 2007 (Ruan et al, 2011).

Nigeria:

Two studies on the effect of capital structure were carried out in Nigeria and their findings are as follows.

The first study examined the impact of capital structure on the performance of manufacturing companies in Nigeria. The annual financial statements of 15 manufacturing companies listed on the Nigerian Stock Exchange were used for this study which covers a period of five (5) years from 2005-2009. A multiple regression analysis was applied on performance indicators such as Return on Asset (ROA) and Profit Margin (PM) as well as Short-term debt to Total assets (STDTA), Long term debt to Total assets (LTDTA) and Total debt to Equity (TDE) as capital structure variables. The results show that there is a negative and insignificant relationship between STDTA and LTDTA, and ROA and PM; while TDE is positively related with ROA and negatively related with PM. STDTA is significant using ROA while LTDTA is significant using PM. The study concluded that statistically, capital structure is not a major determinant of firm performance. It recommends that managers of

manufacturing companies should exercise caution while choosing the amount of debt to use in their capital structure as it affects their performance negatively (Iorpev & Kwanum, 2012).

The second study aimed to provide evidence on the impact of capital structure on a firm's value. The analysis was implemented on a sample of 124 companies quoted on the Nigerian Stock Exchange (NSE) for the year ended 31st December 2007. The ordinary least squares method of regression was employed in carrying out this analysis. The result of the study reveals that in an emerging economy like Nigeria, equity capital as a component of capital structure is irrelevant to the value of a firm, while Long-term-debt was found to be the major determinant of a firm's value. Following from the findings of this study, corporate financial decision makers are advised to employ more of long-term-debt than equity capital in financing their operations since it results in a positive firm value (Ogbulu & Emeni, 2012).

Research on capital structure is very thin in the South African context. Gwatidzo and Ojah (2009) is one of the most encompassing studies that have been conducted on African markets including South Africa. This study, looking at Ghana, Kenya, Nigeria, South Africa and Zimbabwe, found that companies in these markets tend to follow a modified pecking order. In their study, Gwatidzo and Ojah (2009) tested for capital structure dependence on asset tangibility, corporate tax, profitability, size and firm age. Their study found that profitability is negatively related to leverage which means that more profitable African firms tend to use retained earnings to finance their activities before borrowing. Tangibility of assets was found to be negatively correlated to debt for most of the sampled countries. It was also found that country-specific factors played a role in determining corporate leverage with other sample countries using less leverage than South Africa (Gwatidzo & Ojah, 2009).

2.7 Conclusion

According to Firer et al (2008) capital structure decisions can have important implications for the value of the firm and its cost of capital. Firms are, however, generally at liberty to decide on any capital structure they wish to undertake since the capital structure decision can be made independently from the capital investment decision.

In this section we reviewed the three most predominant capital structure theories, which are the trade-off theory, the pecking order theory and the market timing theory. We also briefly reviewed the Modigliani and Miller (1958) Proposition I, which is the capital structure

irrelevance theory. This Proposition states that the value of the levered firm (V_L) is equal to the value of the unlevered firm (V_U).

To analyse the trade-off theory we reviewed two versions of this theory. The static trade-off theory advocated for an optimal level of debt that balances the advantages of adding one unit of debt against the cost of adding one unit of debt to the capital structure. It must, however, be of note that this trade-off theory gives little or no indication of how this optimal debt-to-equity ratio is calculated. The dynamic trade-off theory on the other hand states that firms consider the benefit of adjusting their capital structure against the adjustment cost and make debt adjustments only when the benefits are more than the costs. This version recognises that financing frictions make it suboptimal for firms to continuously adjust their leverage to the target (Ovtchinnikov, 2010).

There are other factors such as external economic shocks that may have a significant impact on firms with debt levels that are fairly similar even though some of these firms might have debt levels that are perceived to be conservative. A classic example of this is the relatively small differences that existed in the leverage ratios of both healthy and distressed firms prior to the Asian crisis. This could indicate that operational factors are at least as important as leverage levels when designing an optimal capital structure (Dreyer, 2010).

According to the pecking order theory, there is a financing hierarchy behaviour in which firms tend to first use retained earnings, then cheap debt and only then after move to expensive equity to fund their investments. This theory is centred around adverse selection costs based on the superior case of information asymmetry. An opposing view to the pecking order theory states that firms might desire to maintain spare debt or preserve some funding capacity by first using debt instead of retained earnings as acclaimed by the pecking order theory.

Under the market timing theory, it is believed that firms tend to issue security when they believe that the security is overpriced and repurchase the stock when they believe that it is underpriced. An opposing view to this theory is that firms don't actually issue securities when they are overpriced. . One probable reason for this failure to issue stock is that a rational investors would almost instantly recognise any attempts to sell off overvalued stocks and as a result would reduce the price they are willing to pay for the stock. This

would then imply that it is difficult for firms to time the market as alluded to by the market timing theory.

In this section we also looked at the findings of recent research on the effect of capital structure on firm value in different countries. In Australia it was found that the market reacts positively to announcements of financing events that lead to the firm's capital structure moving closer to their relative industry median debt-equity ratio, while for firms changing the debt-equity ratios away from the median it lead to either less positive or negative abnormal returns. This indicates that the Australian market perceives the industry median as an appropriate capital structure benchmark.

In Pakistan, the results of the research study lead to the conclusion that capital structure choice is an important determinant of financial performance of firms in that country.

In Bangladesh, the findings of their paper suggested that maximizing the wealth of shareholders requires a perfect combination of debt and equity, whereas cost of capital has a negative correlation in this decision and it has to be as minimal as possible, meaning that by changing the capital structure composition a firm can increase its value in the market.

In China, it was found that managerial ownership does not influence firm value significantly when capital structure is added into the equation, however, managerial ownership significantly affects capital structure, and capital structure affects corporate performance directly.

In the two Nigerian studies, it was found that, statistically, capital structure is not a major determinant of firm performance for manufacturing companies in Nigeria. The other study found that in an emerging economy such as Nigeria, as a component of capital structure, equity capital is irrelevant to the value of a firm while Long-term-debt was found to be a crucial determinant of a firm's value.

Gwatidzo and Ojah (2009) carried out a study in this field on African countries including South Africa. In their study they found that a modified pecking order behaviour was prevalent in these countries.

Based on the above literature review, the question still remains on which pattern best describes the current situation in South Africa. Do firms in South Africa follow the modified

pecking order theory as previously found by Gwatidzo and Ojah (2009)? Or will they have the same patterns as those found in Nigeria and the other researched countries? The rest of the paper carries out analysis to determine the above.

3 Chapter three - Research questions and hypotheses

3.1 Research hypothesis one: capital structure is irrelevant as per MM1

According to Modigliani and Miller (1958), the value of the firm, that is, the stock price, does not depend on the capital structure of the firm. Based on a set of simplifying assumptions such as no taxes, no transaction costs and no information asymmetry, this theory indicates that the total market value of the financial instruments issued by a firm is given by the risk and return of the real assets of the firm.

According to Firer et al, (2008) capital structure decisions can have important implications for the value of the firm and its cost of capital. Inadequate capital structure decisions can lead to a large cost of capital thereby lowering the net present value (NPV) of the firm's investment projects, making the investment projects unacceptable, i.e. the underinvestment problem.

To determine whether capital structure is irrelevant in the South African context, the hypothesis will be stated as follows:

H_0: $\mu > 0.05$ (debt-to-equity ratio is not correlated to EPS)

H_1: $\mu \leq 0.05$ (debt-to-equity ratio is correlated to EPS)

3.2 Research hypothesis two: does the debt-to-equity ratio differ among industries listed on the JSE

According to the capital structure theory the industry within which a firm belongs is likely to have a substantial effect on the observed leverage levels of the individual firms and also that with time the firms will tend to converge towards the median industry debt levels. The said convergence towards the industry median debt level is considered as proof that an optimal capital structure does exist (Bowen, Daley & Huber, 1982).

The analysis in this paper will not necessarily test for the above mentioned convergence towards the industry median debt levels, but, statistically and practically significant differences in the median industry debt levels may be interpreted as support for the optimal capital structure theory (Dreyer, 2010).

To determine the difference between industry debt-to-equity ratio levels descriptive statistics will be employed, the hypothesis will be stated as follows:

H_0: $\mu_1 \neq \mu_2 \neq \mu_{3\ldots}\ \mu_n$ (industry median debt-to-equity ratios are heterogeneous)

H_1: $\mu_1 = \mu_2 = \mu_{3\ldots}\mu_n$ (industry median debt-to-equity ratios are homogeneous)

3.3 Research hypothesis three: is the industry debt-to-equity ratio persistent

Recent literature has proposed that a number of factors impact a firm's capital structure decision and firms do not frequently change their capital structure. This "consistent" structure has provoked Lemmon, Roberts, and Zender (2008) to support the use of firm fixed effect in capital structure regressions. In their research they showed that firm fixed effect not only explains 60% of cross-sectional variation in leverage, but also crowds out all the known explanatory variables for capital structure (Baranchuk & Xu, 2007).

In our research paper, we demonstrate that the popular pooled regression approach is less biased than the fixed effect model in explaining the cross-sectional variation in leverage. In other words, the crowding out phenomenon itself actually implies that the existing literature offers useful factors in understanding the capital structures dispersion. This is confirmed in our empirical study, where we find that up to 25% of the variations in the long-term mean can be explained by the known factors. Therefore, given the persistence of capital structure, we argue that it is more important to focus our attention on what determines the dynamics of capital structure (Baranchuk & Xu, 2007).

To determine the persistence of the debt-to-equity ratios, the hypothesis will be stated as follows:

H_0: $\mu d/e_{y1} \neq \mu d/e_{y2} \neq \ldots..$ (the debt-to-equity ratio is equal over time)

H_1: $\mu d/e_{y1} = \mu d/e_{y2} = \ldots..$ (the debt-to-equity ratio is equal over time)

3.4 Research hypothesis four: there is a relationship between debt-to-equity ratio and profitability, size of firm, tax shield and asset tangibility

A study was recently carried out in Istanbul to determine the firm-specific factors that are influential on capital structure decisions of 212 industrial firms listed in Istanbul Stock Exchange over period 2004 and 2009 with Panel Data Analysis (Basak & Hunkar, 2011).

The findings of the above study showed that firm size, liquidity, profitability and sales growth affect the leverage ratios of industrials firms significantly. Among these factors, firm size and profitability are the most significantly influential factors on capital structures of industrial firms, and these two factors are negatively correlated with leverage ratios. Growth factor was found to be statistically significant and positively correlated with leverage ratios. Liquidity factor is also statically significant but negatively correlated with leverage ratios. These findings are consistent with most of the capital structure literature and especially support Pecking Order Theory (Basak & Hunkar, 2011).

To determine factors affecting the debt-to-equity ratio levels, the hypothesis will be stated as follows:

H_0: P (ROA, tax shield, market capitalisation, asset tangibility) > 0.05

H_1: P (ROA, tax shield, market capitalisation, asset tangibility) ≤ 0.05

3.5 Research hypothesis five: is there a difference among industries in terms of reliance on long-term debt

The debt maturity of U.S. industrial firms declined over the past three decades. This decline in maturity is mainly driven by the smallest firms for which the median percentage of long-term debt has decreased from 53% in 1976 to 6% in 2008. For large firms, however, debt maturity has not decreased. Information asymmetry plays an important role in explaining the decrease in debt maturity, while debt and managerial agency problems do not seem to contribute to the decrease (Custódio et al, 2011).

Interestingly, we show that firms are using more short-term debt regardless of their characteristics. This unexpected component of debt maturity is more important than changing firm characteristics in explaining the decline in debt maturity and is a result of the new firms issuing public equity in the 1980s and 1990s (Custódio et al, 2011).

To determine the difference between long-term debt ratios, the hypothesis will be stated as follows:

H_0: µlong-term debt/total $debt_{y1,industry1}$ ≠ µlong-term debt/total $debt_{y2,\ industry\ 2}$≠…..

H_1: µlong-term debt/total $debt_{y1,industry1}$ = µlong-term debt/total $debt_{y2,\ industry\ 2}$=…..

4 Chapter four - Research data and methodology

4.1 Introduction

Research entails the collection and assembling of relevant data and extracting from that data relevant findings to support or refute an argument or draw valid conclusions (Dreyer, 2010; Cameron & Price, 2009). This section elaborates the data collection process, research process and methodology that was employed in answering the research hypotheses presented in the previous section (Dreyer, 2010).

4.2 Population of analysis

Population can be defined as individuals, groups, organisations, human products and events and the conditions to which that population is exposed (Rayan, 2008; Welman & Kruger 2005). The population of application for this study is all non-financial services companies that are listed on the main board of the JSE Securities Exchange (JSE) for the period 2002 – 2011 (ten year period).

4.3 Unit of study

The unit of study for this research paper is an individual company listed on the JSE for the period of ten years from 2002 to 2011. Variables of interest for the purpose of this study are collected on each of these companies.

4.4 Sampling technique

The sample may be viewed as a suitability sample as firms are included or excluded based on whether they fulfilled the preferred criteria of the study. Industry analysis are also carried out in an effort to detect capital structure differences between industries, therefore, the sample may be regarded as stratified and because the number of firms in each industry are unequal this is a disproportional stratified sample (Dreye, 2010; Zikmund, 2003).

There are a few of data exclusions that included:

AltX listed companies: There are significant differences between the AltX and JSE listing requirements which makes the calibre of companies listing in the respective exchanges vastly different.

Financial services companies: These are excluded because their capital structure is different from that of a non-financial firm. Their capital structure, sources and allocation of funds are regulated with regulations such as the capital adequacy ratio and the reserve requirement.

Other exclusions included firms who did not have data covering the observed period.

After all the above exclusions, the sample for this study has 65 firms.

4.5 Data collection

For the purpose of this study, only secondary data was employed. The primary source of the data employed for the study was Bloomberg because it was the preferred all-encompassing data base for global information.

Panel data was employed for the purposes of this research study because of its advantages. A panel data set provides more observations leading to larger sample status. The central limit theorem may apply where single dimensional single dimensional time series or cross-sectional data sets fails making estimation and inference more efficient (Wang, 2009). According to Wooldridge (2002), it allows for control of unobserved cross-section heterogeneity.

4.6 Data analysis

Quantitative analysis has become an increasingly important way of analysing financial data. Quantitative techniques are now regarded as an effective way of providing solutions to management problems (Richard, 1992). The data analysis process employed the data analysis techniques discussed below:

4.6.1 Descriptive statistics

Descriptive statistics convert data into a format that is easier to analyse, interpret and understand (Zikmund, 2003).

Below is an indication of how descriptive statistics can be employed according to Pallant (2009).

- A description of the characteristics that make up the sample
- A check of whether the variables are compliant with the techniques to be used in answering the research questions
- Descriptive statistics can also be used to address the research questions

The descriptive statistics that are covered in this study are:

4.6.1.1 Measures of central tendency

- The sample mean

  The sample mean which is calculated as the sum of all data observations divided by the number of the observations, is widely known as the arithmetic average of the sample or observations.

