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# **Capital structure: profitability, earnings volatility and the probability of financial distress**

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## **Abstract**

This research project set out to determine whether there is a relationship between the observed leverage levels of South African companies, their profitability, earnings volatility and the probability of financial distress. The relevant body of knowledge against which to execute this research project is known as capital structure theory.

Capital structure theory deals with the way in which firms finance themselves. It is concerned with the relationship between the structure of debt, equity and hybrid securities found on the right hand side of the firm's balance sheet.

It is believed that the 2007/8 global financial crisis offers researchers a unique opportunity to gain insight into how the observed leverage levels of firms and their earnings volatility interact to form their probability of financial distress. This area of research is of particular interest since it is commonly believed and frequently stated that South African firms are underleveraged and secondly because there is contrarian research beginning to be published indicating that firms with very little or no debt (commonly referred to as lazy balance sheets) are outperforming their more indebted peers and are being rewarded by investors for their prudence.

## **Keywords:**

Capital structure; Leverage; Financial distress; pecking order

## **Declaration**

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Jacque Dreyer

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## **1. Chapter One – Introduction**

### **1.1. Research title**

Capital structure: profitability, earnings volatility and the probability of financial distress.

### **1.2. Research problem**

Since the introduction of the Miller and Modigliani capital structure irrelevance theorem the existence and determination of an optimal capital structure have been one of the most controversial issues in corporate finance (Ryen, Vasconcellos & Kish, 1997). Despite the fact that there is a substantiated body of research about capital structure theory academics are still not able to utilise the existing theory to explain capital structure choice in practice or give practitioners guidance with regard to the optimal mix between debt and equity in their financing decisions (Cai & Gosh, 2003). According to Myers (2001) there is no unifying theory on the choice between debt and equity and no reason to expect one either, there are however several theories that are “conditionally useful” for explaining capital structure choice. This view is supported by Frydenburg (2004) who states that current research does not point to a single capital structure theory that adequately explains capital structure choice.

Harris and Raviv (1991) state that the various models and theories they have surveyed identified a large number of potential determinants of capital structure but that the empirical work does not point out which of these factors are (reliably) important in various contexts. Some of these contexts include the increases and decreases in profitability, increases and decreases in free cash flow, changes in

liquidation values of the firm, probability of financial distress and changes in the price of the firm's common stock to name but a few. Although they specifically exclude tax based theories (stating that this is not their comparative research strength) Harris and Raviv (1991) categorise the non-tax based categories of capital structure into four broad groups, namely:

- I. Conflict of interest based approaches (i.e. agency cost)
- II. Conveyance of information based approaches (i.e. asymmetric information)
- III. Factors that influence the nature of competition or products (i.e. input/output based approaches)
- IV. Factors that will influence the outcome of corporate control contest

Norton (1991) indicated that one potential reason for the lack of agreement in capital structure theory may be the fact that factors affecting capital structure choices are not easily and objectively quantified by outside researchers. Norton states that these factors include information asymmetries between managers and the marketplace, expected bankruptcy cost, managerial risk preferences and the agency cost of monitoring management. Titman and Wessels (1988) corroborate this view stating that there are serious shortcomings in empirical tests of capital structure including:

- I. There may be no unique representation for the attributes researchers wish to measure. There are often several possible proxies for any particular attribute and researchers lacking theoretical guidelines, may be tempted to select those variables that work best in terms of statistical goodness-of-fit criteria thereby biasing the significance levels of their tests

- II. It is often difficult to find measures of particular attributes that are unrelated to other attributes of interest, thus the selected proxy variables may be measuring the effect of several different attributes
- III. Since the observed variables are imperfect representations of the attributes they are supposed to measure their use in regression analysis introduces an errors-in-variable problem
- IV. Measurement errors in the proxy variables may be correlated with measurement error in the dependant variables creating spurious correlations even when the unobserved attribute being measured is unrelated to the dependant variable

Harris and Raviv (2007, 2009) do however point to six core factors that have been shown to be primarily responsible for the observed leverage levels:

- a) Industry median leverage – firms that operate in industries that have high levels of leverage tend to have high levels of leverage
- b) Asset tangibility – leverage is positively correlated with asset tangibility
- c) Profits – profitability and leverage is negatively correlated
- d) Firm size – firm size and leverage is positively correlated
- e) The market-to-book value of assets – market-to-book value of assets and leverage are negatively correlated

- f) Expected inflation – in high inflationary environments firms tend to increase their leverage

Two of the most popular theories used to explain capital structure choice, and the departure point for this study, are the trade-off theory and the pecking order theory.

The trade-off theory states that firms will pursue the tax deductibility of debt weighted against the potential financial distress associated with excessive leverage in their capital structures. The level of leverage a firm has in its capital structure is therefore a balancing act between the benefits and cost of debt. The trade-off theory suggests that there is an optimal ratio between debt and equity (Myers 2001).

The pecking order theory proposes a hierarchy of funding preferences by managers starting with internal sources of funds (i.e. retained earnings) followed by external sources of funds, namely debt and equity, in order of preference. The pecking order does not suggest an optimal ratio between debt and equity (Myers, 1984).

According to Fama and French (2005) both the trade-off model and pecking order model have serious shortcomings that prevent them from explaining capital structure and therefore it does not make sense to continue to run empirical tests in an attempt to see which theory best describes market behaviour, rather the two theories should be seen as complimentary to each other in being able to describe some aspect of financing decisions.

In contrast to the trade-off and pecking order theories of capital structure Baker and Wurgler (2002) observed that companies with low leverage levels tended to raise funds when their share valuations were high and those with high leverage tended to

raise funds when their share valuations were low. They claim that these results cannot be explained within the traditional theories of capital structure hence they propose a market timing theory of capital structure which seems to offer substantial explanatory power over chosen capital structures. The market timing theory is disputed by DeAngelo, DeAngelo and Stulz (2010) who argue that firms near term funding needs are a more reliable indication of equity issues and that market timing is subordinated to capital requirements not a cause of it.

According to Frank and Goyal (1993) one of the reasons why no conclusive answers to capital structure questions can be given, despite vast amounts of theoretical literature and hundreds of empirical tests, is that many empirical studies are aimed at giving support for a particular theory. Although this might be adequate for a given paper it does not benefit our understanding of capital structure decisions. Several researchers (Pinegar & Wilbricht, 1989; Brounen, de Jong & Koedijk, 2004) have attempted to bridge the gap through survey research in order to try and explain how managers make decisions with regard to capital structure. According to Pinegar and Wilbricht (1989) their results indicate that financial planning principles are more important in governing the financing decision of the firm than are specific capital structure theories. This view is supported by Graham and Harvey (2002) who found that although financial theory is incorporated into capital budgeting decisions through the use of principles like Net Present Value (NPV) and Discounted Cash Flow (DCF) calculations, finance professionals are not likely to pay attention to capital structure theory but rather rely on practical, informal rules of thumb.

### **1.3. Research aim**

According to Titman and Wessels (1988) a substantiate amount of empirical research has been done on the determinants of the observed capital structure of firms. In most cases this is done by identifying a number of potential explanatory variables and regressing the explanatory variables against the firm's capital structure. The most common variables that have been used as explanatory (independent) variables include profitability, asset tangibility, earnings volatility, non-debt tax shields and growth opportunities.

The aim of this research is to test three of these capital structure determinants against the observed leverage witnessed in firms over the 1998-2007 periods. The explanatory variables that will be tested in the South African context are:

- a) Profitability
- b) Earnings volatility
- c) Industry median leverage and the observed leverage of the firm

The predictions of the trade-off and pecking order theories are outlined in the table on the following page:



**Table 1: Leverage in relation to explanatory variable under different capital structure theories (based on data extracted from Frank & Goyal, 2009)**

Explanatory variable	Trade-off theory	Pecking order theory
Profitability	Positive correlation (+)	Negative correlation (-)
Earnings volatility	Negative (-)	Negative (-)
Industry median leverage	Positive (+)	No direct relationship – leverage determined by funding deficit

The reason for asking this question in the context of the 1998-2007 timeframe is directly related to the global financial crisis which is commonly believed to have its origins in the sub-prime mortgage crisis in the USA. According to the BBC News website the USA was officially in recession by December 2007 according to the National Bureau of Economic Research. By the end of 2008 the major world equity market had already lost a significant amount of value and the FTSE 100 index closed down 31% below its opening level at the beginning of the year, the CAC 40 in Paris closed down 42% lower and the DAX in Frankfurt lost 40% of its value (BBC news, 2010). There is evidence to suggest that firms with no debt are both significantly less likely to experience financial distress and are also more likely to be rewarded by investors for their prudent balance sheets (Zaher, 2010).

A final question that the research will attempt to answer is whether there is a correlation between the default probabilities of firms making aggressive use of debt financing in their capital structures versus those firms that make conservative use of debt in their capital structures.

In answering these research questions this research project aims to give additional insight into the capital structure decisions of South African firms. A distinguishing factor of this research project is the fact that this research incorporates the impact of an external financial and economic shock (the global financial crisis) in an effort to determine what impact such an externality had on firms with varying levels of leverage. In answering this question the research hopes to be able to give a unique and contrarian insight into the commonly held notion that South African firms are under leveraged (Firer, Ross, Westerfield & Jordan, 2008).

## **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 pg. 507). Poor capital structure decisions can lead to an increased cost of capital thereby lowering the net present value (NPV) of many of the firm's investment projects to the point of making many investment projects unacceptable (known as the underinvestment problem). Effective capital structure decisions will lower the firms overall cost of capital and raise the NPV of investment projects leading to more projects being acceptable to undertake and consequently increasing the overall value of the firm (Gitman, 2003).

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 and Goyal, 2009). What is perplexing for anyone trying to make sense of the capital structure literature is the fact that the different capital structure theories are often diametrically opposed in their predictions while at other times they may be in agreement but have different views about why the outcome has been predicted. For this reason Myers (2002) stated that there is no universal theory of capital structure, only conditional ones. Factors that are important in one context may prove unimportant in another.

Perhaps it is for this reason that Barclay and Smith (2010) states that much of finance education was designed to pass on to finance students rules of thumb derived from the actions of successful practitioners. For this reason it has become of growing

importance to “develop theory to yield more precise predictions, and to devise more powerful empirical tests as well as better proxies for the key firm characteristics that are likely to drive corporate financing decisions” (Barclay & Smith, 2010 pg. 9).