- The median

  The median of a data set is the observation in the middle of the data. If the data set has an equal number of observations, then the median is calculated by averaging the two middle observations.

4.6.1.2 Measures of dispersion

- The minimum, maximum and the range

  The minimum is the smallest observation in a data set and the maximum is the biggest value in a data set. The difference between the smallest and largest observations is called the range.

4.6.1.3 Measures of variability

- Variance

  Variance is calculated at the average of the squared deviations from the mean of a data set.

- Standard deviation

  The standard deviation of a data set is the square root of the variance of the data set.

4.6.2 Regression analysis

According to Sykes (2003) a regression analysis is a statistical tool that is used for the investigation of relationships between variables where the investigator assembles data on the underlying variables of interest and employs regression to estimate the quantitative effects of the causal variables upon the variable that they influence. As explicitly stated among the study objectives and hypothesis, part of this study sought to establish whether the capital structure is irrelevant as per MM I and the factors that determine the debt - equity structure divide. To effectively and efficiently achieve these objectives, a parsimonious panel data regression analysis was adopted

4.6.2.1 The Panel Data regression model

The extant literature on panel data analysis submits that generally, as in this case, data can form a panel that is tenable for panel data modelling and analysis when it is formed out of observations pooled across different individuals, countries, companies, households, etc. and also over several time periods. To test the MM I proposition and unravel the key determinants of a firms capital structure, data was collected on different variables for each company from 2002 to 2011 for 65 companies. The desire for parsimony required that only a few variables were included in the model, yet, according to Koops (2006) a poorly specified model runs into the risk of misspecification and spurious or meaningless regression. To mitigate such an unfavourable likelihood, we adopted a panel data regression methodology that is acclaimed for being able to control for individual heterogeneity which helps to account for missing variables and reduce the possibility of multicollinearity that is prevalent in time series data Baltagi (2005). A basic representation of the study model can be shown as:

$$Y_{it} = \alpha + \boldsymbol{X'_{it}\beta} + \varepsilon_{it} \quad (4)$$

In the model above, Y represents the dependent variable and X denotes a vector of explanatory variables. In addition, β is a vector of explanatory variables' coefficients, ε is the error term, i is the individual company subscript while t is the time subscript. In the first case, this model is used to represent a model that seeks to estimate whether firm's performance, which is proxied by EPS, has a significant relationship with debt-to-equity ratio, corporate tax shield ratio and asset tangibility. Consequently, X denotes a vector of debt-to-equity ratio, corporate tax shield ratio and asset tangibility whereas Y represents the firm's performance. As can be seen, very few variables are included on the right hand side of equation (4), this means that the error term will not meet the classic least square orthogonality requirements since effects of variables not covered in the study will all be captured by ε_{it} . Fortunately, the panel literature advises that ε_{it} can be decomposed into company specific effects and a pure error term. Specifically,

$$\varepsilon_{it} = d_i + \epsilon_{it} \quad (5)$$

d_i is called the individual specific effect which captures unobserved company-specific effects while ϵ_{it} are pure errors that are independent and identically distributed with a mean of zero and a constant variance. Assuming further that d_i is a fixed parameter for every company, independent of the ϵ_{it} for all i and t but highly correlated to X_{it}, then the new model formed is often called a fixed effect model (FEM). In particular,

$$Y_{it} = \alpha + \boldsymbol{X'_{it}\beta} + d_i + \epsilon_{it} \quad (6)$$

It's common for such a model to be estimated using dummy variables technique to represent each company so that the intercept can vary between companies. This method is popularly known as least square dummy variable (LSDV) approach. According to Gujarati (2003), the number of dummies to be introduced will be equal to the number of companies less one, that is, only 64 dummies will be used.

$$EPS_{it} = \alpha + \beta_1(\frac{D}{E})_{it} + \beta_2 TS_{it} + \beta_3 AT_{it} + d_i + \epsilon_{it} \quad (7)$$

Where:

EPS = earnings per share of firm i in time t (proxy for firm value)

$\frac{D}{E}$ = the debt-equity ratio of firm i in time t (proxy for capital structure)

TS = the tax shield which is the tax to net income ratio of firm i in time t

AT = the asset tangibility which is the ratio of fixed assets to total assets of firm i in time t

In our second case, the above model can be specified as:

$$(\frac{D}{E})_{it} = \delta + \gamma_1 Size_{it} + \gamma_2 Prof_{it} + \gamma_3 TS_{it} + \gamma_4 AT_{it} + \epsilon_{it} \quad (8)$$

Where:

$\frac{D}{E}$ = the debt-equity ratio of firm i in time t (proxy for capital structure)

Size = the market cap of firm i in time t

Prof = the return on asset of firm i in time t (proxy for profitability)

TS = is the tax shield which is the tax to net income ratio of firm i in time t

AT = the asset tangibility which is the ratio of fixed assets to total assets of firm i in time t

4.6.3 Defining the dependent variables

For the purposes of addressing the research questions set out in this paper the dependent variables are as follows:

- **Earnings per share (EPS)**: EPS is net profit/earnings expressed on a per share basis. For the purposes of this study, EPS will be used as a proxy for firm value.
- **Debt-to-Equity (D/E):** For the purposes of this study, the D/E ratio will be used as a proxy for the capital structure of a firm.

4.6.4 Defining the explanatory variables

The explanatory variables for the model use in this study are as follows:

- **Debt-to-Equity (D/E):** For the purposes of this study, the D/E ratio will be used as a proxy for the capital structure of a firm.
- **Tax Shield:** For the purposes of this study, the tax shield will be expressed as a ratio of tax paid to net income.
- **Size:** ratio of market capitalization of the firm to the total industry capitalization

- **Profitability:** Return on Assets (ROA) will be used as a proxy for profitability in our model.
- **Asset tangibility:** For the purpose of this study, asset tangibility will be calculated as a ratio of fixed assets to total assets.

4.6.5 Hypothesis testing process

Theoretical hypothesis may be accepted or rejected by the application of appropriate statistical techniques to empirically observed data (Zikmund, 2003).

The process followed for hypothesis testing is as follows:

- Define the null hypothesis (H_0)
- Define the alternative hypothesis (H_1)
- Define the level of significance (α)
    - The level of significance establishes the level that is considered too low to support the null hypothesis. (α = 0.05/95%)
- Reject or accept the null hypothesis based on the level of significance

5 Chapter five - Presentation and analysis of results

5.1 Introduction

The results and findings are outlined in this section with inferences drawn from the hypotheses in the previous section of this paper as follows:

- A presentation of the descriptive statistics of all firms in the sample for the study
- Unit root test results
- The descriptive statistics results
- Regression results for research hypothesis one
- Results for research hypothesis two
- Research hypothesis three
- Regression results for research hypothesis four

5.1.1 Descriptive statistics

Note that the Oil&Gas and Telecommunications industries were excluded when running the regression because they only had one and two firms, respectively, that met the sample selection specifications.

From Table 1 below, several measures of central tendency and dispersion were computed to depict the underlying distribution of each variable. The key highlights of the table are as follows:

- EPS had an overall average of about 3.84% for all 65 companies and a median of 1.96%.
- The debt-to-equity ratio had a mean of 50.17%, a median of 28.98% and a relatively high standard deviation of 71.03%.

As can be seen the two variables, which forms the two main dependent variables adopted for this study, exhibit a distribution close to normality although they are extremely dispersed.

The other variables whose descriptive statistics were computed are shown in table 1 below.

Table 1: ALL INDUSTRIES POOLED – DESCRIPTIVE STATISTICS

	AT	D2E	EPS	MCAP	PE	ROA	TS
Mean	48.84	50.17	3.84	9.23	14.29	11.46	36.21
Median	39.55	28.98	1.96	3.25	11.51	9.40	45.08
Maximum	632.40	582.71	54.52	75.90	265.94	512.28	274.14
Minimum	0.00	0.00	-8.22	0.00	0.02	-45.60	-3,257.14
Std. Dev.	38.72	71.03	5.46	15.01	17.45	21.52	137.83

5.1.2 Unit root test

A variable is said to have unit root when it is explosive. According to existing literature on unit root tests, a variable can only be included in a model when it does not have unit root or is stationary. Since most financial series have an underlying growth rate, their mean and/or variance are continually increasing which will lead to spurious regression results if they are included in regression models without eliminating such non-stationarity.

Several methods of testing panel data unit root exist, but the Levin, Lin & Chu (2002) test was adopted for this study. The results of this test are given below.

According to the results in Table 2 below, all variables exhibited stationarity and unit root was non-existent and were all suitable to include in the regression analysis.

Table 2: UNIT ROOT TEST

Panel unit root test: Summary
Sample: 2002 2011
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	
Null: Unit root (assumes common unit root process)				
AT	-325.366	0.0000	65	520
Debt-to-Equity Ratio	-5.66143	0.0000	65	520
EPS	-4.34689	0.0000	65	520
PE	-12.4399	0.0000	65	520
TS	-215.158	0.0000	65	520
ROA	-17.2426	0.0000	65	519
Market Capitalization Ratio	-12.6915	0.0000	65	520

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Note: EPS stands for Earnings Per Share, PE stands for price per earnings ratio, TS stands for tax shield ratio, AT stands for asset tangibility ratio, ROA stands for return on assets

5.2 Research hypothesis one: capital structure is irrelevant as per MM1

The results for the pooled companies across industries show that none of the explanatory variables were significant at the 5% level of significance. However, asset tangibility showed significance at the 10% level. The debt-to-equity ratios of South African firms sampled in this study were insignificant in this model, which means that they had no explanatory power on EPS (firm value).

The overall fit of the model shown by the R squared stood at 0.6 or 60% which indicates that the model can explain 60% of the variance in the EPS (firm value). This is supported by a significant F-statistic at 5% level.

Table 3: FEM REGRESSION OF ALL COMPANIES - FIRM VALUE AS DEPENDENT

Dependent Variable: EPS
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 65
Total panel (balanced) observations: 650

Variable	Coefficient	Std. Error	t-Statistic	
C	4.451460	0.387097	11.49959	0.0000
D2E	-0.002138	0.002996	-0.713499	0.4758
TS	0.001515	0.001110	1.365001	0.1728
AT	-0.011029	0.006351	-1.736578	0.0830

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.595398	Mean dependent var	3.860712
Adjusted R-squared	0.548820	S.D. dependent var	5.475059
S.E. of regression	3.677593	Akaike info criterion	5.541123
Sum squared resid	7871.369	Schwarz criterion	6.009483
Log likelihood	-1732.865	Hannan-Quinn criter.	5.722788
F-statistic	12.78285	Durbin-Watson stat	1.078609
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.2.1 The irrelevance of capital structure in some of the industries sampled in the study

5.2.1.1 Industrials

The results for the industrials companies depicted below indicates that asset tangibility is the only significant variable at the 5% level of significance, however, the tax shield was found to be significant at the 10% level of significance. As in the previous results, the debt-

to-equity ratios of firms in the Industrials industry were insignificant meaning that they had no explanatory power on the dependent variable EPS.

The R squared was significant at the 5% level and revealed that the model explains 63% of the variance in EPS (firm value).

Table 4: FEM REGRESSION OF INDUSTRIAL COMPANIES - FIRM VALUE AS DEPENDENT

Dependent Variable: EPS
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 18
Total panel (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.963874	0.884506	7.873177	0.0000
D2E	0.000194	0.003570	0.054303	0.9568
TS	0.001590	0.000847	1.877088	0.0623
AT	-0.068269	0.023086	-2.957164	0.0036

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.625761	Mean dependent var	4.463009
Adjusted R-squared	0.578687	S.D. dependent var	4.162982
S.E. of regression	2.702134	Akaike info criterion	4.935242
Sum squared resid	1160.943	Schwarz criterion	5.307753
Log likelihood	-423.1717	Hannan-Quinn criter.	5.086279
F-statistic	13.29312	Durbin-Watson stat	0.807361
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.2.1.2 Basic materials

The basic materials like the industrials results, show that only asset tangibility is significant at the 5% level of significance. The debt-to-equity and tax shield are not significant. This means that the debt-to-equity ratios of firms in the Basic materials industry had no explanatory power over the dependent variable.

The R squared was significant at the at the 5% significance level revealing that 53% of the variance in EPS (firm value) is explained by the model.

Table 5: FEM REGRESSION OF BASIC MATERIALS COMPANIES - FIRM VALUE AS DEPENDENT

Dependent Variable: EPS
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 12
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.62170	4.001696	3.903768	0.0002
D2E	-0.045150	0.044473	-1.015218	0.3123
TS	0.006028	0.017290	0.348669	0.7280
AT	-0.105043	0.049307	-2.130406	0.0355

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.538854	Mean dependent var	6.229901
Adjusted R-squared	0.477368	S.D. dependent var	10.03394
S.E. of regression	7.253866	Akaike info criterion	6.917415
Sum squared resid	5524.950	Schwarz criterion	7.265851
Log likelihood	-400.0449	Hannan-Quinn criter.	7.058916
F-statistic	8.763828	Durbin-Watson stat	1.185977
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.2.1.3 Consumer Services

The results for Consumer services also show that asset tangibility was the only significant variable at the 5% significance level. Once again the debt-to-equity ratio is insignificant which means that the debt-to-equity ratios of firms in the Consumer services have no effect on their firm value.

The R squared was significant at the 5% significance level and showed that the model explained 65% of the variation in EPS (firm value).

Table 6: FEM REGRESSION OF CONSUMER SERVICES COMPANIES - FIRM VALUE AS DEPENDENT

Dependent Variable: EPS
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 17
Total panel (balanced) observations: 170

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.926782	0.931943	5.286572	0.0000
D2E	0.000183	0.003172	0.057712	0.9541
TS	-0.003598	0.005218	-0.689529	0.4916
AT	-0.044045	0.020753	-2.122396	0.0354

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.647460	Mean dependent var	2.884656
Adjusted R-squared	0.602805	S.D. dependent var	2.654892
S.E. of regression	1.673203	Akaike info criterion	3.977488
Sum squared resid	419.9414	Schwarz criterion	4.346405
Log likelihood	-318.0865	Hannan-Quinn criter.	4.127190
F-statistic	14.49915	Durbin-Watson stat	0.569593
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.2.1.4 Consumer goods

The results for Consumer goods like the previous industries show that only asset tangibility was significant at the 5% level of significance. This means that the debt-to-equity ratios of these firms did not have explanatory power over the dependent variable.

The R squared was significant at the 5% significance level and showed that the model explains 83% of the variation in EPS (firm value).

Table 7: FEM REGRESSION OF CONSUMER GOODS COMPANIES - FIRM VALUE AS DEPENDENT

Dependent Variable: EPS
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 11
Total panel (balanced) observations: 110

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.100045	1.272217	0.864668	0.3894
D2E	-0.003253	0.005113	-0.636205	0.5262
TS	-0.002381	0.002751	-0.865349	0.3890
AT	0.047942	0.023476	2.042156	0.0439

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.831334	Mean dependent var	3.332155
Adjusted R-squared	0.808494	S.D. dependent var	3.915189
S.E. of regression	1.713343	Akaike info criterion	4.033184
Sum squared resid	281.8124	Schwarz criterion	4.376881
Log likelihood	-207.8251	Hannan-Quinn criter.	4.172589
F-statistic	36.39780	Durbin-Watson stat	0.892084
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.2.1.5 Health care

According to the Health care regression results, tax shield was the only significant variable at the 5% level of significance. Once again the debt-to-equity ratios of firms within this industry have no statistical effect on firm value.

The R squared was significant at the 5% significance level indicating that the model explains 56% of the variation in EPS (firm value).

Table 8: FEM REGRESSION OF HEALTH CARE COMPANIES - FIRM VALUE AS DEPENDENT

Dependent Variable: EPS
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 3
Total panel (balanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.805106	0.593117	4.729431	0.0001
D2E	0.000402	0.001673	0.240129	0.8123
TS	-0.026596	0.009360	-2.841362	0.0090
AT	-0.001995	0.002149	-0.928016	0.3626

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.556607	Mean dependent var	1.634580
Adjusted R-squared	0.464233	S.D. dependent var	1.512952
S.E. of regression	1.107422	Akaike info criterion	3.218802
Sum squared resid	29.43318	Schwarz criterion	3.499042
Log likelihood	-42.28204	Hannan-Quinn criter.	3.308453
F-statistic	6.025608	Durbin-Watson stat	0.595468
Prob(F-statistic)	0.000952		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.2.1.6 Technology

The results for the Technology industry show that asset tangibility was the only variable that was significant at the 5% significance level. The debt-to-equity ratio was insignificant meaning that it had no statistical effect on firm value.

The R squared was significant at the 5% significance level and showed that the model explained 47% of the variation in EPS (firm value).

Table 9: FEM REGRESSION OF TECHNOLOGY COMPANIES - FIRM VALUE AS DEPENDENT

Dependent Variable: EPS
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 4
Total panel (balanced) observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.733536	0.909980	-1.905028	0.0655
D2E	0.001082	0.015802	0.068483	0.9458
TS	-0.005117	0.006036	-0.847837	0.4026
AT	0.191378	0.056131	3.409503	0.0017

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.468932	Mean dependent var	1.314178
Adjusted R-squared	0.372374	S.D. dependent var	1.629320
S.E. of regression	1.290794	Akaike info criterion	3.506020
Sum squared resid	54.98292	Schwarz criterion	3.801574
Log likelihood	-63.12040	Hannan-Quinn criter.	3.612883
F-statistic	4.856481	Durbin-Watson stat	1.805290
Prob(F-statistic)	0.001181		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.2.2 Summary of results

According to the results for the effect of capital structure on firm value above, the debt-to-equity ratio has no explanatory power over EPS (proxy for firm value). This means that there is no statistical relationship between firm value and the capital structure of firms in the South African context.

These results are inconsistent with expectations as previous research in the South African context established correlation between EPS and debt-to-equity ratio. Rayan (2008) found that there is a significant negative correlation between EPS and debt-to-equity ratio at the 95% significance level. However, as above, Rayan (2008) found no significant correlation between EPS and debt-to-equity for the Basic materials, Consumer goods, Health care, Industrials and Technology industries.

The value of a firm is equal to its equity value. Because firms are traded on the market, their value equals their "market value of equity" which is essentially their market capitalisation. Market capitalisation of a firm is the firm's share price multiplied by the firm's number of outstanding shares. Being traded on the market also exposes firm value to

systematic or market effects. These systematic effects affect all firms each to a greater or lesser extent. The value of the firm is also affected by idiosyncratic or unsystematic effects which are unique to each firm.

To ensure robustness of our model we re-specified the model and increased the number of firms in the sample to 82 firms. To strip out the systematic and idiosyncratic effects on firm value we included the Top 40 All share Index (Alsi40) and Earnings Before Interest, Tax, Depreciation and Amortisation (EBITDA) as control variables for systematic and idiosyncratic effects respectively. Although gearing (debt-to-equity) is also an idiosyncratic effect, for the purpose of this study it will be treated as an independent variable in our model.

$$MCap_{it} = \Phi + \theta_1 \frac{D}{E}_{it} + \theta_2 ALSI40_{it} + \theta_3 EBITDA_{it} + d_i + \varepsilon_{it} \quad (9)$$

Where:

$MCap$ = market capitalisation of firm i in time t (proxy for firm value)

$\frac{D}{E}$ = the debt-equity ratio of firm i in time t (proxy for capital structure)

$ALSI40$ = top 40 all share index (proxy for systematic/market effects)

$EBITDA$ = earnings before interest, tax, depreciation and amortisation of firm i in time t (proxy for idiosyncratic/unsystematic effects)

The results of the re-specified model are presented below starting with the unit root test:
According to the results in Table 10 below, all variables in the re-specified model exhibited stationarity and unit root was non-existent. This means that all these variables were suitable for inclusion in the regression analysis.

Table 10: UNIT ROOT TEST (RE-SPECIFIED MODEL)

Panel unit root test: Summary
Sample: 2002 2011
Exogenous variables: Individual effects
User specified lags at: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
ALSI40	-7.56325	0.0000	82	653
DEBT_EQUITY	-17.9186	0.0000	82	641
EBITDA	-10.0099	0.0000	82	641
MKT_CAP	-6.58019	0.0000	82	653

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

To determine the relationship between firm value and capital structure, the Fixed Effect Model (FEM), Random Effect Model (REM) and the Pooled Ordinary Least Squares models were used for our panel data analysis. The most appropriate model is determined by the structure of the composite error term and the correlation between components of the error term and the observed explanatory variables (Gwatidzo & Ojah, 2009). Because the cross-section used for the purposes of this study is exhaustive in nature, FEM is probably the most appropriate model. The F-test and Hausman test were carried out to compare FEM and REM outcomes and the FEM was found to be the appropriate model to use.

The results of the pooled companies across all industries show that debt-to-equity is insignificant at the 5% level of significance, which means that debt-to-equity ratio (proxy for capital structure) has no explanatory power on market capitalisation (proxy for firm value). However, the two control variables, ALSI40 and EBITDA were both significant at the 5% significance level which meaning that they have explanatory power on market capitalisation (proxy for firm value).

The overall fit of the model shown by the R squared stood at 0.73 or 73% indicating that the model explains 73% of the variation in market capitalisation (firm value). This is supported by a significant F-statistic at 5% level of significance.

Table 11: FEM REGRESSION OF ALL COMPANIES - FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 82
Total panel (unbalanced) observations: 813

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.66E+09	4.13E+09	-0.886679	0.3755
DEBT_EQUITY	-3.57E+08	5.69E+08	-0.627068	0.5308
ALSI40	901929.7	197719.3	4.561669	0.0000
EBITDA	6113.164	386.0488	15.83521	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.732780	Mean dependent var	3.06E+10
Adjusted R-squared	0.701947	S.D. dependent var	7.39E+10
S.E. of regression	4.04E+10	Akaike info criterion	51.77879
Sum squared resid	1.19E+24	Schwarz criterion	52.27025
Log likelihood	-20963.08	Hannan-Quinn criter.	51.96744
F-statistic	23.76607	Durbin-Watson stat	1.117615
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

The results of the REM and pooled ordinary least squares models are in Appendix A, Table A1 and Table A2.

Further analysis of the MM I were carried out on the data by segregating the data by market capitalisation into large, medium and small firms. The year 2007 was selected as the base year for the selection of firms and firms with a market capitalisation of over R50 billion were classified as large firms, between R50 billion and R10 billion were classified as medium firms and all the firms with a market capitalisation of below R10 billion were classified as small firms.

The results of the regressions on large firms in Table 12 below indicated that debt-to-equity ratio is insignificant at the 5% level of significance meaning that even for large firms the capital structure has no explanatory power over firm value. As with the results of the regression on all companies, the two control variables were significant at the 5% level of significance.

According to the R squared of 0.83, the model explained 83% of the variation in firm value of large firms and this is supported by a significant F-statistic at the 5% level of significance.

Table 12: FEM REGRESSION OF LARGE FIRMS - FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 14
Total panel (balanced) observations: 140

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.51E+10	1.70E+10	-0.886430	0.3771
DEBT_EQUITY	2.98E+09	8.34E+09	0.356941	0.7217
ALSI40	6199926.	790222.1	7.845802	0.0000
EBITDA	2387.307	739.6243	3.227729	0.0016

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.832195	Mean dependent var	1.34E+11
Adjusted R-squared	0.810367	S.D. dependent var	1.32E+11
S.E. of regression	5.76E+10	Akaike info criterion	52.50400
Sum squared resid	4.08E+23	Schwarz criterion	52.86120
Log likelihood	-3658.280	Hannan-Quinn criter.	52.64915
F-statistic	38.12474	Durbin-Watson stat	0.756377
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

The results of the REM and pooled ordinary least squares models are in Appendix A, Table A3 and Table A4.

According to the regression results for the medium firms, debt-to-equity has no explanatory power over market capitalisation of medium size firm values. Debt-to-equity was found to be insignificant at the 5% level of significance while ALSI40 and EBITDA were both significant at the 5% level of significance.

The model explains 71% of the variation in firm value of medium firms and this is supported by a significant F-statistic at the 5% level of significance.

Table 13: FEM REGRESSION OF MEDIUM FIRMS - FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 26
Total panel (balanced) observations: 260

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.92E+08	1.23E+09	-0.237689	0.8123
DEBT_EQUITY	-76079960	1.14E+08	-0.667469	0.5051
ALSI40	759995.5	65950.82	11.52367	0.0000
EBITDA	1410.480	324.1809	4.350904	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.708183	Mean dependent var	1.77E+10
Adjusted R-squared	0.672812	S.D. dependent var	1.20E+10
S.E. of regression	6.87E+09	Akaike info criterion	48.24467
Sum squared resid	1.09E+22	Schwarz criterion	48.64183
Log likelihood	-6242.808	Hannan-Quinn criter.	48.40434
F-statistic	20.02118	Durbin-Watson stat	0.854069
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

The results of the REM and pooled ordinary least squares models are in Appendix A, Table A5 and Table A6.

The regression results for small firms presented in Table 14 below show that even for small firms the debt-to-equity ratio has no explanatory power over firm value. The two control variables were found to be significant at the 5% level of significance for small firms as well. The overall fit of the model shown by the R squared stood at 0.76 indicating that 76% of the variation in firm value for small is explained by the model.

Table 14: FEM REGRESSION OF SMALL FIRMS - FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 416

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.08E+08	2.45E+08	-0.847309	0.3974
DEBT_EQUITY	-37849379	43908164	-0.862012	0.3892
ALSI40	149148.2	12338.50	12.08804	0.0000
EBITDA	1159.603	221.5937	5.233012	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.761047	Mean dependent var	3.29E+09
Adjusted R-squared	0.732708	S.D. dependent var	3.26E+09
S.E. of regression	1.69E+09	Akaike info criterion	45.43027
Sum squared resid	1.05E+21	Schwarz criterion	45.86629
Log likelihood	-9404.497	Hannan-Quinn criter.	45.60267
F-statistic	26.85469	Durbin-Watson stat	0.828664
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

The results of the REM and pooled ordinary least squares models are in Appendix A, Table A7 and Table A8.

As with the results of the initial model, the re-specified model indicate that there is no statistically significant relationship between firm value and the capital structure of a firm in the South African context even when other idiosyncratic and systematic effects have been stripped out.

We therefore accept the null hypothesis and conclude that the debt-to-equity ratio is insignificant at the 5% level of significance, meaning that as according to MM I, the capital structure of a firm has no effect on firm value in the South African context.

5.3 Research hypothesis two: does the debt-to-equity ratio differ among industries listed on the JSE

Table 15: DEBT-TO-EQUITY RATIOS BY INDUSTRY

Ratio (%)	Industrials	Basic materials	Consumer services	Consumer goods	Telecoms	Health care	Technology	Oil&Gas
2002/12/31	63	41	31	44	49	30	15	42
2003/12/31	69	43	29	34	38	32	15	26
2004/12/31	61	63	36	33	26	43	13	29
2005/12/30	71	52	30	41	29	53	32	34
2006/12/29	85	45	29	38	37	194	14	31
2007/12/31	80	36	53	48	41	210	19	25
2008/12/31	78	37	40	61	42	278	18	21
2009/12/31	75	37	35	43	34	238	10	15
2010/12/31	70	32	32	54	31	228	17	13
2011/12/30	69	29	32	44	38	214	38	10
Average ratio	**72**	**42**	**35**	**44**	**37**	**152**	**19**	**25**

The table above presents the different debt-to-equity structures per industry. According to the table above, the Health care industry had the highest levels of debt-to-equity followed by the Industrials sector. The Technology industry had the lowest levels of the debt-to-equity ratio over the observed period.

The average market capitalisation of the Health care industry was 33.3% as compared to an average of 25% for the Technology industry over the observed period. This is consistent with the results of previous studies. Gwatidzo and Ojah (2009) found that large South African and Zimbabwean firms tended to use more debt than their small counterparts. Kurshev and Strebulaev (2005), also established that large firms in the United States tend to have higher leverage ratios than smaller firms.

According to the results presented in the table above, we can conclude that the debt-to-equity ratios of the different industries sampled for this study are heterogeneous, therefore, we accept the null hypothesis.

5.4 Research hypothesis three: is the industry debt-to-equity ratio persistent

The results presented graphically below depict the persistence of the different debt-to-equity structures within the different industries over the observed 10 year period.