## **2.2. Maximising shareholder wealth**

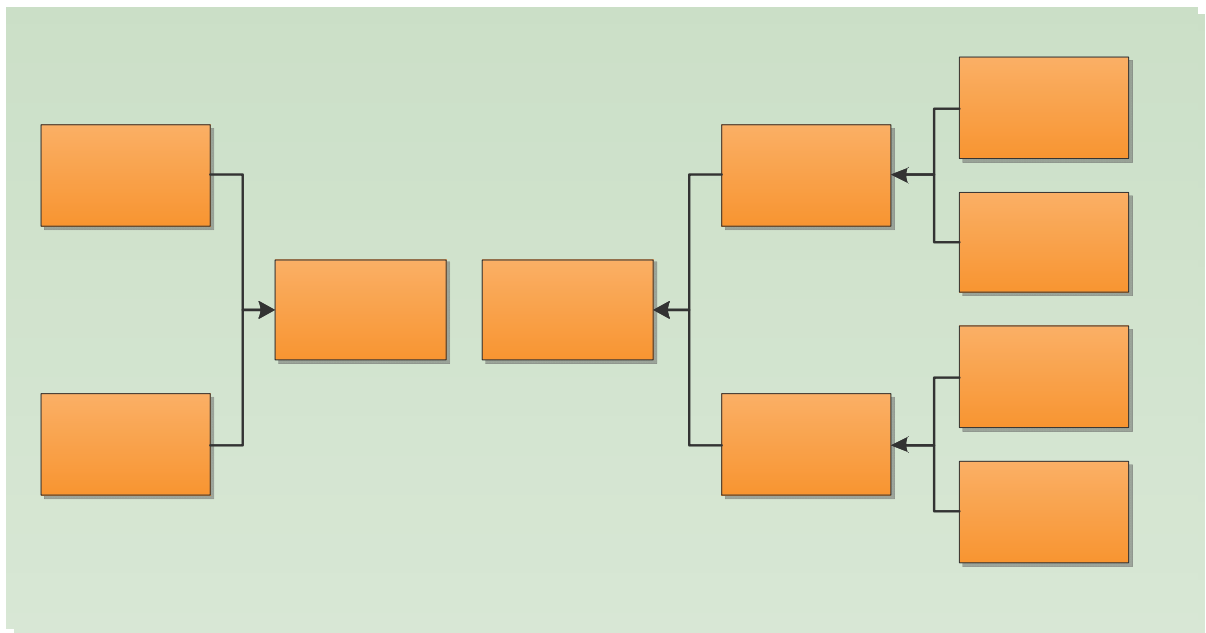
The commonly stated goal of financial management is to maximise the wealth of the owners or shareholders of the firm. Shareholder wealth in turn is defined as the current price of the firm’s outstanding ordinary shares. It should be emphasised that shareholders only have a residual claim to the assets of the firm and therefore they will only be paid after every other stakeholder with a legal claim has been paid. Because debt holders, suppliers of goods and services and employees all have a priority claim it stands to reason that if the wealth of the shareholders are maximised all other parties will stand to benefit (or at least not be disadvantaged) if this goal is fulfilled. It should however be noted that profit maximisation and wealth maximisation are not synonymous. A firm can undertake a variety of actions that might improve short term profit that are either not translated into cash flows (i.e. selling to firms or individuals that have no realistic probability of paying) or engaging in other practises that are either not sustainable or ethical. 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 (Gitman, 2003; Firer *et al*, 2008).

In achieving the goal of shareholder wealth maximisation managers are faced with two important financial decisions, the investment decision and the financing decision. Investment decisions or capital budgeting decisions refer to decisions about whether to finance a project or assets and ensuring that the cash flows received from a project or asset exceeds the cost incurred in acquiring that asset or implementing the project. The financing decision refers to the way in which the asset or project are financed. Financial managers therefore have to decide whether they will fund the assets and projects of the firm through retained earnings, borrowings or equity or a combination of the aforementioned options. The mixture chosen will affect both the firm's cost of capital, its risk and associated return and hence the value of its shares (Gitman, 2003; Correia & Cramer, 2008).

### **2.3. Defining capital structure research**

The study of capital structure focuses on the mix between debt, equity and the variety of hybrid instruments used to finance the real investment of the firm. It is therefore concerned with the right hand side of the balance sheet (Myers, 2001). All the 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. Graphically a simplified capital the capital structure can be illustrated as:

Figure 1: Application and sources of funding (Adapted from Ward & Price, 2006 pgs. 24-25)



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. 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 (Gitman, 2003).

## Fixed Assets

Debt holders are rewarded through interest payments and normally insist on some form of collateral as security for the loans they provide. In some instances they may also secure their interest through the application of loan covenants. Because their interest is collateralised lenders have first claim on the assets of the organisation and therefore bear less risk than equity holders. Debt is therefore normally a cheaper funding option than equity (Gitman, 2003).

According to Ward and Price (2006) 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.

Companies manage their capital structure through the issuance of new debt and equity, by repaying debt or repurchasing shares. Other aspects relating to management of the capital structure such as risk management, the issuance of hybrid securities and various classes of bonds, dividend pay-out management etc. fall largely beyond the scope of this research.

## **2.4. Capital structure theories**

Although there are numerous capital structure theories only the three most pervasive capital structure theories, the trade-off theory, the pecking order theory and the market timing theory will be reviewed for the purposes of this study.

### **2.4.1. 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. According to the theory the way in which a firm finances its assets (through the mix of debt and equity) can have no impact on the value of the firm. The value of a firm is derived by the productivity and the quality of the assets in which the firm has invested. Consider the following abbreviated balance sheet:

Figure 2: Abbreviated balance sheet (Myers, 2002 pg. 5)

Assets-in- place and growth opportunities	Debt (D)
	Equity (E)
	Firm value (V)

Considering the right hand side of the balance sheet the value of the firm (V) will remain the same regardless of how the ratio between debt and equity is varied (Myers, 2001). It is therefore possible to state:

$$V_L = V_U$$

Equation 1: Value of the firm under perfect market conditions (Firer *et al*, 2008, pg. 524)

Where:

$V_L$  = the value of a levered firm

$V_U$  = the value of an unlevered firm

It is important to note however that the Modigliani and Miller capital structure irrelevance theory only holds under the assumption of perfect capital markets which were defined by Modigliani and Miller (1958) as:

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



Modigliani and Miller (1958) conclude their seminal paper by remarking that these restrictive assumptions were necessary to come to grips with the capital structure problem, “Having served their purpose they can now be relaxed in the direction of greater realism and relevance” (Modigliani and Miller, 1958 pg. 296).

#### 2.4.2. Trade-off theory

Modigliani and Miller (1963, pg. 433) issued a correction on their 1958 paper in which they stated that the tax deductibility of debt would prevent arbitrage from making the value of all firms “proportional to the expected returns generated by their physical assets”.

According to the correction the value of the levered firm will be equal to the value of the unlevered firm plus the value of the tax deductibility of debt at the firm’s corporate income tax rate (Firer *et al*, 2008). This can be expressed as:

$$V_L = V_U + T_C \cdot D$$

Equation 2: Value of the levered firm (Firer *et al*, 2008 pg. 524)

Where:

$V_L$  = the value of a levered firm

$V_U$  = the value of a unlevered firm

$T_C$  = the corporate tax rate

$D$  = the amount of debt

The primary benefit or value of debt is therefore the fact that interest payments incurred on the repayment of debt is deductible from corporate income tax. Debt does however have disadvantages that include the increased probability of bankruptcy should the firm fail to meet its obligations, the agency costs incurred by the lender to monitor the activities of the firm and the fact that managers have better knowledge about the prospects of the firm than investors do (Gitman, 2003).

The trade-off theory therefore suggests that there is an optimum capital structure in which the benefits of debt are offset by the cost of debt. This optimal capital structure is achieved when the marginal benefit of an additional unit of debt is exactly offset the marginal cost of an additional unit of debt (Fama & French, 2005).

A value maximising firm that is profitable should therefore not pass up the benefit of an interest tax shield given an acceptably low probability of incurring financial distress (Myers, 2001).

According to Gitman (2003) it is generally believed that the value of a firm is maximised when its cost of capital is minimised. In order to prove this statement a modification of the zero growth dividend model is used to determine the value of the firm:

$$V = \text{EBIT} \times (1-T)/k_a$$

Equation 3: Value of the firm (Gitman, 2003, pg.533)

Where:

$V$  = the value of the firm

EBIT = Earnings before interest and taxes

$T$  = Tax rate

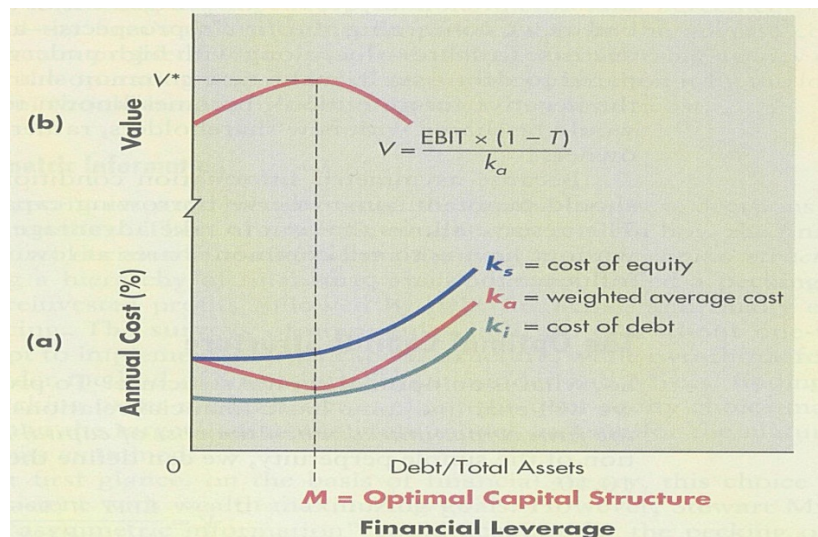
$EBIT \times (1-T)$  = after tax operating earnings available to debt and equity holders

$k_a$  = Weighted average cost of capital (WACC)

One can therefore conclude 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.

This can be graphically illustrated as follows:

Figure 3: Capital cost and the optimal capital structure (Gitman, 2003, p.544)



In the depiction above the WACC is a function of the cost of equity and the cost of debt. At a debt ratio of 0% the firm is 100% equity financed. Due to the fact that it is

generally cheaper to employ debt financing than equity financing ( $k_i < k_s$ ) the WACC declines as more debt is added to the capital structure. As more debt is added costs associated with debt begin to increase and the WACC starts to increase forming a U shape or inflection point beyond which it is no longer sensible or economically viable to add debt to the capital structure of the firm (Gitman, 2003).

#### 2.4.2.1. The advantages of debt

##### 2.4.2.1.1. Interest tax shield

Because interest is deductible from profits the judicious use of debt can decrease the firm's tax liability and therefore increase its after-tax free cash flow (Barclay & Smith, 2005). The value of the debt tax shield is a function of the amount of interest the firm pays and its marginal tax rate (Opler, Saron & Titman, 1997).

##### 2.4.2.1.2. Reduction of agency cost

In the most basic form of the agency cost problem managers may not act in the best interest of shareholders especially when excessive free cash flows are present choosing to spend cash on corporate empire building, consumption of (self-appointed) perks, making overpriced acquisitions or generally failing to operate efficiently. In the aforementioned cases both debt and the payment of dividends may be used as tools for disciplining managers (Graham & Harvey, 2001).

##### 2.4.2.1.3. The benefit of debt in controlling overinvestment

The overinvestment problem occurs when managers invest the free cash flow of the firm in projects that have returns below the firm's cost of capital. It may be the result

of investing unprofitably in growth in the firm's core business, or worse, diversifying into unknown business areas. Contractually obliged interest and principal payments, as a result of incurring debt, may in such cases crowd out excess capital problems (Barclay & Smith, 2005). This could be achieved by paying out excess free cash as dividends to the shareholders of the firm and borrowing to fund the growth projects of the firm. In such cases debt will serve as a disciplining tool ensuring that investment decisions and their implications are fully considered prior to committing to the projects in question.

#### 2.4.2.2. The cost of debt

##### 2.4.2.2.1. Cost of financial distress

One of the major benefits proposed by the trade-off theory is the interest tax deductibility of debt. However should the firm go through a period of operating at a loss the value of the interest tax shield will be reduced to zero but the burden of interest expenses will only serve to increase the financial distress experienced by the firm.

##### 2.4.2.2.2. Agency cost

Agency costs are defined as costs that occur as a consequence of conflicts of interest and can originate as a result of conflicts between the managers and owners of firms or the debt holders and equity holders of firms (Harris & Raviv, 1991).

**Manager-Shareholder:** According to Ryen *et al* (1997) the two most prevalent areas of manager-shareholder conflict can be seen in the unwillingness of managers to leverage the firm to its optimal value thereby forgoing significant shareholder value

and overspending on management perquisites. In instances where there is excessive free cash flow debt can serve as a tool to discipline management.

**Shareholder-debtor:** There is a variety of ways in which management may favour shareholders above debt holders thereby transferring wealth from debt holders to the owners of the firm. This could be achieved by issuing new debt with a higher priority than the existing debt, rejecting positive Net Present Value projects if the benefits will accrue only to debt holders, and at the extreme, through perverse dividend pay-outs at the risk of liquidating the firm. In order to protect themselves debt holders can introduce protective covenants into their loan agreements. It should however be noted that these covenants can lead to underinvestment, finance and production problems (Ryen, Vasconcellos & Kish, 1997).