5.4.1 Results presentation

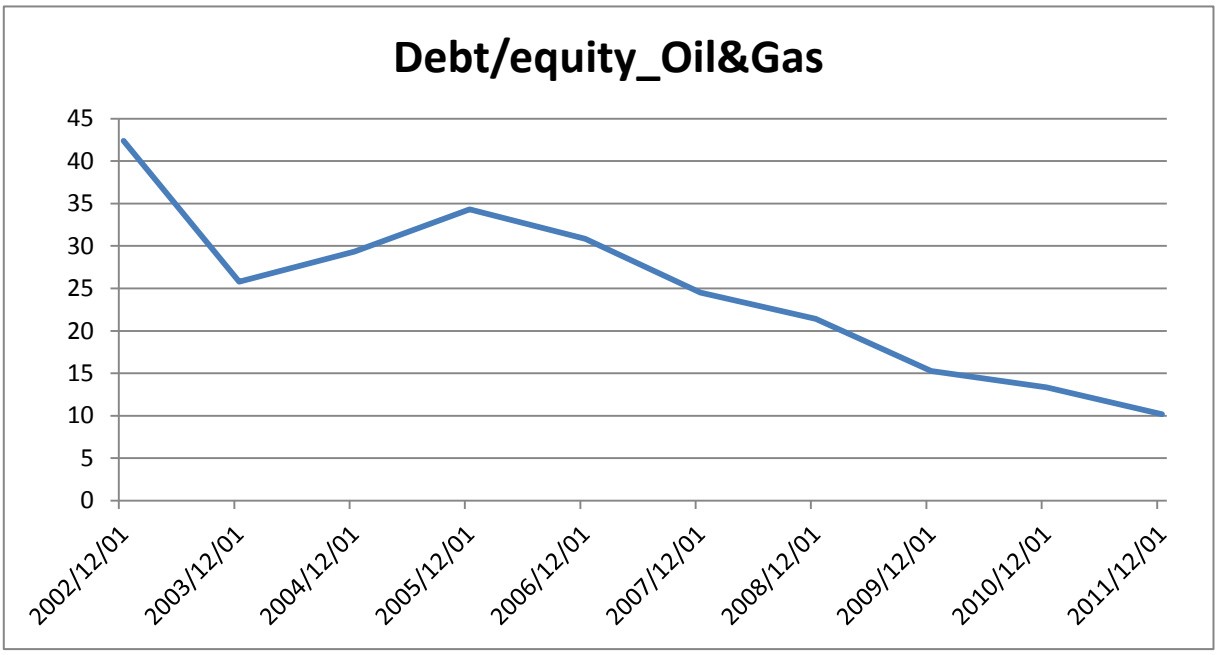


Figure 6: DEBT-TO-EQUITY_OIL&GAS

The Oil&Gas industry only has one company of the JSE being Sasol Limited ("Sasol"). Over the observed period Sasol's debt-to-equity ratio has drastically declined from just over 40% in 2002 to 10% by the end of 2011.

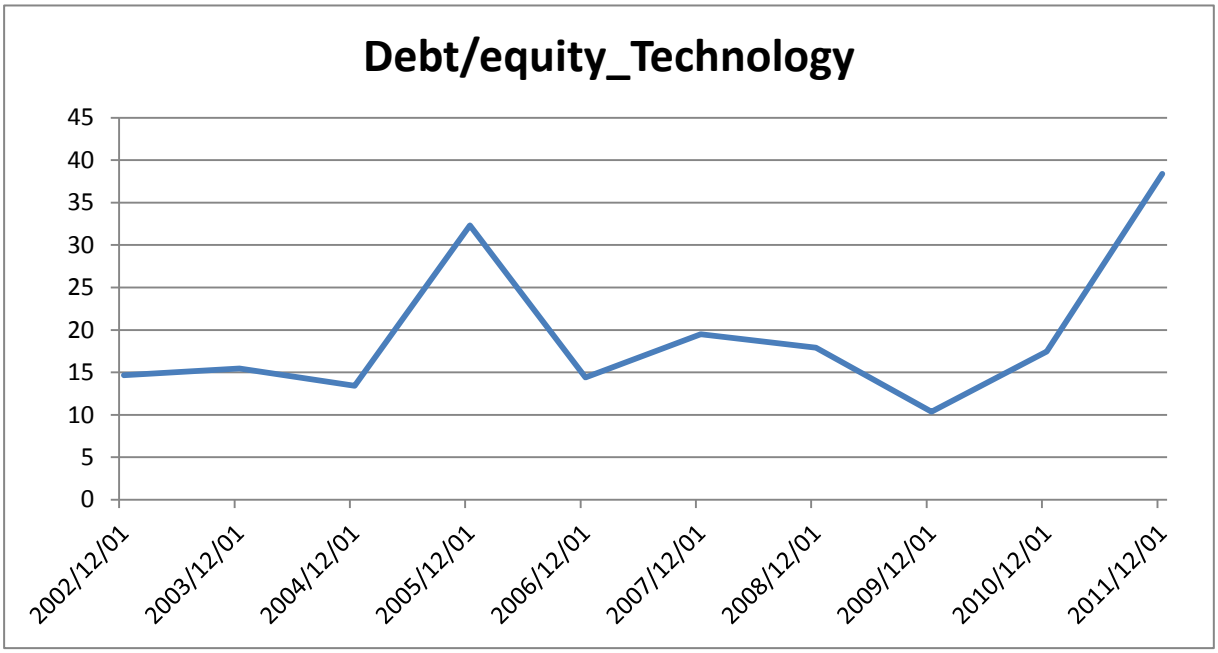


Figure 7: DEBT-TO-EQUITY_TECHNOLOGY

The debt-to-equity structure of firms within the technology industry has varied over time within the observed period. There has, however, been a sharp persistent increase in the debt-to-equity ratio from 2009 to 2011.

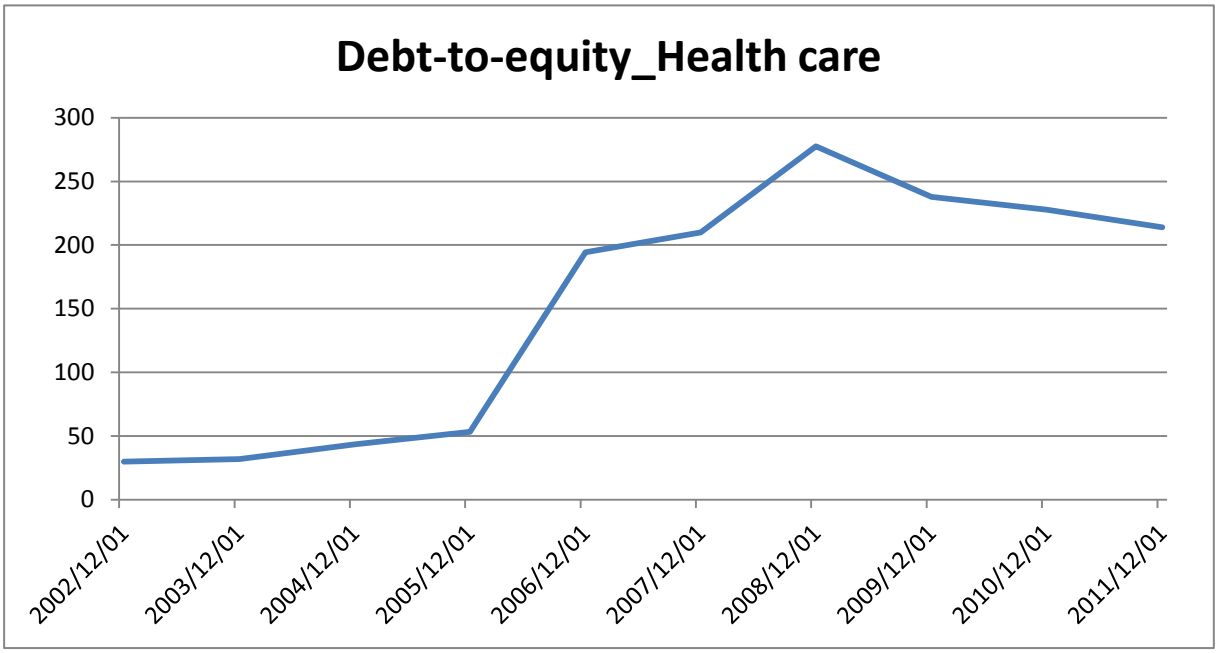


Figure 8: DEBT-TO-EQUITY_ HEALTH CARE

As shown in the figure above, the health care industry is highly leveraged. The firms within the health care industry relied heavily on debt with their debt levels aggressively increasing from 2005 to 2008. These debt-to-equity levels are higher than of all the other industries represented in this study.

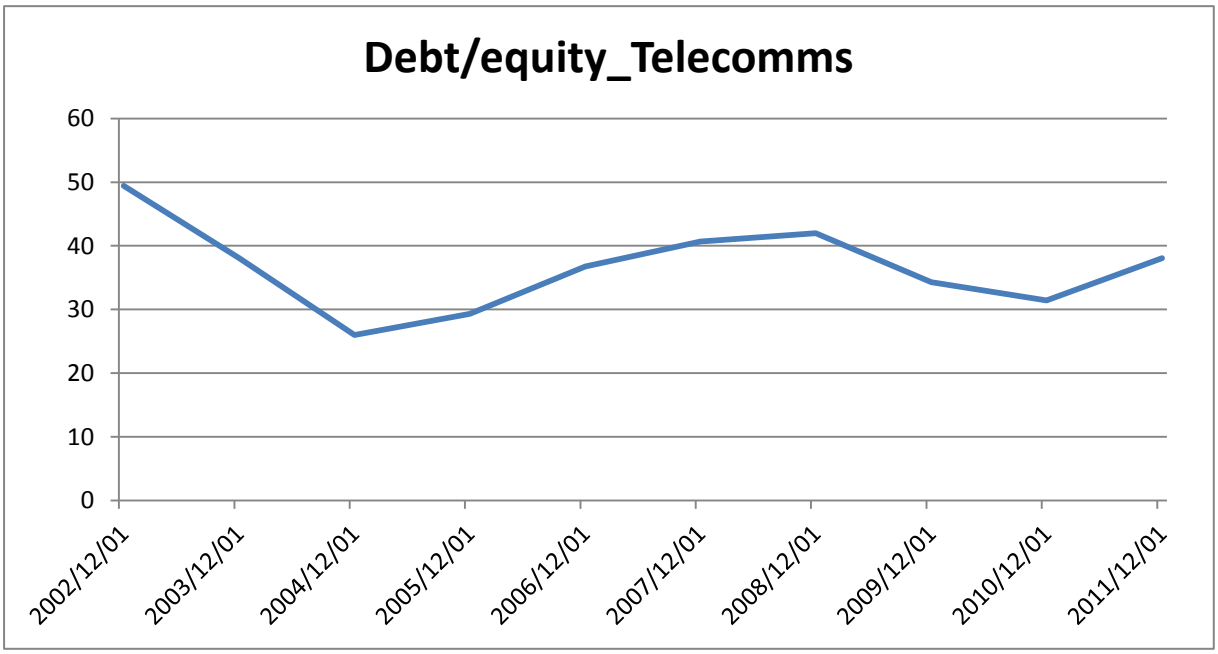


Figure 9: DEBT-TO-EQUITY_TELECOMMS

The debt-to-equity ratio for the telecommunications industry declined sharply from about 49% in 2002 to just below 30% in 2004. From 2004, the diagram shows a gradual increase that fell slightly around 2008 and moderately increasing again in 2010.

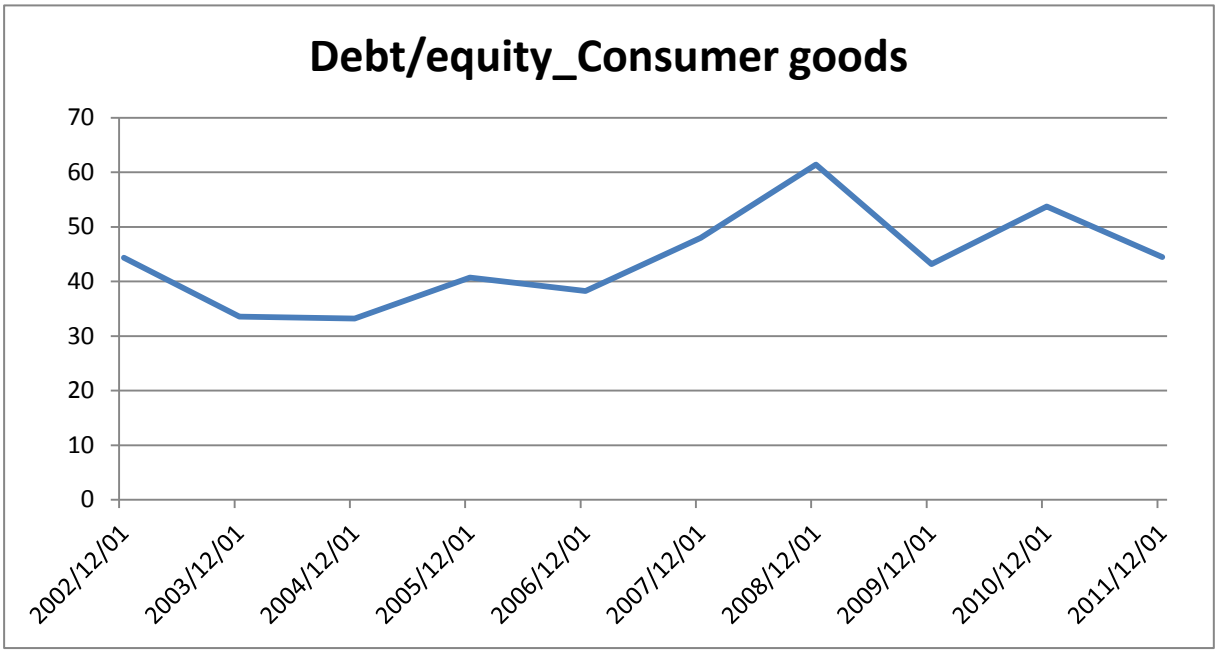


Figure 10: DEBT-TO-EQUITY_CONSUMER GOODS

The consumer goods industry shows a variable pattern in the debt-to-equity ratio. The debt-to-equity ratios of firms in the consumer goods industry show a structure that is range bound between 30% and 60% over the observed period.

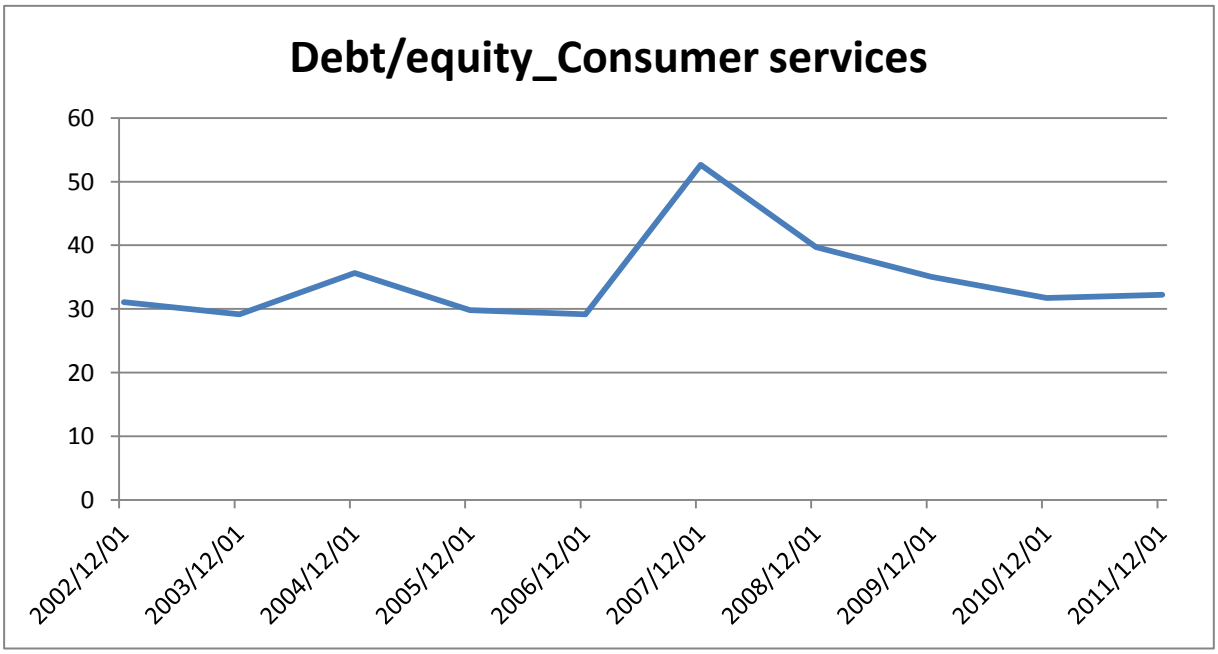


Figure 11: DEBT-TO-EQUITY_CONSUMER SERVICES

The consumer services industry show a range bound structure, however, there was a sharp increase in the structure from 2006. The sharp increase fell in 2007 to restore the persistent range.

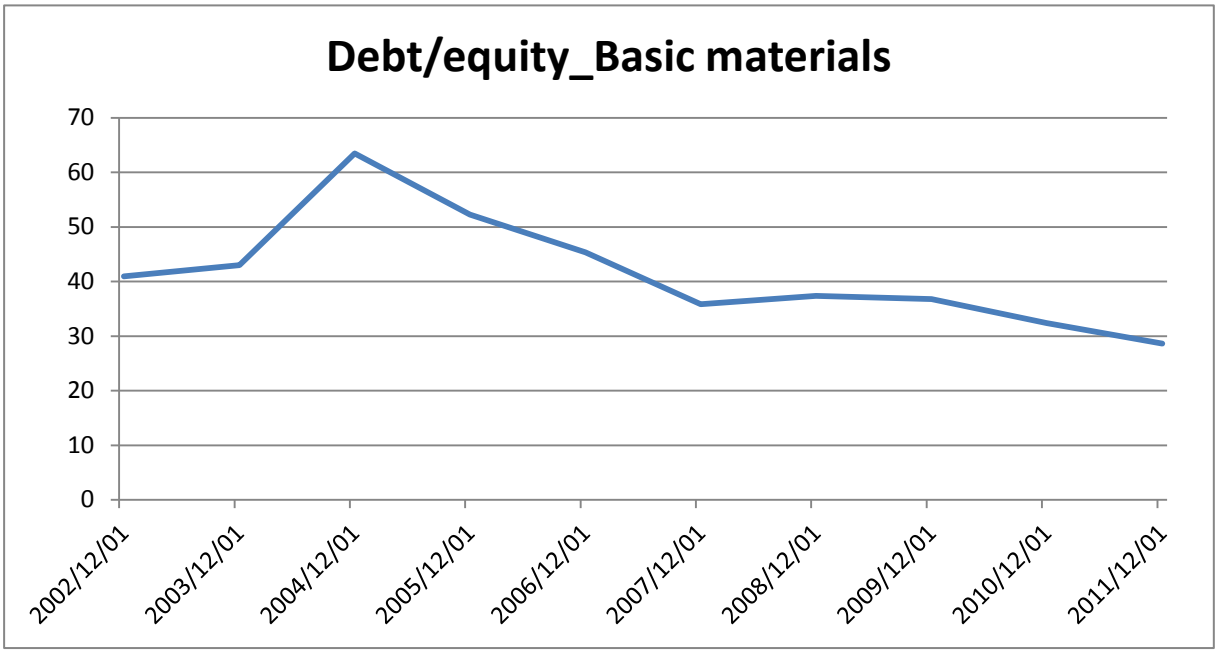


Figure 12: DEBT-TO-EQUITY_BASIC MATERIALS

The debt-to-equity ratio of the basic materials industry went down from just over 60% in 2004 to below 30% in 2011. The figure shows a persistent decline between 2004 and 2011.

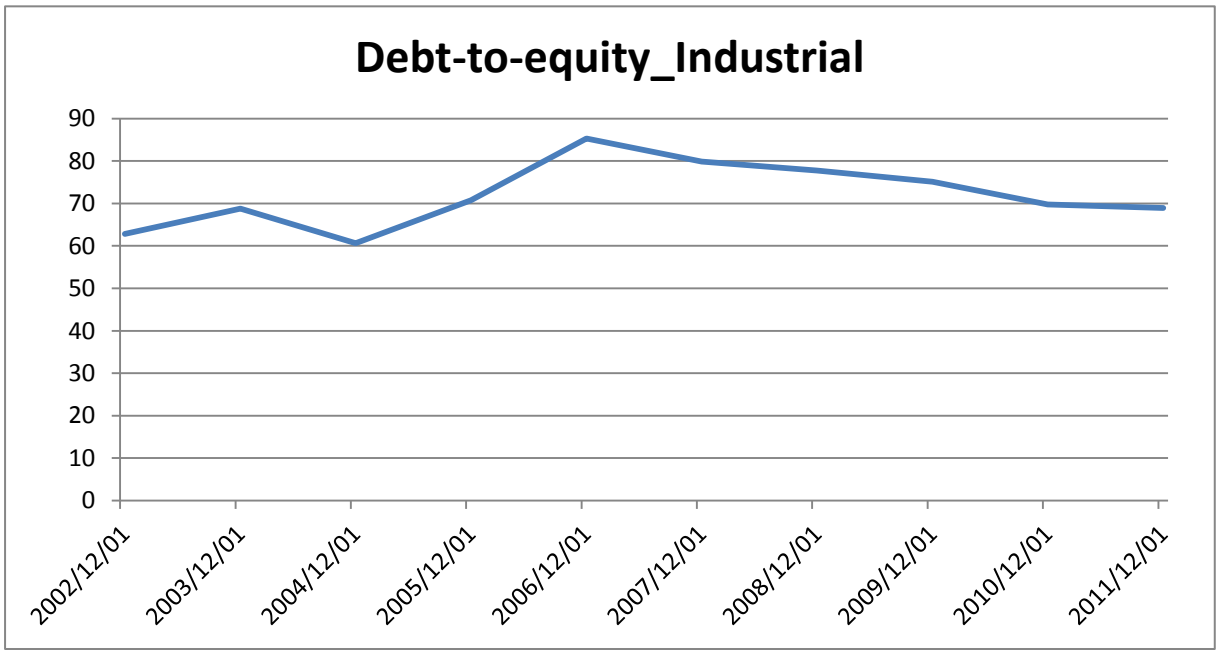


Figure 13: DEBT-TO-EQUITY_INDUSTRIAL

The debt-to-equity ratio in the industrial industry was persistently above 60% over the observed period. The ratio increased to between 80 % and 90% in 2006 and gradually declined to just below 70% where it levelled for the rest of the observed period.

5.4.2 Summary of results

The results presented above indicate that there is a vast difference with regards to the capital structure of different industries. The capital structure does not only vary but the persistence patterns are also different.

Sasol, which represents the Oil & Gas industry in this study, had very low levels of debt-to-equity ratios. These levels were predominantly below 40% throughout the observed period. The debt-to-equity levels of technology firms are variable and moderate over the observed period. There was, however, a sharp increase in levels from a little under 15% to a little over 30% in 2004. Another jump in the levels was from 15% in 2010 to levels of just below 40% in 2011.

The debt-to-equity ratios of firms in the Health industry are higher than those of all the other sectors sampled in this study. The Health industry levels are a serious outlier of the sample. The Health industry firms broke the 100% level around 2005 and peaked at 250% in 2010. The levels have, however, fallen moderately from the peak levels. The Telecommunications firms had very moderate levels of debt-to-equity throughout the observed period. The levels fell sharply from 50% in 2002 to just below 30% in 2004 and remained below the 40% level for the rest of the period.

The Consumer goods levels of debt-to-equity had a persistent range bound pattern over the observed period. The levels ranged between 30% and 60%. The Consumer services industry also had range bound levels. The upper range of firms in the Consumer services was, however, lower than that of the Consumer goods firms at 50%. The Consumer services range also had a sharp increase of levels from 30% to a little over 50% between 2006 and 2007 but they fell back to the 30% levels for the rest of the period.

The Basic materials industry had a very wide range of debt-to-equity levels. Their levels fell from a little over 60% in 2004 to levels of a little under 30% in 2011. Industrials were second after the Health industry with debt-to-equity levels ranging between 60% and 85% over the observed period.

The results above show that the debt-to-equity levels among the different industries sampled in this study are heterogeneous, therefore, we accept the null hypothesis.

5.5 Research hypothesis four: there is a relationship between debt-to-equity ratio and profitability, size, asset tangibility and tax shield

According to the regression results presented below, return on assets and asset tangibility were the only two variables in the model that were significant, meaning that they have explanatory power over the dependent variable debt-to-equity ratio (proxy for capital structure). The R squared was significant at the 5% significance level, with the model explaining 54% of the variation in the capital structure of firms sampled in this study.

Table 16: FEM REGRESSION OF ALL COMPANIES AND INDUSTRIES - CAPITAL STRUCTURE AS DEPENDENT

Dependent Variable: D2E
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 65
Total panel (balanced) observations: 650

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	68.56153	6.892333	9.947508	0.0000
MCAP	-0.574213	0.492695	-1.165453	0.2443
ROA	-0.226823	0.101865	-2.226697	0.0264
TS	0.001885	0.015285	0.123351	0.9019
AT	-0.215968	0.087574	-2.466129	0.0139

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.544307	Mean dependent var	50.18922
Adjusted R-squared	0.490972	S.D. dependent var	70.97957
S.E. of regression	50.64120	Akaike info criterion	10.78749
Sum squared resid	1489993.	Schwarz criterion	11.26274
Log likelihood	-3436.936	Hannan-Quinn criter.	10.97183
F-statistic	10.20559	Durbin-Watson stat	0.910026
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, MCAP stands for market capitalisation, ROA stands for return on asset, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.5.1 The variables that affect the capital structure of some of the industries sampled in this study

5.5.1.1 Industrials

According to the Industrials results below, return on asset was the only variable that was significant at the 5% level of significance. Market capitalisation, tax shield and asset

tangibility were all insignificant meaning that they did not have explanatory power over the Industrial firms' capital structure.

The R square was significant at the 5% level of significance and indicated that the model explained 44% of the variation in the Industrial firms' capital structure.

Table 17: FEM REGRESSION OF INDUSTRIALS COMPANIES - CAPITAL STRUCTURE AS DEPENDENT

Dependent Variable: D2E
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 18
Total panel (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	63.52329	24.12477	2.633115	0.0093
MCAP	-1.005274	2.144806	-0.468702	0.6399
ROA	-1.737170	0.612976	-2.833994	0.0052
TS	0.004596	0.018565	0.247556	0.8048
AT	0.667979	0.501177	1.332820	0.1845

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.436653	Mean dependent var	67.15041
Adjusted R-squared	0.361777	S.D. dependent var	73.49036
S.E. of regression	58.71060	Akaike info criterion	11.09720
Sum squared resid	544615.6	Schwarz criterion	11.48745
Log likelihood	-976.7480	Hannan-Quinn criter.	11.25543
F-statistic	5.831731	Durbin-Watson stat	0.803002
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, MCAP stands for market capitalisation, ROA stands for return on asset, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.5.1.2 Basic materials

According to the Basic materials results below, market capitalisation was the only variable that was significant at the 5% level of significance. Return on assets, tax shield and asset tangibility were all insignificant at the 5% level of significance meaning that they had no explanatory power over the capital structure.

The R squared was significant at the 5% level of significance and showed that this model explained 86% of the variation in Basic materials firms' variation in capital structure.

Table 18: FEM REGRESSION OF BASIC MATERIALS COMPANIES - CAPITAL STRUCTURE AS DEPENDENT

Dependent Variable: D2E
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 12
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	38.19706	10.01638	3.813459	0.0002
MCAP	-0.569989	0.282368	-2.018605	0.0461
ROA	-0.018499	0.036035	-0.513364	0.6088
TS	0.046972	0.037455	1.254074	0.2126
AT	0.013184	0.119018	0.110771	0.9120

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.861123	Mean dependent var	35.95127
Adjusted R-squared	0.841093	S.D. dependent var	39.33392
S.E. of regression	15.67976	Akaike info criterion	8.466184
Sum squared resid	25568.90	Schwarz criterion	8.837850
Log likelihood	-491.9710	Hannan-Quinn criter.	8.617119
F-statistic	42.99090	Durbin-Watson stat	1.287387
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, MCAP stands for market capitalisation, ROA stands for return on asset, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.5.1.3 Consumer services

The Consumer services model showed that return on assets, tax shield and asset tangibility were all significant at the 5% level of significance. Market capitalisation was the only variable that was insignificant meaning that it had to explanatory power over the capital structure of firms in the Consumer services industry.

The R squared was significant at the 5% level of significance meaning that this model explained 60% of the variation in the capital structure of firms in the Consumer services industry.

Table 19: FEM REGRESSION OF CONSUMER SERVICES COMPANIES - CAPITAL STRUCTURE AS DEPENDENT

Dependent Variable: D2E
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 17
Total panel (balanced) observations: 170

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-48.62539	28.44569	-1.709412	0.0895
MCAP	1.598333	1.507378	1.060340	0.2907
ROA	-1.737781	0.502196	-3.460362	0.0007
TS	0.425092	0.125283	3.393055	0.0009
AT	1.825408	0.528354	3.454899	0.0007

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.596871	Mean dependent var	35.50554
Adjusted R-squared	0.542760	S.D. dependent var	61.29674
S.E. of regression	41.44858	Akaike info criterion	10.40199
Sum squared resid	255979.8	Schwarz criterion	10.78935
Log likelihood	-863.1693	Hannan-Quinn criter.	10.55918
F-statistic	11.03043	Durbin-Watson stat	1.519763
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, MCAP stands for market capitalisation, ROA stands for return on asset, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.5.1.4 Consumer goods

According to the Consumer goods model below, none of the variables were significant at the 5% level of significance meaning that none of them had explanatory power over the capital structure of the Consumer goods firms.

The R squared was significant at the 5% level of significance meaning that this model explained 66% of the variation in the capital structure of firms in the Consumer goods industry.