#### 2.4.2.2.3. The underinvestment problem

Companies have a tendency to under invest when they face financial difficulty such as the inability to service its debt (principal and interest) repayments. (Barclay & Smith, 2005). This problem is further accentuated when potential equity investors are deterred by the fact that much of their equity investment will not go towards creating wealth for them but rather will be applied to restore the financial position of the firm's debt holders. In such cases the cost of equity would be so excessive (deeply discounted) that managers may choose to forgo profitable investment opportunities (Myers, 2001; Barclay & Smith, 2005).

In addition to forgoing positive Net Present Value projects management may also forgo adequate company specific investment in its human resources (Ryen *et al*, 1997).

#### 2.4.2.3. The dynamic trade-off theory

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 their leverage to the target. Under the dynamic trade-off theory, firms weigh the benefit of adjusting their capital structures against the *adjustment* cost and make leverage adjustments only when the benefit outweighs the cost (Ovtchinnikov, 2010). This means that should market conditions be unfavourable, firms may spend considerable time away from their target capital structures and only revert to them when conditions are favourable. Whether a firm is above or below its target leverage ratio will also impact the speed with which it returns to its target capital structure. The reason for this may be that once a firm operates at a level of debt significantly above the industry mean the cost of financial distress increases markedly and the act of rebalancing its capital structure becomes a more meaningful task (Cai & Gosh, 2003).

Myers (1984) indicates that he is not fully satisfied with the explanation of a dynamic trade-off theory insofar as frictions that prevent firms from staying at or near their ideal capital structure are not mentioned to be of first order concern in the static trade-off theory. Should costs be so large that it could serve to force managers to

take extended excursions away from their optimal capital structure, more time should be spend on understanding and explaining these frictions rather than refining the static trade-off theory (Myers, 1984).

#### 2.4.3. Pecking order theory

According to the pecking order theory firms have no well-defined target debt/equity ratio and each firm's observed debt ratio simply reflects the firm's cumulative requirement for external finance over an extended period (Myers, 1984). According to the pecking order model firms will first use internal funds (retained earnings) before issuing debt and will finally only issue equity under duress or when the investment requirement so far exceed debt capacity that it would lead to excessive leverage (Fama & French, 2005).

Just as is the case with trade-off theory the pecking order has an intuitive appeal but it is not without challenges however.

Although the pecking order theory is grounded on adverse selection based on information asymmetry, it is not necessary for information asymmetry to exist for a financing hierarchy to arise, other factors such as the expense of issuing various classes of securities and incentive conflicts can create their own pecking orders (Leary and Roberts, 2010). This view is supported by Titman and Wessels (1988) who found that transaction cost may be an important determinant of capital structure choice;



this is reflected in the fact that short-term debt ratios are negatively related to firm size. This is probably related to the relatively high transaction cost of issuing long term financial instruments such as bonds for smaller firms.

According to Myers (2001) practitioners usually think of the cost of external finance as that of administration and underwriting and in some instances the under-pricing of new securities however asymmetric information creates the possibility that there might also be a cost related to not accepting positive net present value (NPV) projects. One such cost may be that the shareholders of the firm could conclude that managers are excessively risk adverse thereby failing to adequately represent shareholder interest. Managers on the other hand may feel that they have better information about the cost and benefits of debt than shareholders thereby choosing to forgo new investment opportunities especially if the earnings of the firm or investment project is volatile (Lewellen, 2006).

Even if a pecking order do exists, companies may at times choose to ignore it in order to maintain a spare debt capacity or to retain internal funding in favour of debt if they believe that it will be required to fund attractive future investment opportunities (Ryen *et al*, 1997). Shivdasani and Zenner (2005) state that one reason companies may choose to maintain spare debt capacity is to maintain their credit ratings since it can take several years to recover from a downgrade. Spare debt capacity improves a company's ability to withstand a period of poor performance and allows it to execute a recovery plan.

#### 2.4.4. The market timing theory of capital structure

Equity marketing timing refers to the practise of issuing shares when equity valuations are high relative to book and past market valuations and repurchasing equities when their market values are low. As a consequence observed capital structures are a function of the past market values of securities rather than a desire to achieve an optimum capital structure or as a consequence of following a pecking order (Baker & Wurgler, 2002).

Baker and Wurgler (2002) point to four outcomes of empirical studies that support their market timing hypothesis:

- I. Past analysis of financing decisions indicate that firms issue equity instead of debt when share prices are high relative to book and past market values and tend to repurchase shares when the market values are low compared to historic averages
- II. Analyses of long-run stock returns following corporate finance decisions suggest that timing the equity market is successful (for firms) on average
- III. Earnings forecasts and realisations around equity issues suggest that firms issue equity when there is investor market optimism about future earnings prospects (and investors are hence likely to overpay for those equities)
- IV. Finally and most convincingly two thirds of Chief Financial Officers (CFOs) admit to market timing in anonymous surveys

DeAngelo, DeAngelo and Stulz (2010) do however pose a serious empirical caveat to market timing theorist: most firms with attractive market timing opportunities fail to issue stock. One reason proposed for this failure to issue stock is the fact that investor rationality would force managers to disguise attempts to sell overvalued stock. Rational and alert investors would immediately recognise any attempts to sell overvalued stock and as a consequence reduce the price they are prepared to pay for the stock. Another explanation is the fact that managers may simply not be able to time the market as is proposed by Baker and Wurgler (2002). De Angelo *et al* (2010) states that this explanation seems to be especially compelling in the light of recent events where prominent financial institutions (Lehman Brothers, AIG, Bear Stearns etc.) all repurchased shares at high prices immediately preceding the 2008 financial meltdown.

DeAngelo *et al* (2010) states the primary reason for issuing stock is to fund the firms near term cash needs with market timing playing only an ancillary role in the decision. According to their findings 81% of all firms would have subnormal cash levels and 62% would run out of cash within one year if they failed to engage in a seasoned equity offering.

## **2.5. Financial distress**

Traditional capital structure theory holds that a reasonable or moderate amount of debt incurred by profitable firms will reduce the overall cost of capital of the firm and hence increase firm value. Once the level of debt moves beyond the optimal debt

point the cost of capital and the financial risk associated with the firm will increase and the value of the firm will decrease and the likelihood of financial distress increases (Ariff, Hassan & Shamsheer, 2008). Highly levered firms are more likely to become distressed however the margin between highly levered and acceptable leverage levels may not be significant especially in the light of external economic shocks. Examples of this can be found in the Asian financial crisis. Prior to the Asian crisis the difference between the debt ratio of firms that became distressed and healthy firms was .0167 and .0108 respectively. After the financial crisis the debt level of distressed firms rose to 0.627-0.740 while that of healthy firms increased to 0.350-0.423. A limitation of previous capital structure research is the fact that the linkage between healthy firms becoming financially distressed after financial shocks has been under explored (Ariif *et al*, 2008). Indirect support for this finding is provided by Zaher (2010) who found that debt free firms outperformed their indebted peers in both the long and short run. Investors also penalised firm with high debt levels while rewarding those firms that had no debt on their balance sheets following financial crisis (Zaher, 2010). This result stands in direct contrast to the optimal capital structure theory and may be interpreted as offering support for the pecking order theory.

Financial distress refers to the costs that are incurred as a consequence of bankruptcy, the efforts to avoid bankruptcy, the need to reorganise or the agency cost that is incurred when the credit worthiness of a firm is in question (Myers, 2001).

Financial distress costs can be classified as either a direct or an indirect insolvency cost (Firer *et al*, 2008).

Direct costs are those cost that are incurred either as a consequence of insolvency procedures or in the efforts of reorganisation. Although the primary costs here are legal and administrative costs there are also costs related to the dissipation of value of the firm's assets under bankruptcy procedures (Firer *et al*, 2008, Gitman 2003).

Indirect costs are far broader and more difficult to measure but includes factors such as the under and overinvestment problems and the disengagement of the various stakeholders of the firm.

Until such a time that the firm has been declared insolvent through legal proceedings the shareholders own the firm and the assets of the firm and will be reluctant to hand over ownership to debt holders that have a priority claim on the assets of the firm. This might force the firm to invest in excessively risky projects in an effort to save the firm; known as the overinvestment problem. Bondholders on the other hand will act in their economic self-interest and will try to protect the value of their legal claim to the assets of the firm leading to an underinvestment problem.

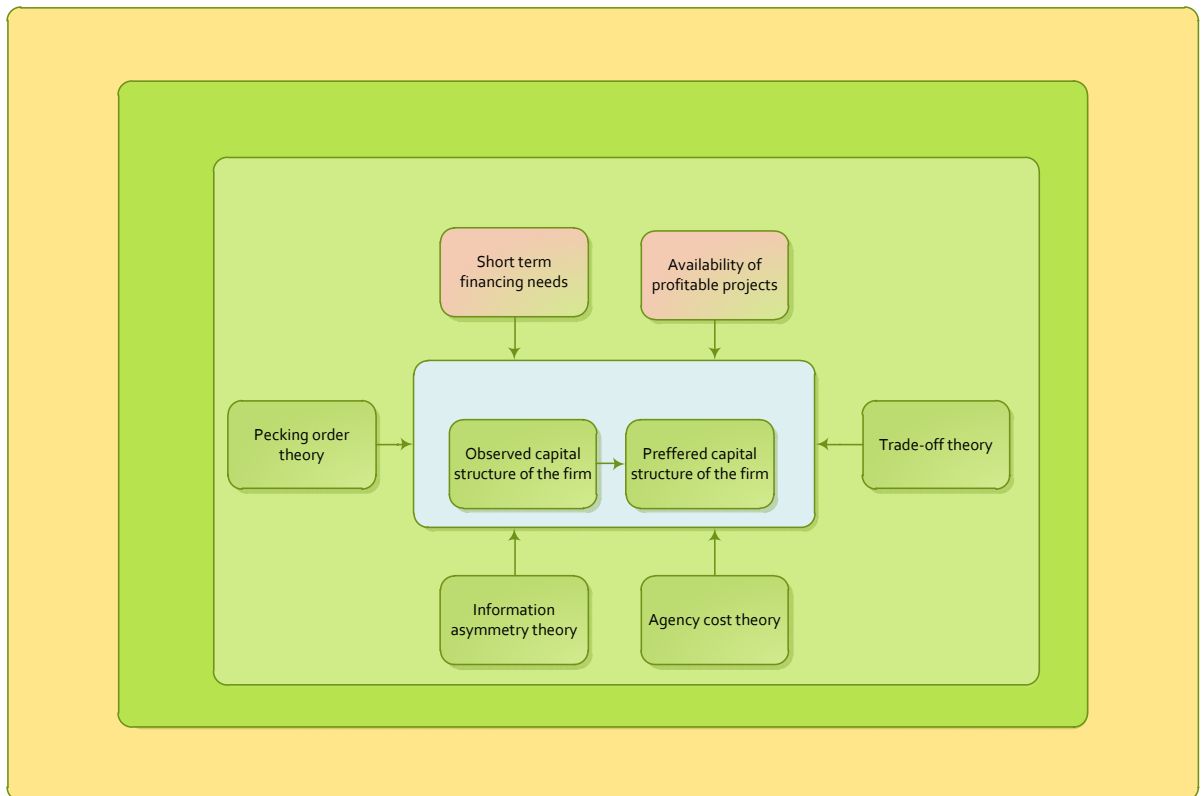
There is also a possibility that the customers, suppliers and employees of the firm will be reluctant to continue doing business with a financially distressed firm resulting in further indirect costs.

Finally in trying to avoid insolvency the management of the firm will be distracted from their normal operational and strategic functions leading to lost sales and investment opportunities.

## 2.6. The capital structure landscape

Figure 4 below provides a conceptual overview of the factors impacting on or influencing capital structure decisions.

Figure 4: Conceptual overview of capital structure landscape (adapted from Rayan, 2008)



The centre of the figure indicates the optimal capital structure range for a firm. The observed capital structure may or may not be in this optimal capital range. One

example of a firm not being within the optimal capital structure range could be that of a firm experiencing financial distress another may be the case of a firm operating without any debt in its capital structure. Most firms with a target capital structure will spend a substantial amount of time away from its target capital structure. This

departure from the ideal capital structure could be as a consequence of changes in

equity valuation or market friction or investment opportunities. The firm is however assumed to take certain actions over time that will move it toward its target capital structure.

Immediately outside the optimal capital structure range are a number of factors impacting on the decision about what would constitute an ideal capital structure or optimal capital structure range. Here it is possible to distinguish between two types of factors: firstly purely theoretical constructs that are assumed to influence or guide the practitioners and secondly practical aspects such as the availability of investment opportunities and short term funding needs.

The next level indicates firm specific factors that include factors such as the maturity of the firm (life cycle theory), profitability, and money spent on tangible versus intangible assets etc.

The second outer most ring constitutes industry specific factors. This includes the volatility of the industries revenues, typical debt/equity ratios etc.

The final level is the macro environment in which the firm operates and constitutes all the macro-economic realities faced by the firm as well as the legal and political environment. Factors such as the rate of exchange volatility would form part of this environment.

From the model above it should be clear that the capital structure decision is not a simple one and a failure to understand the environment in which these decisions are made could lead to flawed assumptions.

## 2.7. Conclusion

Firms (or the managers of firms) are largely free to choose any capital structure they want especially since capital structure decisions can be made independently from investment decisions. Capital structure decisions can however have important implications for the value of the firm and its cost of capital (Firer *et al*, 2008).

In this chapter we reviewed the three most prevailing capital structure theories namely the trade-off theory, the pecking order theory and the market timing theory.

The trade-off theory suggests that there is an optimal level of debt that balances the advantages of debt against the costs of debt. It must be noted however that theory is able to give precious little advice to practitioners about the calculation of an optimal debt/equity ratio. Factors such as external economic shocks may also have a bigger than expected impact on firms with comparatively similar leverage levels even if academics regard these firms as conservatively leveraged. A prime 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 might indicate that operational factors are at least as important as leverage levels when designing an optimal capital structure.

Pecking order theory suggests that there is a financing hierarchy that starts with retained earnings before moving to low cost debt and finally expensive equity. The pecking order theory is based on a special case of information asymmetry namely adverse selection cost. An unanswered question for the pecking order theory remains the desire for management to maintain spare debt or funding capacity thereby violating the pecking order theory in favouring debt over retained earnings.



The market timing theory suggests that managers will issue a specific type of security when it believes that the security is overpriced or when market conditions are favourable. A major flaw with this theory is that there is ample evidence of managers mistiming the market suggesting that the theory, although desirable, may not be practically feasible.

Following this literature review the researcher has to concur with the statement by Ryen *et al* (1997, pg 48) that “there is much room for improvement in the explanatory and predictive ability of capital structure theory”.

### **3. Chapter Three – Research questions and hypothesis**

#### **3.1. Research hypothesis one: the relationship between profitability and debt**

The trade-off and pecking order theories differ in their predictions on firm profitability and the amount of leverage incurred by firms.

According to the trade-off theory profitable firms will make greater use of debt in order to capture the benefit of the tax shield offered by debt. In addition to the tax shield benefit more profitable firms may also impose the discipline of debt on managers in order to reduce agency cost problems. The trade-off theory predicts a positive relationship between profitability and leverage. However the evidence is mixed at best with more profitable firms having either insignificantly more debt at best or having less debt in their capital structures (Barclay & Smith, 2010).

The pecking order theory predicts that profitable firms will make use of retained earnings as their primary source of funding and only if a funding deficit exists will they make use of debt and then equity.

In order to deal with the different predictions of the trade-off and pecking order theories the research hypotheses has been stated twice. First to test for the positive correlation between leverage and profitability suggested by the trade-off theory and secondly to test for the negative correlation between leverage and profitability suggested by the pecking order theory.

### **Research Hypothesis 1A:**

$H_{0a} = \rho_{\text{leverage,profitability}} \leq 0$  (Profitability and leverage is not correlated or negatively correlated)

$H_{1a} = \rho_{\text{leverage,profitability}} > 0$  (Profitability and leverage is positively correlated)

### **Research hypothesis 1B:**

$H_{0b} = \rho_{\text{leverage,profitability}} \geq 0$  (Profitability and leverage is not correlated or positively correlated)

$H_{1b} = \rho_{\text{leverage,profitability}} < 0$  (Profitability and leverage is negatively correlated)

### **3.2. Research hypothesis two: difference between industry median debt levels**

Capital structure theory suggests that the industry to which a firm belongs is likely to have a considerable impact on the observed leverage levels of individual firms and that over time firms will tend to migrate toward the median industry debt levels. This movement toward the industry median debt level is regarded as evidence that an optimal capital structure does exist (Bowen, Daley & Huber, 1982).

Although this research does not specifically test for the migration toward industry median debt levels over time the existence of both statistically and practically significant differences in median industry debt levels may be interpreted as support for the optimal capital structure theory.

$H_0 = \mu_1 = \mu_2 = \dots \mu_8$  (Industry median debt levels are homogenous)

$H_1 = \mu_1 \neq \mu_2 \neq \dots \mu_8$  (Industry median debt levels are heterogeneous)

### **3.3. Research hypothesis three: the relationship between earnings volatility and debt**

Both the trade-off theory and pecking order theory predicts that firms with higher earnings volatility should make more conservative use of leverage in their capital structures in order to prevent potential financial distress caused by the inability to meet their financial obligations. According to the trade-off theory firms weigh the benefits of debt against the potential cost of debt in an effort to maximise shareholder wealth.

The pecking order theory predicts that firms with more volatile earnings will preserve spare debt capacity in an effort to prevent them from issuing more costly debt at a later stage.

Regardless of which theory is correct the relationship between earnings volatility and the observed capital structure of the firms is of practical significance in an environment characterised by an increasing volatility in currency and commodity prices. In such an environment managers are expected to be both prudent in their financial management practises and proactive in their risk management strategies (Shivdasani & Zenner, 2005).

$H_0 = \rho_{\text{leverage, stdev ROA}} \geq 0$  (There is no correlation between debt and earnings volatility)

$H_1 = \rho_{\text{leverage, stdev ROA}} < 0$  (Earnings volatility and debt is negatively correlated)

### **3.4. Research hypothesis four: the relationship between the price-to-book ratio and debt**

The value of a firm's future opportunities can be estimated by observing the firm's market to book ratio. The book value is the value of the firm's assets in place, net of liabilities and is backward looking (i.e. based on historic accounting values). The market value is an estimation of the firm's growth opportunities as perceived by investors. Empirically there has been a strong inverse relationship between market-to-book ratios and leverage levels or debt ratios (Myers, 2002). Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001) however question the portability of all the elements of capital structure theory specifically noting the price-to-book ratio as an exception to the rule. According to them the price-to-book ratio can vary widely in developing countries.

This hypothesis will therefore test to see if this relationship holds true in the South African context.

$H_0 = \rho_{\text{leverage,p/book}} \geq 0$  (leverage and the price-to-book ratio is not correlated)

$H_1 = \rho_{\text{leverage,p/book}} < 0$  (leverage and the price-to-book ratio is negatively correlated)

### **3.5. Research hypothesis five: the relationship between debt and the probability of financial distress**

Opler *et al* (1997) states that firms with highly levered balance sheets are likely to suffer disproportionately during economic downturns and as a consequence are more likely to become financially distressed than their lower levered counterparts.

This view is supported by Shivdasani and Zenner (2005) who states that firms with little debt on their balance sheets will continue to service their debt obligations even in the face of significant financial and economic shocks while highly levered firms would see their cash flow ratios plummet, perhaps to the point of being unable to meet their obligations. This research hypothesis therefore aims to test whether firms that made aggressive use of debt finance (i.e. was in the upper 50 percentile of indebted firms) have financial distress scores that differ statistically from those firm that made conservative use of debt following the onset of the global financial crisis.

$H_0 = \rho_{\text{fin distress}, D/E} \leq 0$  (the financial distress score of firms making aggressive use of debt is no different than firms making conservative use of debt financing in their capital structures)

$H_1 = \rho_{\text{fin-distress}, D/E} > 0$  (the financial distress score of firms making aggressive use of debt is greater than firms making conservative use of debt financing in their capital structures)

## **4. Chapter four - Research Methodology**

### **4.1. Introduction**

According to Cameron and Price (2009) research is about collecting relevant data and extracting from that data the relevant information to support an argument or draw valid conclusions.

Chapter four discusses the research process and methodology that was employed to answer the research hypotheses defined in chapter three.

### **4.2. Population of relevance**

The population of relevance was all companies listed on the main board of the Johannesburg Stock Exchange over the ten year period from 1999 to 2007.

The following firms were specifically excluded from the study:

- a. AltX listed companies – due to the fact that AltX listed companies have very different listing requirements from that of the main board of the Johannesburg Stock Exchange, lower volumes traded and significantly lower market capitalisation it was decided to exclude this sector.
- b. The financial sector was excluded due to the fact that there is a separate strand of literature dealing specifically with the capital structure of the financial industry. Banks are bound by a host of regulations that non-financial firms are not subjected too, they are also incentivised to maximise leverage up to the regulatory minimum (Gropp and Heider, 2009).

The following firms were excluded from the study:

A firm for which the debt-to-equity ratio data over the full ten year period was not available was excluded from the study. This means that all firms that were suspended, de-listed or not yet listed at 1 January 1998 were specifically excluded from the study.

#### **4.3. Unit of analysis**

The unit of analysis was a single company listed on the Johannesburg Stock Exchange over the period ranging from 1999 until 2009. This is in line with previous empirical studies conducted on capital structure.

#### **4.4. Sampling Method**

The sample may be regarded as a convenience sample as firms were selected or excluded based on whether they fulfilled the desired criteria of the researcher. Analysis was also conducted on industry segments in an attempt to observe differences in the capital structure choices of different industries therefore the sample may be regarded as stratified. Since the number of firms in each industry segment is not the same the result was a disproportional stratified sample. (Zikmund, 2003 pg. 388)

#### **4.5. Data collection process**

Only secondary data was used in this study. The primary source for data was the McGregor BFA (2010) research domain database.



## 4.6. Data analysis process

### 4.6.1. Descriptive statistics

The transformation of data into a format that is easier to understand and interpret is known as descriptive statistics (Zikmund, 2003). According to Pallant (2009) descriptive statistics can be used to:

- a) Describe the characteristics of your sample
- b) Checking your variables to ensure that they do not violate the underlying statistical techniques that you intend using to answer your research questions
- c) To address specific research questions

The first step will therefore be to describe the sample using descriptive statistics. In addition to graphs and tables the following descriptive statistics will be used to describe the sample

#### 4.6.1.1. Measures of central tendency

##### 4.6.1.1.1. The sample mean

The mean is also known as the arithmetic average of the sample or the sum of all the observations divided by the number of observations. The formula for the mean is:

$$\text{Mean} = \frac{\sum_{i=1}^n X_i}{n}$$

Equation 3: Sample mean (Albright *et al*, 2006 pg. 82)

Where:

$\Sigma$  = Sigma or summation sign

n = number of observations

i = the value of the observation, therefore  $X_i$  is the value of the  $i^{\text{th}}$  observation

#### 4.6.1.1.2. The median

The median is the centre or middle observation of the data set. In the case of an equal number of observations it is the average of the two centre observations.

#### 4.6.1.2. Measures of dispersion

##### 4.6.1.2.1. The minimum, maximum and range

The minimum is the smallest value in the data set and the maximum is the largest observation in the data set. The range is the difference between the minimum and maximum values.