Table 20: FEM REGRESSION OF CONSUMER GOODS COMPANIES - CAPITAL STRUCTURE AS DEPENDENT

Dependent Variable: D2E
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 11
Total panel (balanced) observations: 110

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	88.72528	30.11890	2.945834	0.0041
MCAP	-0.068998	1.536023	-0.044920	0.9643
ROA	-1.092647	0.657300	-1.662327	0.0997
TS	-0.019803	0.054726	-0.361864	0.7183
AT	-0.615712	0.463234	-1.329160	0.1870

Effects Specification
Cross-section fixed (dummy variables)

R-squared	0.665984	Mean dependent var	44.08492
Adjusted R-squared	0.616760	S.D. dependent var	54.74102
S.E. of regression	33.88818	Akaike info criterion	10.01013
Sum squared resid	109098.9	Schwarz criterion	10.37838
Log likelihood	-535.5574	Hannan-Quinn criter.	10.15950
F-statistic	13.52979	Durbin-Watson stat	0.820708
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, MCAP stands for market capitalisation, ROA stands for return on asset, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.5.1.5 Health care

The results below that only return on asset was significant at the 5% level of significance while tax shield only had explanatory power that the 10% level of significance. Market capitalisation and asset tangibility both had no explanatory power over the capital structure of firms in the Health care industry.

The R squared was significant at the 5% level of significance and indicated that this model explained 81% of the variation in the capital structure of firms in the Health care industry.

Table 21: FEM REGRESSION OF HEALTH CARE COMPANIES - CAPITAL STRUCTURE AS DEPENDENT

Dependent Variable: D2E
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 3
Total panel (balanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	453.6803	75.11458	6.039844	0.0000
MCAP	-1.858029	1.808227	-1.027542	0.3149
ROA	-21.77118	2.966142	-7.339898	0.0000
TS	-1.099116	0.631393	-1.740779	0.0951
AT	0.026219	0.148385	0.176698	0.8613

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.812315	Mean dependent var	152.0290
Adjusted R-squared	0.763354	S.D. dependent var	153.5209
S.E. of regression	74.68219	Akaike info criterion	11.66532
Sum squared resid	128280.9	Schwarz criterion	11.99227
Log likelihood	-167.9799	Hannan-Quinn criter.	11.76992
F-statistic	16.59100	Durbin-Watson stat	2.036564
Prob(F-statistic)	0.000000		

Note: C stands for the common intercept, D2E stands for debt-to-equity ratio, MCAP stands for market capitalisation, ROA stands for return on asset, TS stands for tax shield ratio, AT stands for asset tangibility ratio, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

5.5.2 Summary of results

According to the results above, the regression for all companies show that return on asset and asset tangibility are the determinants of the capital structure of South African firms. The relationship between the capital structure of a firm and these two variables is negative. This means that the more profitable firms in South Africa are the less debt they use to finance their investments. These findings support the findings by Gwatidzo and Ojah (2009) who found that profitability was negatively related to the debt-to-equity ratio meaning that firms in South Africa follow the pecking order theory.

The results for the Industrials firms also indicate that Industrial firms in South Africa follow a pecking order theory as return on asset is the only significant variable in the model with a negative relationship to debt-to-equity.

For the Basic materials industry, our findings are a little different to Gwatidzo and Ojah (2009)'s findings. In their study they found a significant positive relationship between size and the debt-to-equity ratio. Our findings for firms in the Basic materials industry indicate a

significant negative relationship between size and the debt-to-equity ratio. The difference in the relationship could be attributable to the difference in variables used as a proxy for size. In their study Gwatidzo and Ojah (2009) used the years of existence of a firm as a proxy for size and in our study we used market capitalisation as a proxy for firm size. Our results indicate that firms in the Basic materials industry follow a pecking order theory as size has a significant negative relationship with the firm's capital structure.

The results for the Consumer services industry show that the capital structure of firms in this industry is determined by return on asset, the tax shield and asset tangibility. Return on asset is negatively related to the debt-to-equity ratio meaning that firms in the Consumer services industry also follow a pecking order theory. The tax shield and asset tangibility are positively related to the debt-to-equity ratio indicating that as the tax shield and fixed assets increase the more debt Consumer services firms undertake.

For the health care industry, our findings indicate that firms in this industry follow a pecking order theory as there is a negative significant relationship between return on asset and the debt-to-equity ratio.

These results indicate general pecking order behaviour in South African companies. We therefore, reject the null hypothesis and conclude that there is a relationship between the debt-to-equity ratio of firms in South Africa and profitability, size of firm, tax shield and asset tangibility.

5.6 Research hypothesis five: is there a difference among industries in terms of reliance on long-term debt

The results below graphically depict the levels of long-term borrowing ("LT Borrowing") within the different industries and their persistence over the observed period.

5.6.1 Results presentation

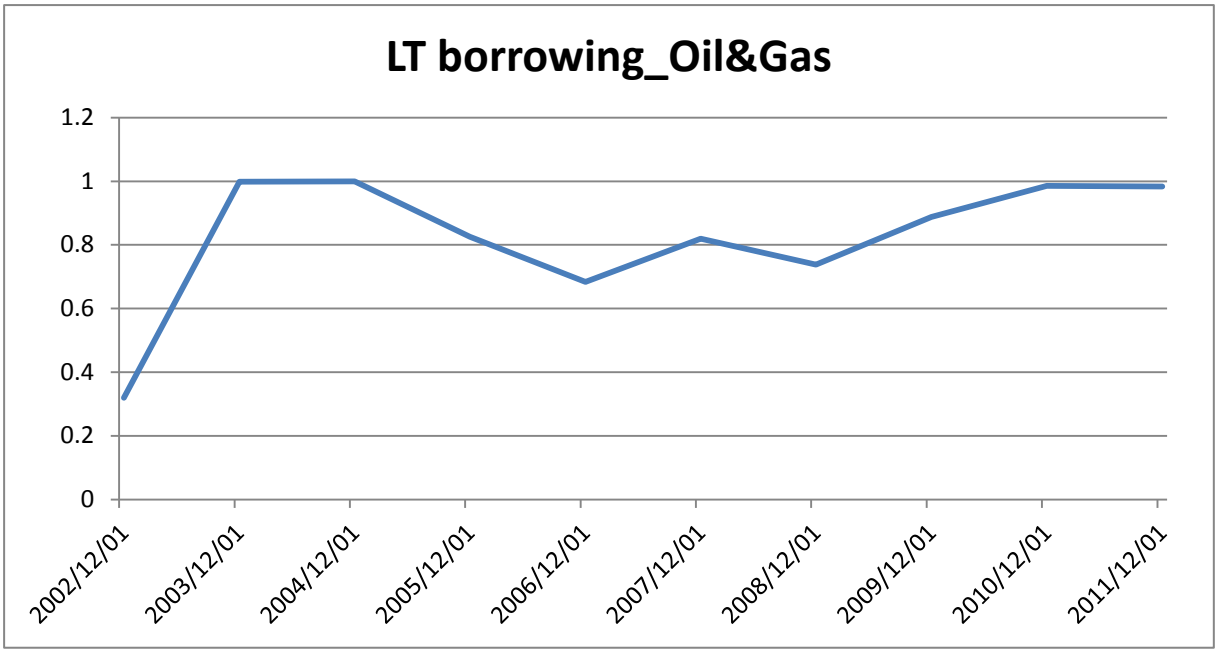


Figure 14: LONG-TERM BORROWING_OIL&GAS

According to the figure above, Sasol relies heavily on long-term borrowing as compared to short-term borrowing. The long-term debt to total debt ratio depicted in the figure above has been persistently above 70% from 2003 to 2011. Between 2003 and 2004 Sasol only had long-term debt in their books.

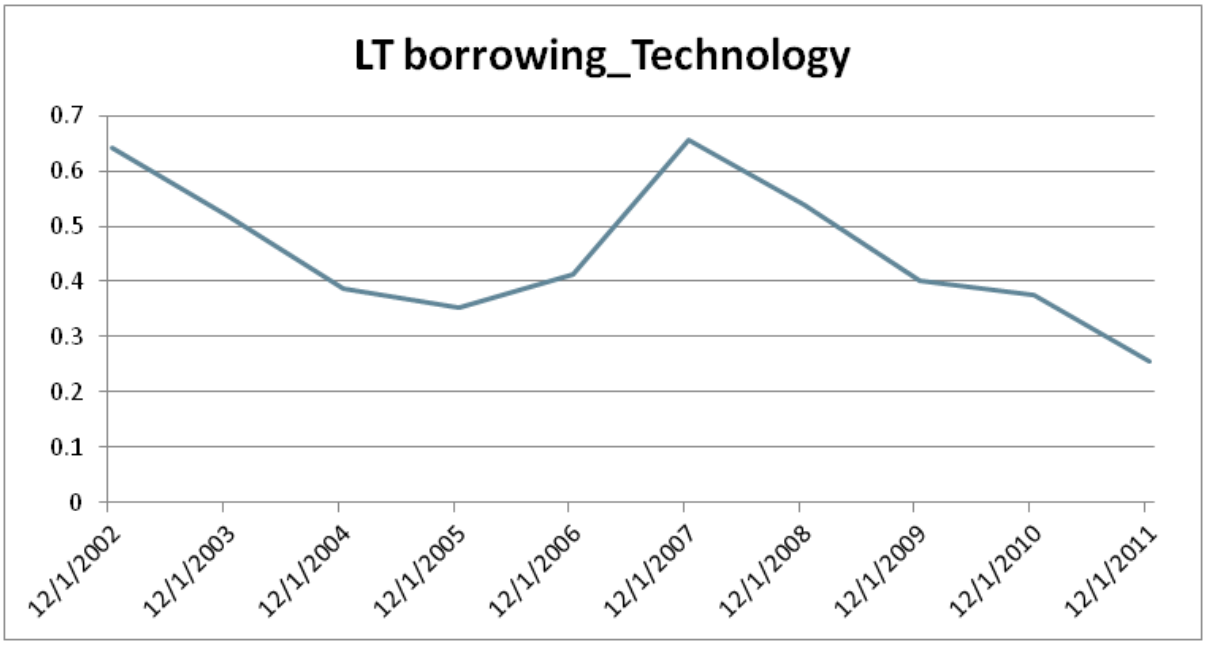


Figure 15: LONG-TERM BORROWING_TECHNOLOGY

The levels of long-term borrowing in the technology sector were variable over the observed period. Between 2004 and 2006, firms within this industry used more short-term borrowing

than long-term borrowing, however, the long-term borrowing increased to about 65% in 2007. The high levels of long-term borrowing were not sustained as the gradually declined.

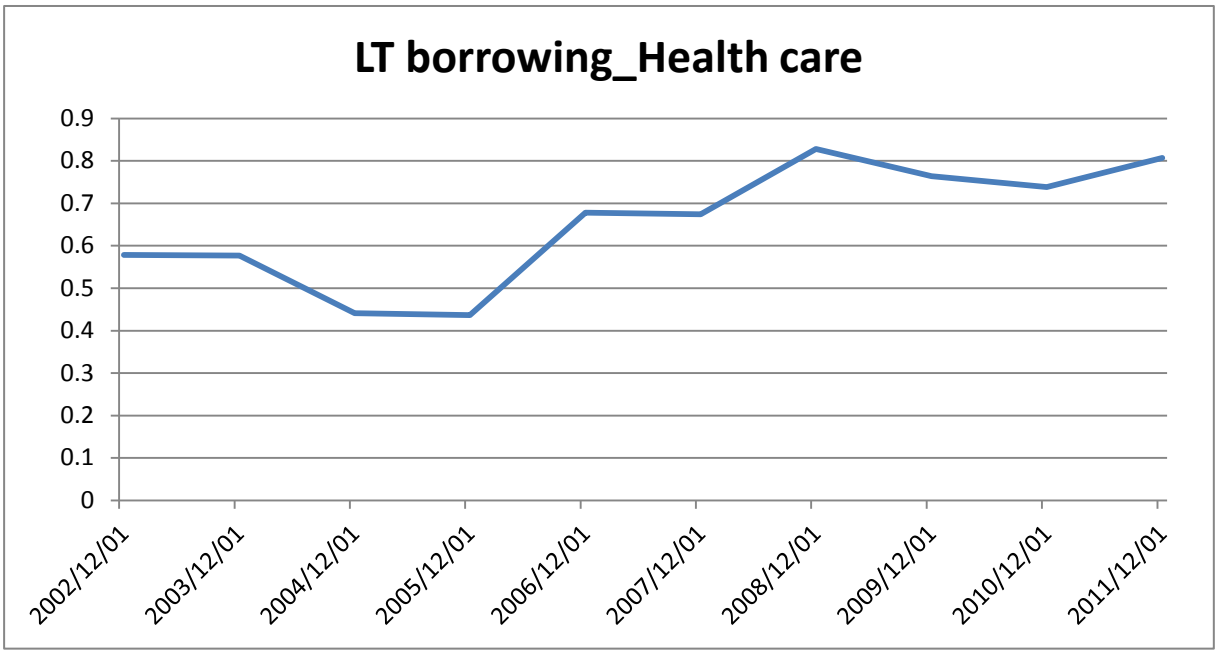


Figure 16: LONG-TERM BORROWING_HEALTH CARE

The health industry relied more on short-term borrowing between 2004 and 2005 and thereafter the long-term borrowing levels increased. The increase has been persistent from about 45% in 2005 to 80% in 2011.

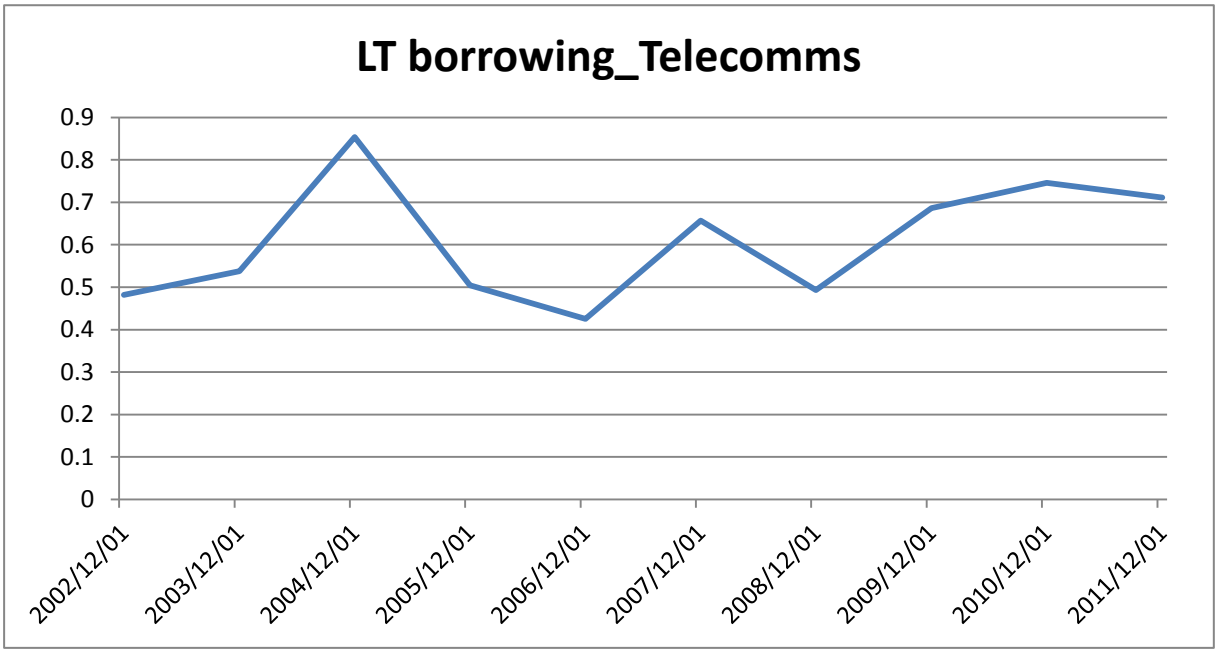


Figure 17: LONG-TERM BORROWING_TELECOMMUNICATIONS

There are variable long-term and short-term borrowing levels for firms within the telecommunication industry over the observed period. The long-term borrowing levels,

however, peaked at just above 80% in 2004. These high levels gradually declined to range bound levels of 40% and 70% between 2005 and 2011.

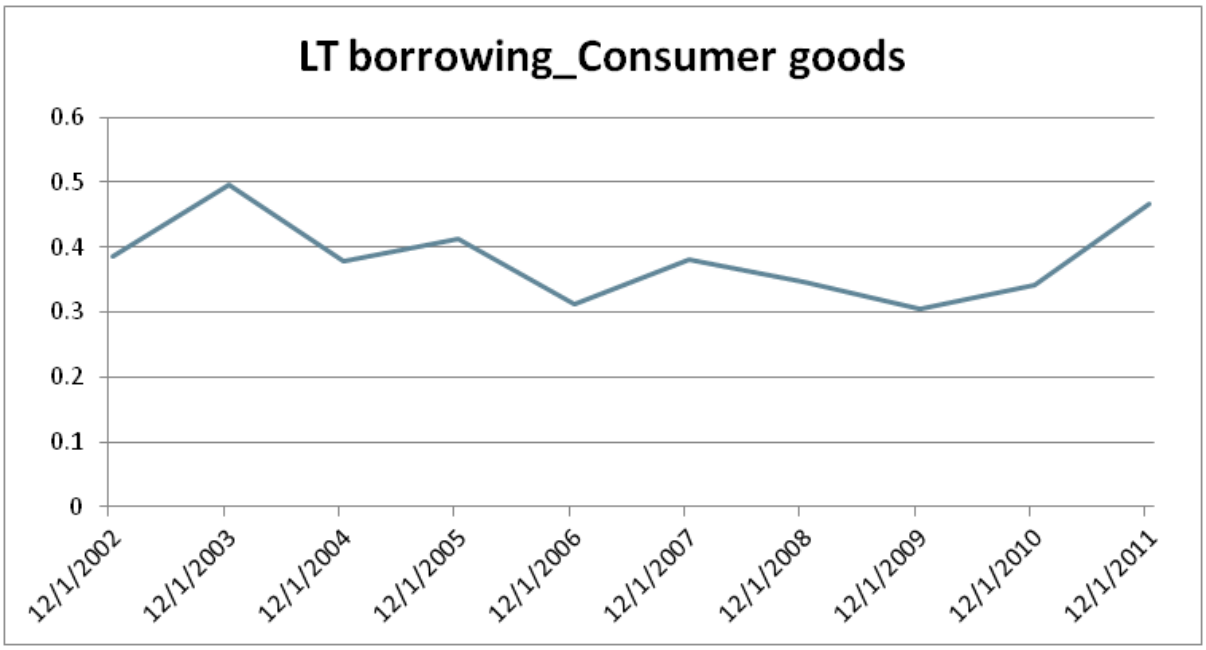


Figure 18: LONG-TERM BORROWING_CONSUMER GOODS

The firms within the consumer goods industry rely more on short-term borrowing than long-term borrowing. The long-term borrowing levels are low peaking at 50% in 2003. The long-term borrowing levels are range bound within 30% and 50% from 2002 to 2011.

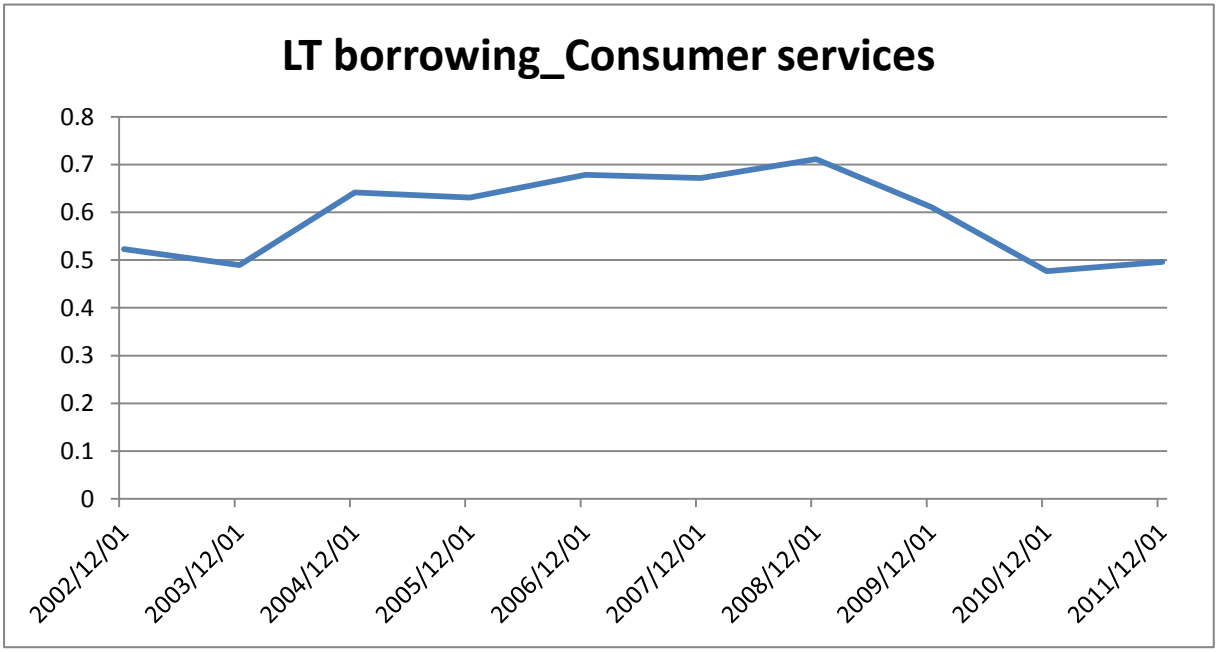


Figure 19: LONG-TERM BORROWING_CONSUMER SERVICES

The figure above shows more reliance on long-term borrowing in the consumer services industry. The long-term borrowing levels range between 50% and 70%.

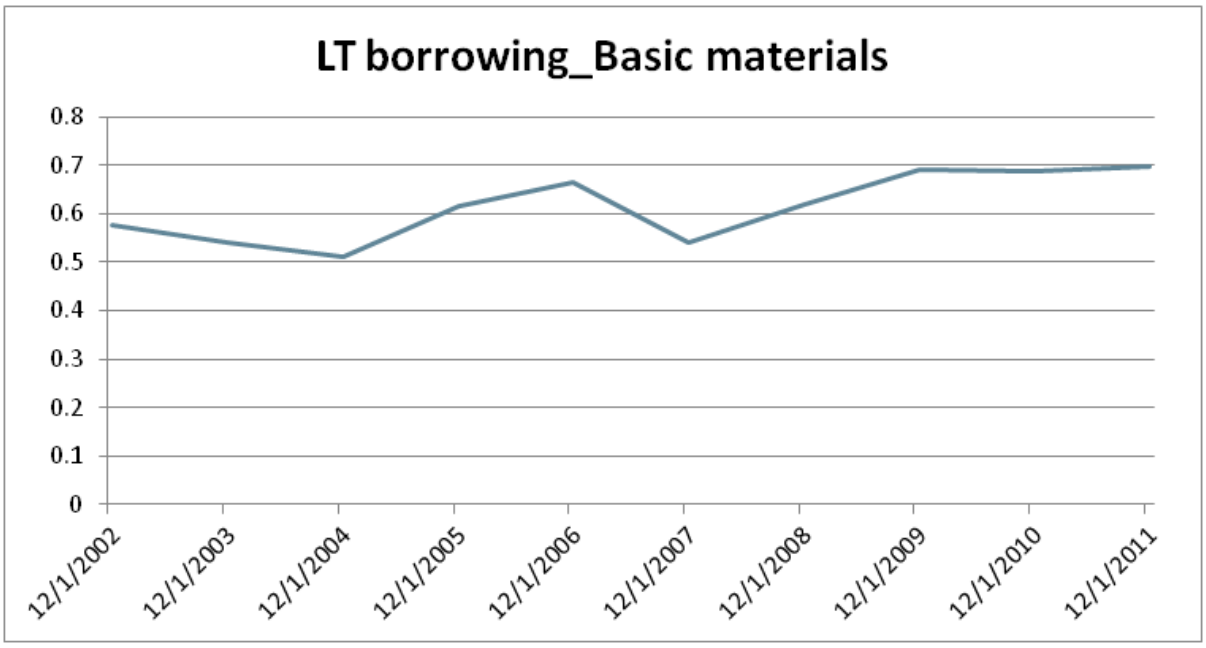


Figure 20: LONG-TERM BORROWING_BASIC MATERIALS

The basic materials industry relies more on long-term borrowing with their levels persistent at around just below 70% from 2009 to 2011.

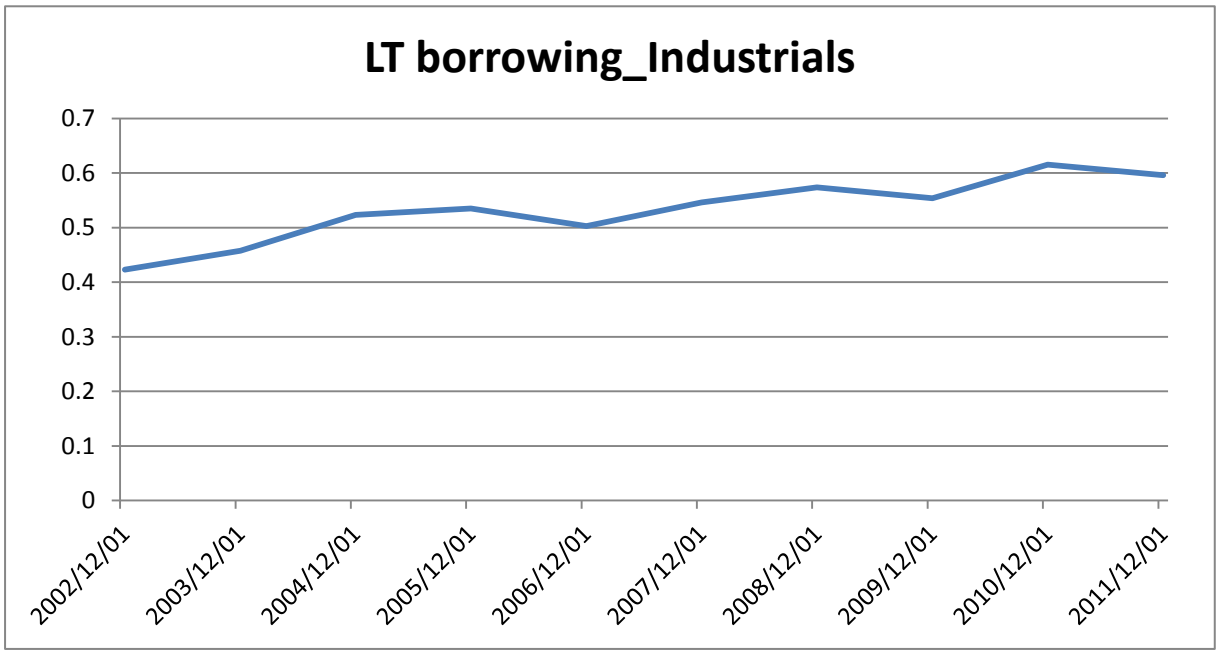


Figure 21: LONG-TERM BORROWING_INDUSTRIALS

The industrials industry's long-term borrowing increased from just over 40% in 2002 to just below 60% in 2011.

5.6.2 Summary of results

According to the results presented above, the debt structure in terms of funding between long-term and short-term debt seems to be heavily biased towards long-term debt. The reliance on long-term debt is however very different among the different industries.

The Oil & Gas industry is heavily reliant on long-term borrowing. Technology also relied heavily on long-term borrowing in the beginning of the observed period, however, these levels came down. There is a high reliance on long-term debt in the health care sector as well and this reliance has increased more towards the end of the period. Unlike the other industries Telecommunications has varying levels of short-term and long-term borrowing. But even so, the long-term borrowing levels of Telecommunications did peak to levels just below 90% around 2004.

Firms within the Consumer goods industry used more short-term borrowing over the observed period with long-term borrowing levels range bound between 30% and 50%. The Consumer services industry's borrowing levels were also range bound between 40% and 70% over the observed period. Another industry with range bound levels was the Basic materials industry. Their levels ranged between 50% and 70%. Even though these three industries all had range bound levels, these levels were different from each other. The Industrials firms' use of long-term borrowing gradually increased over time over the observed period.

The debt structure in terms of funding between long term and short term debt is very different among the different industries. The ratios, however, indicate that all these industries used more long-term borrowing over the observed period. These finding are in contrast to what Gwatidzo and Ojah (2009) found in their study. In their study, Gwatidzo and Ojah (2009), found that firms in South Africa relied more on short-term debt with long-term debt levels at only 14%.

The results indicate that all the sampled industries used more long-term borrowing than short-term borrowing over the observed period. We conclude that the debt structure in terms of funding between long term and short term debt is homogeneous among the sampled industries, therefore, we reject the null hypothesis.

6 Chapter six – Summary of the findings and Conclusion

6.1 Introduction

This chapter presents the summary of the data analysis findings presented in the previous chapter, the conclusions drawn from the findings followed by recommendations.

6.2 Summary of findings

As clearly stated above, the study sought to cover the questions, is capital structure irrelevant as per MM I, what is the capital structure (debt-to-equity) of firms per industry in South Africa, how persistent is the debt-to-equity capital structure, what factors determine the debt-to-equity structure divide, what is the debt structure in terms of funding between long term and short term debt and how persistent is the long term-short term structure. Several techniques were utilised to fulfil this end and each addressed a particular question.

To establish whether capital structure is irrelevant, a panel data regression was done on all firms pooled across industries and an industry specific analysis was also done to establish the behaviours and relationships within the industries. To establish the robustness of our model and expand the analysis of MM I, we also conducted an analysis by firm size.