##### 4.6.1.3. Measures of variability

###### 4.6.1.3.1. Variance

The variance is the average of the squared deviations from the mean.

###### 4.6.1.3.2. Standard deviation

Standard deviation is defined as the square root of the variance and is expressed in the original units of measure. The relationship between the standard deviation and variance can be expressed as:

$$\text{Standard deviation} = \sqrt{\text{Variance}}$$

Equation 4: The relationship between standard deviation and variance (Albright *et al*, 2006 pg. 87)

#### 4.6.1.4. Distribution of data

Many statistical tests assume data is normally distributed. The term normality is used to describe outcomes that are represented by a symmetrical bell shaped curve with the greatest frequency of scores in the centre and reduced frequencies toward the extremes of the curve (Pallant, 2007). Normality can therefore partially be ascertained by obtaining the skewedness and kurtosis values of the data distribution as well as by visually inspection the data distribution (histogram).

#### 4.6.2. Exploring the relationships between variables

##### 4.6.2.1. Independent samples T-test

T-test may be used to determine if there are statistically significant differences between the means of two samples or groups (Zikmund, 2003). T-test may be used for independent or paired samples test that are normally distributed. In the event that data does not conform to the requirement for normality the non-parametric Mann-Whitney U or Wilcoxon signed-rank test for determining the differences in the median between groups may be used (Pallant, 2008).

Table two below illustrates the decision making process followed in deciding upon the appropriate test to determine whether a statistically meaningful difference exist between the means of two groups:

**Table 2: Selection matrix for the appropriate test for differences between the mean values of two groups (from Gibs class notes)**

Data Characteristics		Appropriate difference test reported by NCSS 2007®	Appropriate test statistic reported by NCSS 2007®
Normal	Equal Variance		
Yes	Yes	Equal-Variance T-Test	T-value
Yes	No	Aspin-Welch Unequal-Variance Test	T-value
No	Yes	Mann-Whitney U or Wilcoxon Rank-sum test for difference in medians Rank-Sum Test for Difference	Z-value
No	No	Kolmogorov-Smirnov test for different distributions	Dmn criterion value*

\* Maximum difference between two empirical distribution functions

All t-test will be conducted by firstly preparing and sorting the relevant data. During the preparation phase all missing data and outliers will be corrected or deleted, once this has been done the data will be sorted in descending order according to the independent variable. The dependant variable will then be divided into two equal groups in order to compare the means or medians of the groups. Prior to comparing the means the data will be checked for the assumption of normality in order to ensure that the appropriate statistical test for the difference between means or medians are used for hypothesis testing.

#### 4.6.2.2. Correlation analysis

The study of the relationship between two variables is referred to as correlation analysis and is one of the most persuasive statistical tools used to analyse data. The relationship between the variables can be linear, non-linear or non-existent it is therefore useful to use scatter plots top identify potential relationship that might not be otherwise obvious.

Correlations are numerical summary measures of strength of the relationship between two variables and can vary between a perfect positive correlation (+1) to a

perfect negative correlation (-1). A value approximating 0 indicates that there is no relationship between the variables in question. One of the drawbacks of correlation analysis is the fact that it cannot be used to establish causation amongst variables, or stated differently, state that a change in the independent variable will lead to a change in the dependant variable.

Correlation analysis will be used to support the findings of the t-test in this research project.

#### 4.6.2.3. One way analysis of variance (ANOVA)

The one way analysis of variance is an appropriate statistical tool to measure the difference between means for more than two groups when there is only one independent variable affecting all groups. The null hypothesis states that all means are equal. Should there be significant differences between the groups, in terms of behaviour or characteristics; there will be statistically significant variances of the group's means about a grand mean. The null hypothesis (assuming all means are equal) will be rejected if at least two means vary from the central mean (Zikmund, 2003).

#### 4.6.2.4. Parametric versus non-parametric test

Statisticians generally make use of two types of test, parametric and non-parametric each with its own advantages and disadvantages. Parametric tests make a number of

assumptions about the population from which the sample was drawn including the fact that the population is normally distributed, have a similar variance and were randomly selected (Cameron & Price, 2009). The main advantage of parametric tests is that they are able to find to find relationship among variables even if the relationship is relatively weak. The main disadvantage is that if your data does not meet the stringent requirements for a parametric test the result might be invalid.

**Table 3: Choosing an appropriate parametric or non-parametric test (Cameron and Price, 2009 pg. 484)**

Purpose	Parametric test	Non-parametric test
Test for differences: one sample	t test z test	Chi-squared Kolmogorov-Smirnov
Test for differences: two independent samples	Independent t test Z test	Chi-squared Kolmogorov-Smirnov Mann-Whitney U
Test for differences: two paired samples	Paired t test	Chi-squared Wilcoxon matched pair signed rank
Test for association between two variables	Chi-squared One way analysis of variance	Chi-squared
To access the strength of such an association	Pearson's rho (correlation coefficient)	Spearman rank correlation
To predict one variable from another	Regression line	
To look at relationships between more than two variables	Multivariate analysis of variance	

Should data not meet the requirements for the use of parametric test there are three alternatives available according to Pallant (2008); use the data in any event and hope the result is valid, manipulate your data to meet the requirement of the specific test

or alternatively make use of the equivalent non-parametric test. The only disadvantage of the non-parametric equivalents is that they tend to be less sensitive in detecting differences or relationships between groups (Pallant, 2008).

Due to the fact that financial data is rarely normally distributed non-parametric tests were used to analyse the data obtained for this research project.

#### 4.6.3. Defining the dependant variables

The aim of this research is to try and establish the relationship between profitability and earnings volatility on the level of indebtedness of firms therefore debt, expressed as the debt-to-equity ratio of the firm, was used as the dependant variable for the first four research hypothesis.

The fifth research hypothesis aims to establish a relationship between the level of debt and the likelihood of financial distress therefore the financial distress score was used as the dependant variable in the last research hypothesis.

#### 4.6.4. Cross sectional, longitudinal and panel data

Data can be defined as cross sectional data, time series data or panel data. Cross sectional data is gathered at approximately the same period of time from a large cross section of the population.

The data that was used to calculate the default probability of firms following the announcement of the global financial crisis is an example of cross sectional data.

Time series data involves the observation of the same variable over an extended period, normally at equally spaced intervals. The data collected on level of debt and earnings volatility used in this study are examples of times series data. A common problem with time series data is a lack of depth. Normally 30 observations are required to ensure meaningful statistical analysis can be done on the variable in question. This would have meant that in all cases the researcher would have required 30 years' worth of firm level data. Although this is available on selected companies on the Johannesburg Stock Exchange the practical consequence is that it would have reduced the number of firm suitable for inclusion in the study to a much smaller group. Another drawback is that some data loses its relevance after a period of time and could therefore lead to erroneous conclusions being drawn from the data.

Researchers are able to compensate for the lack of depth in their data by making use of a panel data approach. Panel data analysis enriches both correlation and regression analysis with a spatial and temporal dimension. The spatial dimension refers to the cross-sectional units of observations. The temporal dimension refers to the periodic observations of a set of variables characterising the cross sectional units over a defined time period. This pooled data series, sometimes referred to as time series cross sectional data, is known as panel data (Yaffee, 2003). Figure 5 below illustrates the different data types:



Table 4: Example of panel data with time series and cross sectional data highlighted

	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5	
<b>Year</b>	<b>Debt/Equity</b>	<b>Debt/Equity</b>	<b>Debt/Equity</b>	<b>Debt/Equity</b>	<b>Debt/Equity</b>	<b>Cross sectional data</b>
2011	1.5	2.3	9	0.7	1.7	
<b>2012</b>	<b>0.7</b>	<b>2.8</b>	<b>9.7</b>	<b>0.3</b>	<b>2.3</b>	
2013	0.8	3.6	11.1	0.9	2.9	
<b>2014</b>	<b>0.9</b>	<b>2.9</b>	<b>10.9</b>	<b>0.5</b>	<b>3.6</b>	
2015	1.1	2.7	7.6	0.7	2.4	
<b>2016</b>	<b>1.5</b>	<b>3.2</b>	<b>6.7</b>	<b>0.6</b>	<b>1.9</b>	
2017	1.8	3.8	5.9	0.8	1.8	
<b>2018</b>	<b>0.9</b>	<b>3.9</b>	<b>6.3</b>	<b>1.1</b>	<b>1.6</b>	
2019	1.3	2.9	6.4	0.9	1.0	
<b>2020</b>	<b>3.0</b>	<b>3.0</b>	<b>5.8</b>	<b>0.7</b>	<b>1.3</b>	
<b>Time Series data</b>						

#### 4.6.5. Financial ratios

##### 4.6.5.1. Profitability

The return on total assets (ROA) is used as a scaled measure of firm profitability. It measures the profitability of the firm relative to the firm's investment in assets.

Return on total assets is defined as:

$$ROA (\%) = \frac{EBIT - \text{Extraordinary earnings}}{\text{total assets}} \times 100$$

Equation 5: ROA (Firer et al, 2008 pg. 65)

The use of ROA to measure profitability is in line with previous studies conducted by Titman and Wessels (1988) and Rajan and Zingales (1995).

##### 4.6.5.2. Earnings volatility

Earnings volatility as measured as the standard deviation of the firm's profitability over the period of the study. Each year's earnings are regarded as a separate data point.

The use of the standard deviation of ROA is in line with previous studies conducted by Titman and Wessels (1998).

#### 4.6.5.3. Financial leverage

Financial leverage refers to the amount of debt used in the capital structure of the firm relative to equity. Higher levels of leverage imply higher levels of debt in the capital structure of the firm. The measure of leverage used in study is the debt/equity ratio.

The debt to equity (D/E) ratio is defined as:

$$D/E = \frac{\text{Total long term loan capital} + \text{total current liabilities}}{\text{total owners interest}}$$

Equation 6: Debt-to-equity ratio (Firer *et al*, 2008 pg. 60)

#### 4.6.5.4. Financial distress probability

During 1968 Professor Edward I Altman from the University of New York introduced the use of discriminant statistics to predict the likelihood of financial distress in firms. The model made use of commonly available financial ratios to assign a Z score to firms. The Z score is calculated as follows:

$$Z = 1.2X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_F$$

Equation 7: Altman Z score (Bodie, Kane & Marcus, 2009 pg. 470)

Where:

$Z$  = Altman Z score

$X_1$  = Working capital/total assets

$X_2$  = Retained earnings/total assets

$X_3$  = Earnings before interest and taxes (EBIT)/total assets

$X_4$  = Market value of equity/book value of total liabilities

$X_5$  = Sales/total assets

Firms assigned a score  $Z > 2.99$  is regarded as safe from financial distress while those with a score of  $Z < 1.81$  was regarded as in the distress zone and likely to go bankrupt.

Firms with a score between 1.81 and 2.99 were regarded as being in the grey zone with an uncertain outcome (Bodie *et al*, 2009).

#### 4.6.6. Hypothesis testing

Theoretical hypothesis can be confirmed (or disconfirmed) by the application of appropriate statistical techniques to empirical (observed) data (Zikmund, 2003).

The process of hypothesis testing is briefly outlined below:

- I. The null hypothesis ( $H_0$ ) is defined
- II. The alternative hypothesis ( $H_1$ ) is defined

- III. The significance level or Alpha ( $\alpha$ ) is defined. The significance level determines the probability level that is considered too low to offer support to the null hypothesis. All tests were conducted at the  $\alpha = 0.05$  level (or the 95% confidence level)
- IV. Based on the sample size and characteristics the appropriate statistical techniques were chosen to determine whether the null hypothesis could be rejected in favour of the alternative hypothesis based on the empirical data

#### **4.7. Research limitations**

##### **4.7.1. Listed companies**

The research in this study was done on a judgement sample of companies listed on the Johannesburg stock exchange. Although judgement samples has the advantage that it allows the researcher to select units for inclusion based on defined population characteristics the disadvantage is that the sample might not be representative of the population and the research outcome cannot be generalised to the population of companies listed on the JSE.