The general pooled analysis found the model to be significant with the adjusted R squared of 55%. Although none of the variables were significant at the 5% level of significance, asset tangibility was significant at the 10% level of significance. The industry specific analysis found all models to be significant with adjusted R squared figures of 58% for Industrials, 48% for Basic materials, 60% for Consumer services, 81% for Consumer goods, 46% for Health care and for Technology 37%. The re-specified model on all firms was significant at the 5% level of significance with an R squared of 73%, however, debt-to-equity was still insignificant. The analysis by firm size also found all models to be significant at the 5% level of significance with R squared of 83%, 71% and 76% for large, medium and small firms respectively, however, the debt-to-equity ratio was insignificant in all models.

This means that there is no statistically significant relationship between the firm value and capital structure of firms in South Africa. These findings are highly inconsistent with prominent literature such as Sharma (2006), Fama and French (2002) all of whom concluded that there is a direct relationship between leverage and firm value. Ward and Price (2006) also indicated that an increased debt-to-equity ratio increases returns for the shareholders for profitable firms. Our inconsistent findings could be as a result of misspecification or

other unfavourable effects inherent in the data used for the analysis or it could be that the MM I proposition holds in the South African context.

To establish the capital structure of firms within the different industries listed on the JSE descriptive statistics analysis were carried out were the mean of debt-to-equity ratios for all firms in each industry were computed. According to the computed means, the Health care industry had the highest debt-to-equity ratio meaning that firms in this industry used more debt than equity as their source of capital. The industry with the lowest debt-to-equity ratios was the Technology industry. The Health care industry had a larger market capitalisation ratio of 33.3% as compared to the Technology industry ratio of 25%. These findings imply that larger firms tend to use more debt than smaller ones. Large firms are more visible and diversified than small ones and have access to easy and cheaper debt. This is inconsistent, however, with the findings of the regression analysis which indicated pecking order behaviour of South African firms. There may be other factors not included in this study that are driving the high debt-to-equity ratios of firms in the Health care industry.

To determine the persistence of the capital structure within the different firms, the results above were plotted on a graph to visually illustrate the patterns of persistence. The patterns of the capitals structure within the different industries varied over the observed period. For some industries the patterns had sharp increases and sharp declines while for some it showed a range bound pattern.

To establish factors that have an effect on the debt-to-equity divide, or simply capital structure of firms we employed a panel data regression as in the previous case. All the models were significant at the 5% level of significance. Our findings from the regression models indicated a negative significant relationship between profitability and the capital structure of a firm. This is supported by previous research by Gwatidzo and Ojah (2009) who found a negative significant relationship between profitability and capital structure. Mgudlwa (2009) also found that there was a negative and significant correlation between gearing and profitability for Manufacturing Small, Medium and Micro Enterprises (SMMEs) and large sized enterprises (LSEs). The results of the panel regressions indicated a pecking order behaviour which was also the findings of Gwatidzo and Ojah (2009) as well as Mgudlwa (2009).

In order to determine the debt structure in terms of funding between long-term and short-term debt we computed the long-term debt to total debt ratio and calculated the means for all the industries. The results found that most of the sampled industries relied more on long-term borrowing than short-term borrowing. This was in contrast to what Gwatidzo and Ojah (2009) had found in their study. In their study they found that firms in South Africa tended to use more short-term debt than long-term debt with long-term debt levels of 14%.

6.3 Conclusion

It could be argued that the results on MM I summarised above are mostly inconsistent with recent literature and economic theory from across the world. There is substantial literature that has shown that there is a relationship between firm value and the capital structure of a firm. This outcome, perhaps, concur with Myers (2002) who stated that there is no universal theory of capital structure, only conditional ones. Factors that are of significance in one context may be insignificant in another.

An interesting future research agenda would be to find possible explanations for these contrasting results, starting with verifying differences in test variables proxy and testing techniques deployed in these studies.

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Appendix A

Table A1: REM REGRESSION OF ALL COMPANIES – FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel EGLS (Cross-section random effects)
Sample: 2002 2011
Periods included: 10
Cross-sections included: 82
Total panel (unbalanced) observations: 813
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.69E+09	6.26E+09	-0.589290	0.5558
DEBT_EQUITY	-4.47E+08	5.60E+08	-0.798130	0.4250
ALSI40	877561.6	197220.0	4.449659	0.0000
EBITDA	6324.879	360.3116	17.55392	0.0000

Effects Specification		
	S.D.	Rho
Cross-section random	4.27E+10	0.5278
Idiosyncratic random	4.04E+10	0.4722

Weighted Statistics			
R-squared	0.318637	Mean dependent var	8.87E+09
Adjusted R-squared	0.316111	S.D. dependent var	4.89E+10
S.E. of regression	4.04E+10	Sum squared resid	1.32E+24
F-statistic	126.1089	Durbin-Watson stat	1.017885
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.366958	Mean dependent var	3.06E+10
Sum squared resid	2.81E+24	Durbin-Watson stat	0.478252

Note: C stands for the common intercept, DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

Table A2: OLS REGRESSION OF ALL COMPANIES – FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 82
Total panel (unbalanced) observations: 813

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBT_EQUITY	-1.14E+09	6.92E+08	-1.652381	0.0988
ALSI40	632723.4	119905.6	5.276846	0.0000
EBITDA	7234.240	346.3594	20.88651	0.0000

R-squared	0.373091	Mean dependent var	3.06E+10
Adjusted R-squared	0.371543	S.D. dependent var	7.39E+10
S.E. of regression	5.86E+10	Akaike info criterion	52.42980
Sum squared resid	2.78E+24	Schwarz criterion	52.44714
Log likelihood	-21309.71	Hannan-Quinn criter.	52.43645
Durbin-Watson stat	0.521226		

Note: DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

Table A3: REM REGRESSION OF LARGE FIRMS – FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel EGLS (Cross-section random effects)
Sample: 2002 2011
Periods included: 10
Cross-sections included: 14
Total panel (balanced) observations: 140
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.53E+10	3.49E+10	-0.436995	0.6628
DEBT_EQUITY	3.10E+09	8.27E+09	0.374963	0.7083
ALSI40	6186411.	786321.3	7.867537	0.0000
EBITDA	2419.349	725.0287	3.336901	0.0011

Effects Specification	S.D.	Rho
Cross-section random	1.14E+11	0.7972
Idiosyncratic random	5.76E+10	0.2028

Weighted Statistics

R-squared	0.501946	Mean dependent var	2.11E+10
Adjusted R-squared	0.490960	S.D. dependent var	8.01E+10
S.E. of regression	5.72E+10	Sum squared resid	4.44E+23
F-statistic	45.68765	Durbin-Watson stat	0.696939
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.224050	Mean dependent var	1.34E+11
Sum squared resid	1.89E+24	Durbin-Watson stat	0.164272

Note: C stands for the common intercept, DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

Table A4: OLS REGRESSION OF LARGE FIRMS – FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 14
Total panel (balanced) observations: 140

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBT_EQUITY	2.22E+09	1.16E+10	0.191126	0.8487
ALSI40	5277959.	751135.0	7.026646	0.0000
EBITDA	2898.073	928.0863	3.122633	0.0022

R-squared	0.223922	Mean dependent var	1.34E+11
Adjusted R-squared	0.212592	S.D. dependent var	1.32E+11
S.E. of regression	1.17E+11	Akaike info criterion	53.83545
Sum squared resid	1.89E+24	Schwarz criterion	53.89849
Log likelihood	-3765.482	Hannan-Quinn criter.	53.86107
Durbin-Watson stat	0.179438		

Note: DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

Table A5: REM REGRESSION OF MEDIUM FIRMS – FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel EGLS (Cross-section random effects)
Sample: 2002 2011
Periods included: 10
Cross-sections included: 26
Total panel (balanced) observations: 260
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.39E+08	1.68E+09	-0.202382	0.8398
DEBT_EQUITY	-1.07E+08	1.12E+08	-0.953555	0.3412
ALSI40	742195.4	65146.74	11.39267	0.0000
EBITDA	1609.488	306.0026	5.259721	0.0000

Effects Specification	S.D.	Rho
Cross-section random	5.81E+09	0.4167
Idiosyncratic random	6.87E+09	0.5833

Weighted Statistics			
R-squared	0.506003	Mean dependent var	6.22E+09
Adjusted R-squared	0.500214	S.D. dependent var	9.78E+09
S.E. of regression	6.92E+09	Sum squared resid	1.22E+22
F-statistic	87.40728	Durbin-Watson stat	0.804085
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.421520	Mean dependent var	1.77E+10
Sum squared resid	2.16E+22	Durbin-Watson stat	0.455231

Note: C stands for the common intercept, DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

Table A6: OLS REGRESSION OF MEDIUM FIRMS – FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 26
Total panel (balanced) observations: 260

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBT_EQUITY	-2.76E+08	1.33E+08	-2.075913	0.0389
ALSI40	662761.6	45425.46	14.59009	0.0000
EBITDA	2310.735	301.3975	7.666735	0.0000

R-squared	0.436556	Mean dependent var	1.77E+10
Adjusted R-squared	0.432172	S.D. dependent var	1.20E+10
S.E. of regression	9.06E+09	Akaike info criterion	48.70262
Sum squared resid	2.11E+22	Schwarz criterion	48.74370
Log likelihood	-6328.340	Hannan-Quinn criter.	48.71913
Durbin-Watson stat	0.595096		

Note: DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

Table A7: REM REGRESSION OF SMALL FIRMS – FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel EGLS (Cross-section random effects)
Sample: 2002 2011
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 416
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.94E+08	3.16E+08	-0.928410	0.3537
DEBT_EQUITY	-20139405	41725175	-0.482668	0.6296
ALSI40	135158.1	12147.04	11.12683	0.0000
EBITDA	1765.492	201.1265	8.778017	0.0000

Effects Specification	S.D.	Rho
Cross-section random	1.31E+09	0.3751
Idiosyncratic random	1.69E+09	0.6249

Weighted Statistics			
R-squared	0.418837	Mean dependent var	1.25E+09
Adjusted R-squared	0.414605	S.D. dependent var	2.31E+09
S.E. of regression	1.77E+09	Sum squared resid	1.28E+21
F-statistic	98.97430	Durbin-Watson stat	0.792218
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.426327	Mean dependent var	3.29E+09
Sum squared resid	2.53E+21	Durbin-Watson stat	0.402290

Note: C stands for the common intercept, DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

Table A8: OLS REGRESSION OF SMALL FIRMS – FIRM VALUE AS DEPENDENT

Dependent Variable: MKT_CAP
Method: Panel Least Squares
Sample: 2002 2011
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 416

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBT_EQUITY	-7521670.	45037045	-0.167011	0.8674
ALSI40	82764.99	8269.668	10.00826	0.0000
EBITDA	3191.648	194.7132	16.39154	0.0000

R-squared	0.491362	Mean dependent var	3.29E+09
Adjusted R-squared	0.488899	S.D. dependent var	3.26E+09
S.E. of regression	2.33E+09	Akaike info criterion	45.98382
Sum squared resid	2.24E+21	Schwarz criterion	46.01289
Log likelihood	-9561.635	Hannan-Quinn criter.	45.99531
Durbin-Watson stat	0.729887		

Note: DEBT_EQUITY stands for debt-to-equity ratio, ALSI40 stands for Top 40 all share index, EBITDA stands for earnings before interest, tax, depreciation and amortisation, S.E stands for standard error, S.D is the standard deviation and F-statistic stands for Fischer statistic

Appendix B

Below is a list of JSE Securities Exchange listed companies included in the sample employed for the study.

Table B1: JSE SECURITIES EXCHANGE LISTED COMPANIES BY INDUSTRY

Company	Industry
Adcorp Holdings Limited	Industrials
AdvTECH	Consumer services
AECI Limited	Basic materials
Afgri Limited	Consumer goods
African Oxygen Limited	Basic materials
African Rainbow Min Ltd	Basic materials
Allied Elec Corp Pref	Industrials
Allied Technologies Ltd	Technology
Anglo American Plat Ltd	Basic materials
Anglo American plc	Basic materials
Anglogold Ashanti Ltd	Basic materials
ArcelorMittal SA Limited	Basic materials
Aspen Pharmacare Hldgs Ltd	Health care
Assore Ltd	Basic materials
Astral Foods Ltd	Consumer goods
Aveng Group Limited	Industrials
AVI Ltd	Consumer goods
Barloworld Ltd	Industrials
Bell Equipment Ltd	Industrials
BHP Billiton plc	Basic materials
Bidvest Ltd	Industrials
Cashbuild Ltd	Consumer services
City Lodge Hotels Ltd	Consumer services
Clicks Group Ltd	Consumer services
Combined Motor Hldgs Ltd	Consumer services
Datatec Ltd	Technology
DRD Gold Ltd	Basic materials
EOH Holdings Ltd	Technology
Exxaro Resources Ltd	Basic materials
Famous Brands Ltd	Consumer services
Gold Fields Ltd	Basic materials
Grindrod Ltd	Industrials
Group Five Ltd	Industrials
Harmony GM Co Ltd	Basic materials
Howden Africa Hldgs Ltd	Industrials
Hudaco Industries Ltd	Industrials
Illovo Sugar Ltd	Consumer goods
Impala Platinum Hlgs Ltd	Basic materials
Imperial Holdings Ltd	Industrials
Invicta Holdings Ltd	Industrials
JD Group Ltd	Consumer services
Kagiso Media Ltd	Consumer services
KAP Industrial Hldgs Ltd	Industrials

Company	Industry
Lonmin plc	Basic materials
Massmart Holdings Ltd	Consumer services
Mediclinic Internat Ltd	Health care
Merafe Resources Ltd	Basic materials
Metair Investments Ltd	Consumer goods
Metrofile Holdings Ltd	Industrials
Mr Price Group Ltd	Consumer services
MTN Group Ltd	Telecommunications
Murray & Roberts Hldgs	Industrials
Nampak Ltd	Industrials
Naspers Ltd -N-	Consumer services
Netcare Limited	Health care
Northam Platinum Ltd	Basic materials
Oceana Group Ltd	Consumer goods
Omnia Holdings Ltd	Basic materials
Palabora Mining Co Ltd	Basic materials
Petmin Ltd	Basic materials
Pik n Pay Stores Ltd	Consumer services
Pinnacle Tech Hldgs Ltd	Technology
PPC Limited	Industrials
Rainbow Chicken Ltd	Consumer goods
Remgro Ltd	Industrials
Reunert Ltd	Industrials
SABMiller plc	Consumer goods
Sappi Ltd	Basic materials
Sasol Limited	Oil&Gas
Shoprite Holdings Ltd	Consumer services
Spur Corporation Ltd	Consumer services
Steinhoff Int Hldgs Ltd	Consumer goods
Sun International Ltd	Consumer services
Super Group Ltd	Industrials
Telkom SA SOC Ltd	Telecommunications
The Foschini Group Limited	Consumer services
Tiger Brands Ltd	Consumer goods
Tongaat Hulett Ltd	Consumer goods
Trencor Ltd	Industrials
Truworths Int Ltd	Consumer services
Wilson Bayly Hlm-Ovc Ltd	Industrials
Woolworths Holdings Ltd	Consumer services
York Timber Holdings Ltd	Basic materials