Companies listed on the JSE also excludes privately owned firms and smaller companies it would therefore be inappropriate to generalise the findings of this study to these groups explicitly excluded in the research.

##### **4.7.2. Survivorship bias**

Survivorship bias refers to the act of skewing the results of a sample upwards due to the fact that a number of firms would have failed over the period of the study have

been excluded from the study. In this study no attempt was made to compensate for survivorship bias. The practical significance of this omission is the fact that, especially in the case of the financial distress data, there would be a positive bias in the outcome of the study.

#### 4.7.3. Time period under consideration

Financial ratio data was collected for the period 1998-2007. Financial distress probability data was collected for the year 2009 (this is to allow for the lag effect associated with financial distress as well as to compensate for the lag effect associated with the accounting cycle). Due to changing market conditions it will be inappropriate to expand the findings of this study to all other time periods.

#### 4.7.4. Negative Debt/Equity ratios

All firms with negative Debt/Equity ratios were excluded from this study

### **4.8. Conclusion**

Chapter four outlined the data collection process and research methodology that was used to answer the five research questions stated in chapter three. In the next chapter the data will be described and in chapter six the analysis of the data will be discussed.

## **5. Chapter Five – Presentation of Results**

### **5.1. Introduction**

Chapter five is a summary of the results of the analysis conducted in accordance with the guidelines presented in chapter four indicating the proposed research methodology. The presentation of results is initiated by a general description of the sample selected for inclusion in the study followed by a discussion of the independent variable (capital structure as indicated by the D/E ratio). This is followed by the outcome of the t-tests and correlation analysis that were run using the NCSS statistical package.

### **5.2. General information and descriptive statistics for the sample data**

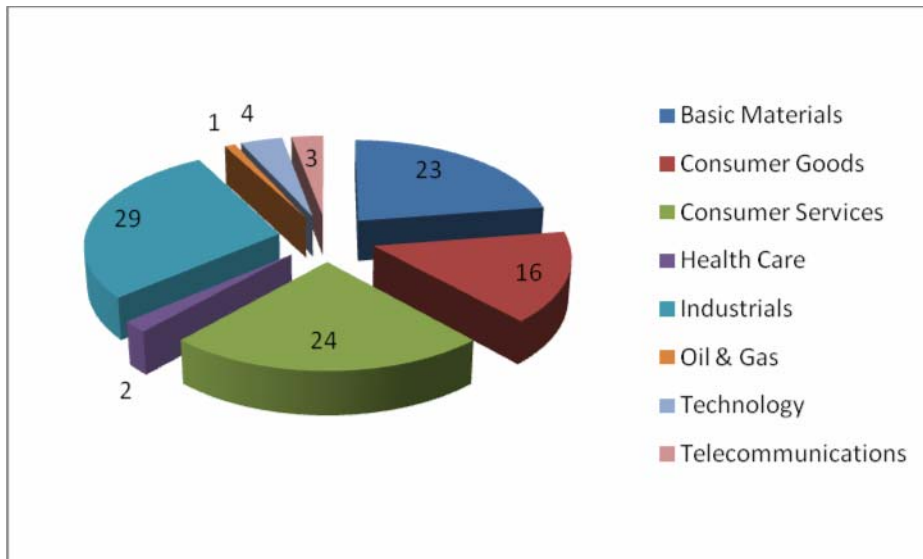
As of October 2010 the main board of the Johannesburg Stock Exchange comprised 342 companies classified into ten industries. Two of the ten industries, the financial and utilities sectors were explicitly excluded from this research. The financial sectors was excluded based on reserve requirements that skew their capital structures and the utilities sector was excluded because there are no firms listed in this category.

In order to be included in the study firms had to have data available throughout the period 1998-2007 as well as a financial distress score for the year 2009. Any firm that did not comply with this requirement was excluded from the sample.

All firms with negative debt-to-equity ratios or that had extreme outliers in their data period were excluded as well. For the debt-to-equity ratio a value greater than nine was considered to be an extreme outlier to be excluded.

In total 102 firms met *all* the requirements of the study and could included in the research project which equated to 30% of all listed firms on the JSE.

Figure 5: Number of firms per sector included in the research project



The dependant variable of the study was the capital structure of firms which is expressed as the observed Debt-to-equity (D/E) ratio of the firm. The descriptive statistics (mean, median, standard deviation, minimum and maximum values, skewness and kurtosis) for the dependant are displayed below:

Figure 6: D/E Histogram for all industries included in the sample

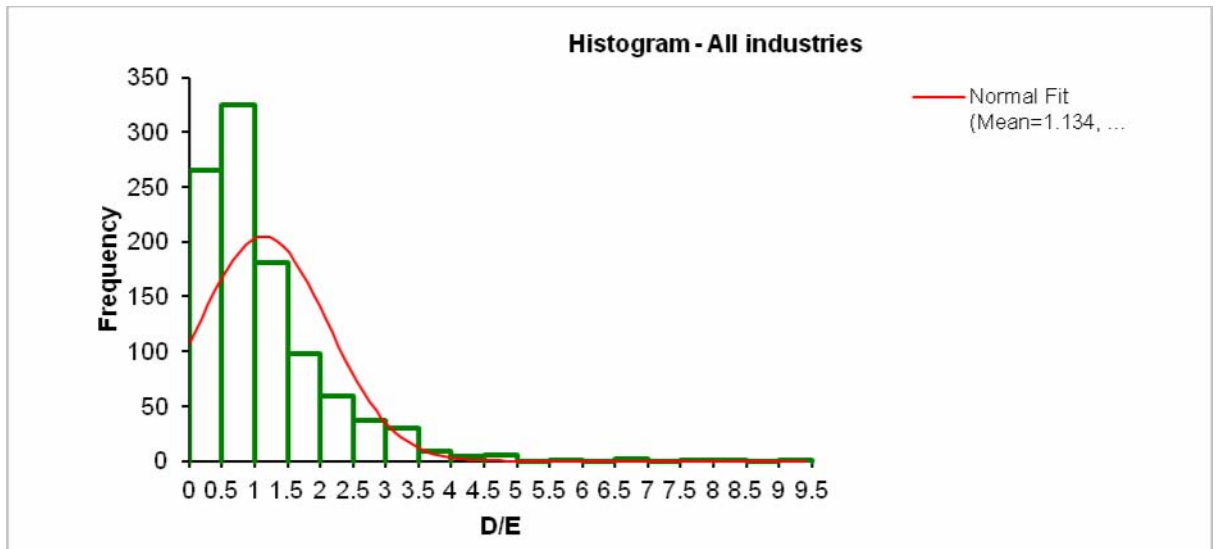
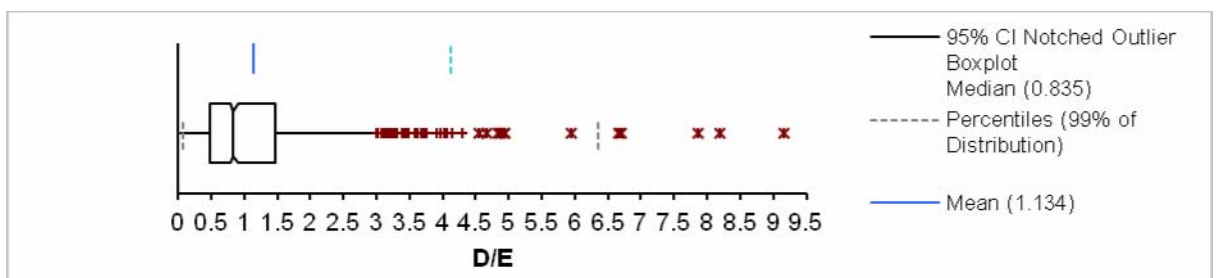


Figure 7: D/E Box plot for all industries included in the sample



In total 1020 data points were collected over the ten year period spanning from 1998-2007. The mean D/E value of 1.134 indicates that on average firms have used more debt than equity financing over the study period. The median D/E value was 0.835. The median D/E ratio is almost one third smaller than the mean D/E ratio. This large difference between the mean and median values can be attributed to the large positive outliers which are clearly visible in the box plot (figure 7) which graphically display the sample D/E ratio. Median values are less susceptible to outliers and may



therefore be regarded as a better summary measure of the central tendency of the sample debt levels especially in data that is not normally distributed.

Since firms with negative D/E ratios were excluded from this research project the minimum D/E ratio was 0.040. The maximum value for the D/E ratio was 9.170. The reason for the observed maximum related to the exclusion of firms with unreasonably high D/E ratios. Only firms with a D/E ratio  $< 10$  were included in the research project.

The standard deviation for the D/E was 0.993. Should the data set have a normal distribution this would mean that 68% of all observations would be found within one standard deviation from the mean or within the values of 0.141 and 2.127. In a normal distribution the mean and median values would be equal. The fact that the mean value is greater than the median value in this sample indicates that the distribution is positively skewed. This is also clearly visible from the inspection of the histogram of D/E ratios for the sample (figure 6). The skewness statistic supports the visual inspection of the histogram. A perfectly symmetrical distribution will have a skewness value of zero, in this instance the skewness value is 2.56.

Another important factor in evaluating the distribution is the peakedness or kurtosis of the distribution. In the case of a normal distribution the kurtosis value would be zero. In the research sample the kurtosis value for the D/E ratio is 11.30 indicating an exaggerated peak or a highly leptokurtic distribution.

Both the Kolmogorov-Smirnov and Shapiro-Wilk test for normality reject the assumption of normality in the distribution of the sample data. This outcome is

supported by the previous descriptive statistics. Because normality has been rejected it would not be suitable to use parametric statistical tests on the sample data, instead non-parametric test that have fewer restrictive assumption and are less sensitive to outlier values will be used for performing t-tests, ANOVA and correlation analysis.

### 5.3. Research hypothesis one: the relationship between profitability and debt

#### 5.3.1. Leverage and ROA

##### 5.3.1.1. T-test for D/E and ROA

**Table 5: Descriptive statistics for D/E and ROA**

Descriptive Statistics Section						
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
DE_ROA_A	510	0.9029804	0.808813	3.581484E-02	0.8326142	0.9733465
DE_ROA_B	510	1.364098	1.101577	4.877864E-02	1.268262	1.459934

Note: T-alpha (DE\_ROA\_A) = 1.9647, T-alpha (DE\_ROA\_B) = 1.9647

In total 1020 firm year data points for the dependant variable (D/E) were included in the sample divided into two equal groups of 510 firm years each. The firm year data points were sorted according to the independent variable. The 50% most profitable firms were allocated to group A, and the 50% least profitable firms were allocated to group B. From the table above it is clear that the means are not the same and that group B (the least profitable firms) have a greater variation about the mean than the most profitable firms. This finding is supported by a visual inspection of figure 8, the box plot for comparison of the means. Group B clearly has a wider interquartile range as well and more dispersed outliers are present.

Figure 8: Box plot for the comparison of means of D/E vs. ROA

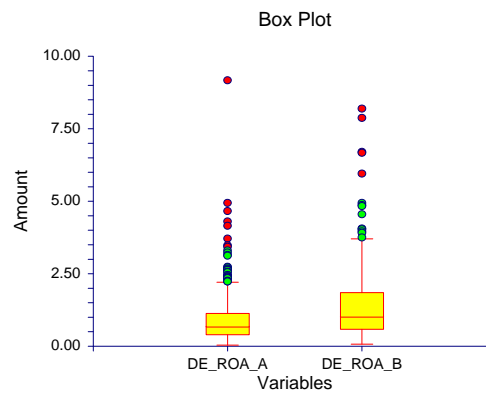
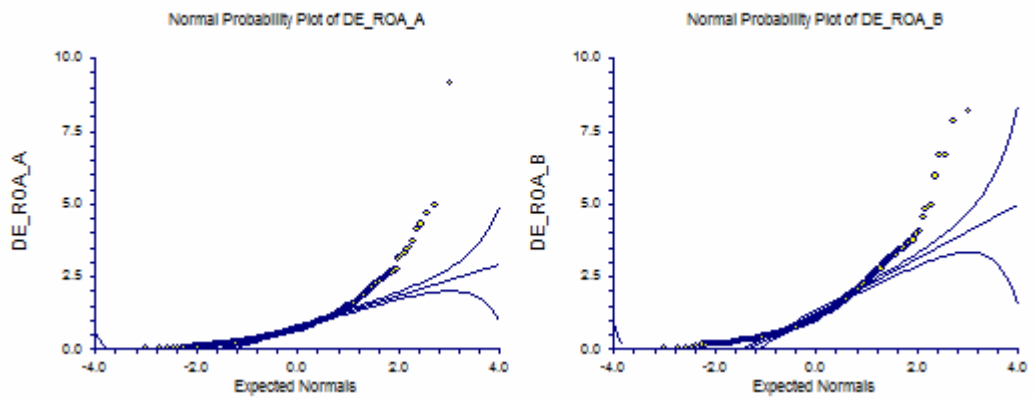


Figure 9: Normal probability plot for D/E and ROA



The normal probability plots for both samples above show the majority of data points falling outside the 95% confidence bands indicating that the assumption of normality of the sample has been violated.

Table 6: Test of assumptions of normality for D/E and ROA

Assumption	Value	Probability	Decision(.050)
Skewness Normality (DE_ROA_A)	16.6697	0.000000	Reject normality
Kurtosis Normality (DE_ROA_A)	12.3398	0.000000	Reject normality
Omnibus Normality (DE_ROA_A)	430.1502	0.000000	Reject normality
Skewness Normality (DE_ROA_B)	12.8138	0.000000	Reject normality
Kurtosis Normality (DE_ROA_B)	9.0380	0.000000	Reject normality
Omnibus Normality (DE_ROA_B)	245.8798	0.000000	Reject normality
Variance-Ratio Equal-Variance Test	1.8550	0.000000	Reject equal variances
Modified-Levene Equal-Variance Test	30.1116	0.000000	Reject equal variances

The findings from the visual inspection of the normal probability plot is confirmed by the test of assumptions section of the NCSS output. Both samples violate the skewness, kurtosis and omnibus normality test. Equal variances have also been rejected using the modified-Levene equal variance test for non-parametric data.

Due to the fact that normality in the data distribution has been rejected the non-parametric Mann-Whitney U test was used to test for the differences between means. The Mann-Whitney U test is used when assumption of normality is not valid but permitting the distributions are at least ordinal in nature and that they are identical except for the measure of central tendency.

Table 7: Test for the differences between means for D/E versus ROA

**Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians**

Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
DE_ROA_A	92012.5	222317.5	260355	4704.178
DE_ROA_B	168087.5	298392.5	260355	4704.178

Number Sets of Ties = 201, Multiplicity Factor = 42318

Alternative Hypothesis	Exact Probability		Approximation Without Correction			Approximation With Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050
Diff<>0			-8.0859	0.000000	Yes	-8.0858	0.000000	Yes
Diff<0			-8.0859	0.000000	Yes	-8.0858	0.000000	Yes
Diff>0			-8.0859	1.000000	No	-8.0860	1.000000	No

Test of hypothesis.

**Research hypothesis 1A:**

$H_{0a} = \rho_{\text{leverage,profitability}} \leq 0$  (Profitability and leverage is not correlated or negatively correlated)

$H_{1a} = \rho_{\text{leverage,profitability}} > 0$  (Profitability and leverage is positively correlated)

The null hypothesis could not be rejected. The probability value (p-value) exceed the pre-defined significance level for this test ( $\alpha = 0.05$ )

**Research Hypothesis 1B:**

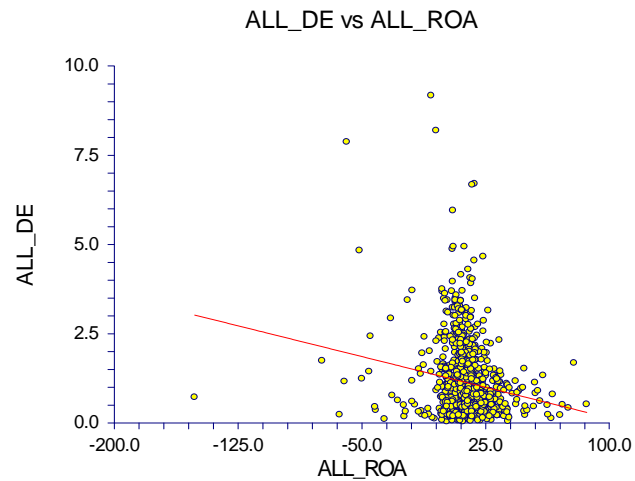
$H_{0b} = \rho_{\text{leverage,profitability}} \geq 0$  (Profitability and leverage is not correlated or positively correlated)

$H_{1b} = \rho_{\text{leverage,profitability}} < 0$  (Profitability and leverage is negatively correlated)

As the probability level (p-value) is smaller than the specified significance level ( $\alpha = 0.05$ ) the null hypothesis stating that there is no correlation or a positive correlation between profitability and leverage is rejected.

### 5.3.1.2. Correlation between D/E and ROA

Figure 10: Correlation between D/E and ROA



Evaluating the scatter plot displaying the data for all the firm year data points for the variables D/E and ROA does not indicate an obvious linear or non-linear relationship between the variables. The data points are tightly clustered with outliers clearly visible on both the X and Y axis.

At a significance level of 5% ( $\alpha = 0.05$ ) the spearman rank correlation coefficient was -0.1373 indicating a weak negative correlation between leverage and ROA for the sample. This result confirms the outcome from the t-test although the correlation is weaker than expected.

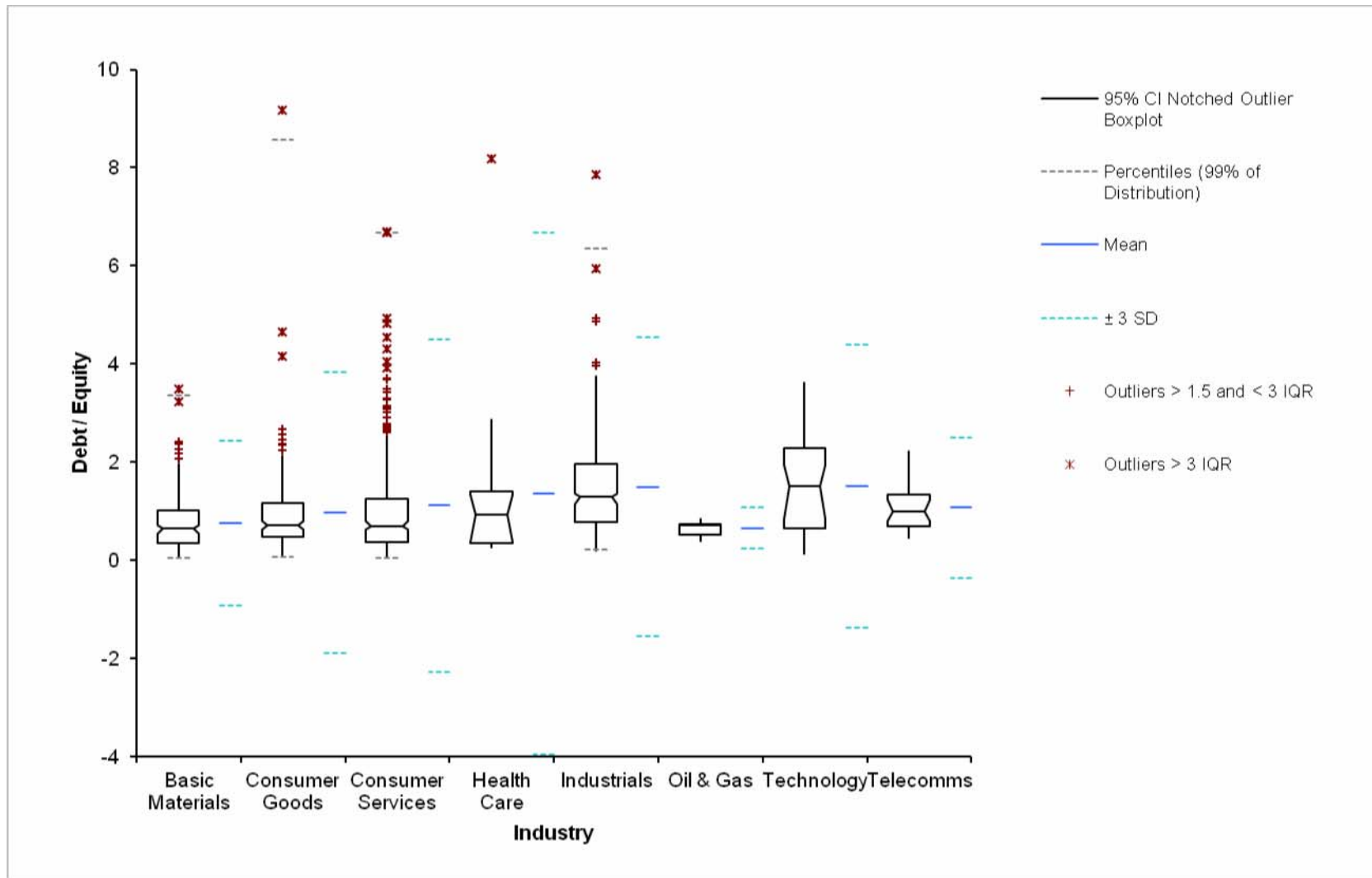
### 5.3.2. Industry median debt levels

The one way analysis of variance (ANOVA) test was executed to determine whether there was a difference between the median industry debt levels.

Visual inspection of the box plot for the mean industry debt levels (Figure 11) indicate both unequal variances indicated by the different sizes of the interquartile ranges of the box plots as well the fact that the data are positively skewed. This can be witnessed by the large number of positive outliers above the box plots.

The mean and median values also appear to be significantly different based on the inspection of the industry mean debt level box plot in figure 11. This indicates that the data is not normally distributed.

Figure 11: Box plot for the industry mean debt levels





The test of assumptions section of the NCSS output confirms the visual inspection of the box plots for industry mean debt levels with regards to both equal variances and the violation of the assumption of normality.

Table 8: Industry median debt levels test for normality

<b>Tests of Assumptions Section</b>			
<b>Assumption</b>	<b>Test Value</b>	<b>Prob Level</b>	<b>Decision (0.05)</b>
Skewness Normality of Residuals	20.3768	0.000000	Reject
Kurtosis Normality of Residuals	14.7466	0.000000	Reject
Omnibus Normality of Residuals	632.6781	0.000000	Reject
Modified-Levene Equal-Variance Test	6.2707	0.000000	Reject

All tests for normality were rejected therefore parametric tests for the difference between means could not be used for this test. The non-parametric Kruskal-Wallis test was therefore used to answer the research hypothesis.

Test of Hypothesis two:

#### **Kruskal-Wallis One-Way ANOVA on Ranks**

Hypotheses

H<sub>0</sub>: All medians are equal.

H<sub>a</sub>: At least two medians are different.

#### **Test Results**

<b>Method</b>	<b>DF</b>	<b>Chi-Square (H)</b>	<b>Prob Level</b>	<b>Decision(0.05)</b>
Not Corrected for Ties	7	124.3774	0.000000	Reject H <sub>0</sub>
Corrected for Ties	7	124.3824	0.000000	Reject H <sub>0</sub>

H<sub>0</sub> =  $\mu_1 = \mu_2 = \dots \mu_8$  (Industry median debt levels are homogenous)

H<sub>1</sub> =  $\mu_1 \neq \mu_2 \neq \dots \mu_8$  (Industry median debt levels are heterogeneous)

At a significance level of 5% ( $\alpha = 0.05$ ) the null hypothesis is rejected and at least two of the median values have been found to be statistically significantly different from one another.

### 5.3.3. Leverage and earnings volatility

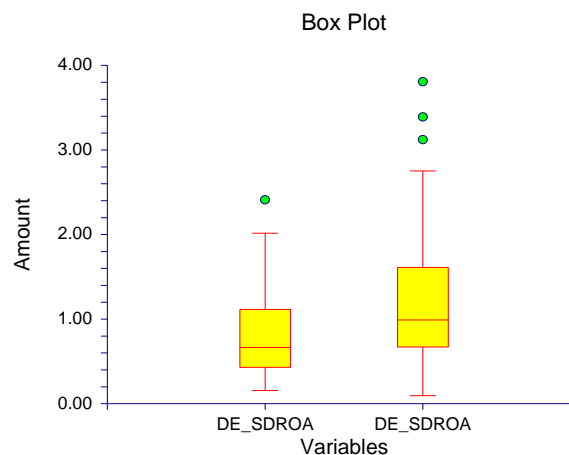
#### 5.3.3.1. T-test for D/E and earnings volatility

Table 9: Descriptive statistics for D/E and earnings volatility

Descriptive Statistics Section						
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
DE_SDROA_A	51	0.8690196	0.5373751	7.524757E-02	0.7178804	1.020159
DE_SDROA_B	51	1.24049	0.8650418	0.1211301	0.9971933	1.483787

The standard deviation of ROA was used as a proxy for earnings volatility. Earnings volatility (standard deviation of ROA) was calculated for each firm over the ten year period from 1998 to 2007. The independent variable was then sorted in descending order and the sample (based on the dependant variable) divided into two equally sized groups. Group A represents the D/E ratio of firms with the greatest earnings volatility and group B the D/E ratio of firms with the least earnings volatility.

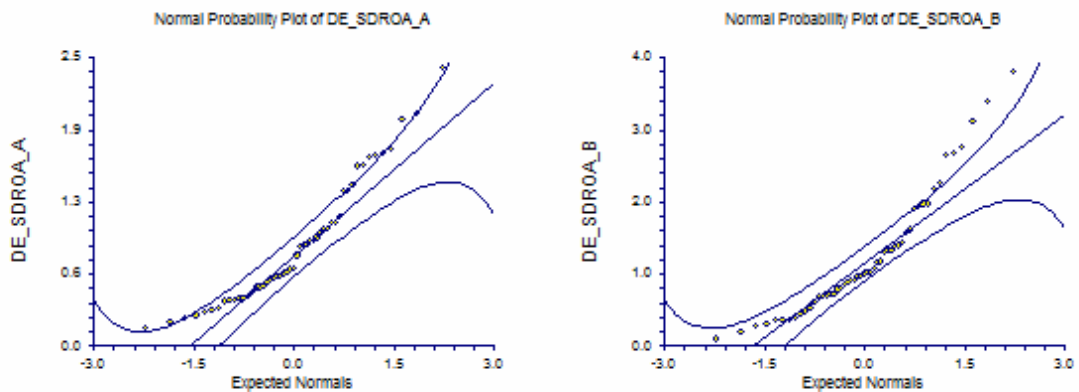
Figure 12: Box plot for the D/E ratio of firms based on their earnings volatility



Visual inspection of the box plots reveal that their median values are not located in the center of the interquartile ranges and both groups show evidence of being positively skewed. Group B (right hand side) show greater variability around the

mean as well as significantly more positive outliers than group A. This is confirmed by the slightly larger standard deviation score in the descriptive statistics section. Both groups show signs of non-normality. The unequal sizes of the interquartile box plots also indicate that equal variances are likely to be rejected.

Figure 13: Normal probability plot for D/E versus earnings volatility



Both groups show a significant number of observations that fall outside the 95% confidence bands indicating that the data is not normally distributed.

Table 10: Test of assumptions section for D/E versus earnings volatility

Assumption	Value	Probability	Decision (.050)
Skewness Normality (DE_SDR0A_A)	2.6184	0.008834	Reject normality
Kurtosis Normality (DE_SDR0A_A)	0.5119	0.608748	cannot reject normality
Omnibus Normality (DE_SDR0A_A)	7.1181	0.028466	Reject normality
Skewness Normality (DE_SDR0A_B)	3.1331	0.001730	Reject normality
Kurtosis Normality (DE_SDR0A_B)	1.3669	0.171663	cannot reject normality
Omnibus Normality (DE_SDR0A_B)	11.6848	0.002902	Reject normality
Variance-Ratio Equal-Variance Test	2.5913	0.001003	Reject equal variances
Modified-Levene Equal-Variance Test	4.2812	0.041114	Reject equal variances

The test of assumptions of normality for both groups is rejected based on the numerical assessment of skewness, kurtosis and omnibus normality. The Modified-Levene equal variance test for non-parametric data indicates that equal variances are also rejected.

Table 11 : Test for the differences between means for D/E versus earnings volatility

Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians								
Exact Probability		Approximation without Correction			Approximation With Correction			
Alternative Hypothesis	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050
Diff<>0			-2.1585	0.030889	Yes	-2.1551	0.031150	Yes
Diff<0			-2.1585	0.015445	Yes	-2.1551	0.015575	Yes
Diff>0			-2.1585	0.984555	No	-2.1618	0.984685	No

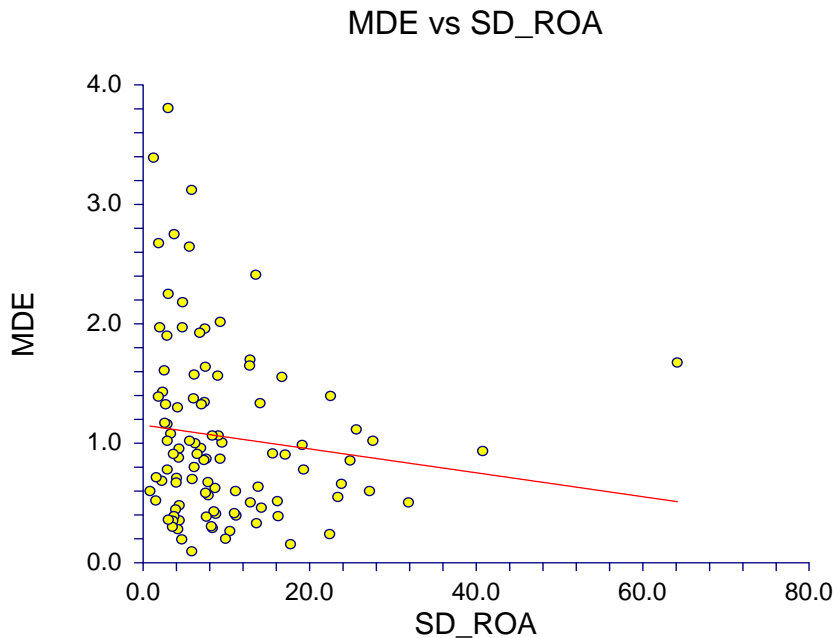
$H_0 = \rho_{\text{leverage, stdev ROA}} \geq 0$  (There is no correlation between debt and earnings volatility)

$H_1 = \rho_{\text{leverage, stdev ROA}} < 0$  (Earnings volatility and debt is negatively correlated)

At a significance level of 5% ( $\alpha = 0.05$ ) the null hypothesis was rejected in favour of the alternative hypothesis indicating that there is a negative correlation between earnings volatility and debt.

### 5.3.3.2. Correlation between D/E and earnings volatility

Figure 14: Correlation between leverage and earnings volatility



Visual inspection of the scatter diagram for the median debt to equity ratio versus earnings volatility over the period 1998-2007 shows a weak downward sloping tail

from the left to the right of the diagram indicating a negative correlation between the variables. At a significance level of 5% ( $\alpha = 0.05$ ) the Spearman rank correlation coefficient was -0.2036 indicating a weak negative correlation between the dependant variable (D/E) and the independent variable (earnings volatility). This finding supports the outcome of the t-test.

### 5.3.4. Leverage and the price-to-book ratio

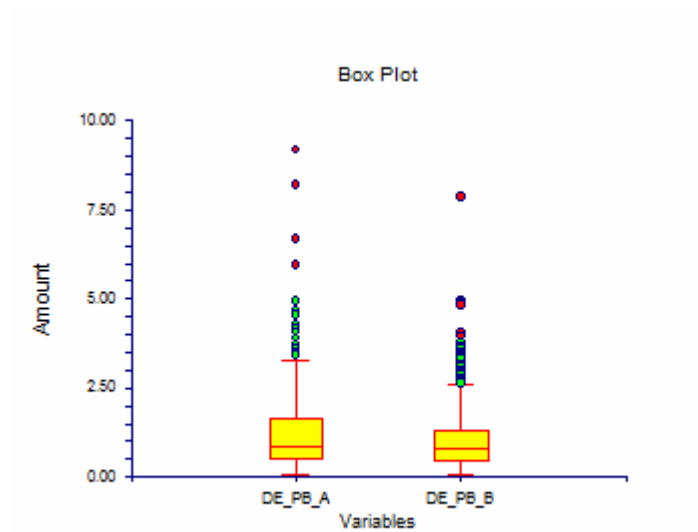
#### 5.4.4.1 t-test for D/E and the price-to-book ratio

**Table 12: Descriptive statistics for D/E versus the price-to-book-ratio**

<b>Descriptive Statistics Section</b>						
<b>Variable</b>	<b>Count</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>95.0% LCL of Mean</b>	<b>95.0% UCL of Mean</b>
DE_PB_A	499	1.245471	1.099705	4.922958E-02	1.148748	1.342194
DE_PB_B	499	1.039619	0.8739138	3.912175E-02	0.9627552	1.116483

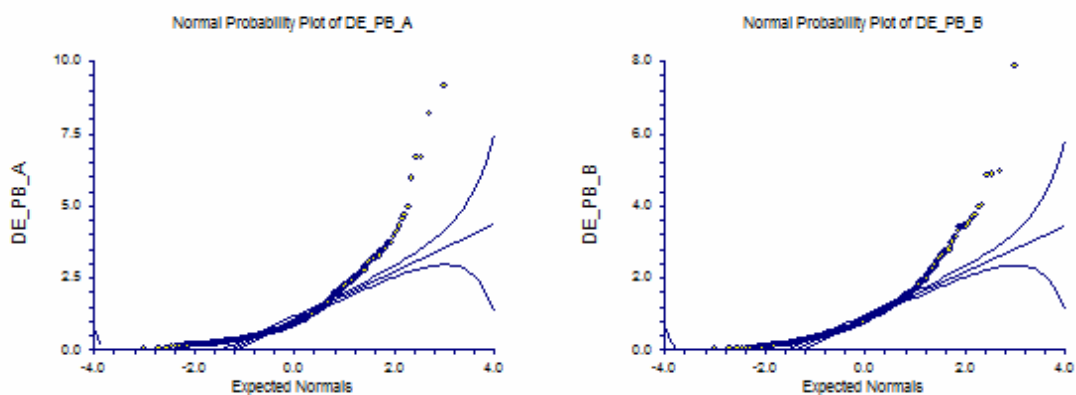
After all missing cases were removed 998 firm year data points were available for inclusion in the sample. The independent variable (price-to-book) was sorted in descending order and the information used to divide the dependant variable into two equally sized groups. Group A represented the firms with the highest price-to-book ratio and group B represented the firms with the lowest price-to-book ratio.

Figure 15: Box plots for D/E versus the price-to-book-ratio



A visual inspection of the box plots indicate that both groups show signs of non-normality. The samples are both positively skewed and both samples have a large number of positive outliers. Group A (highest price-to-book ratio) also has a wider interquartile box plot and more extreme outliers indicating greater variability in this group. This observation is confirmed by the larger standard deviation score indicated in the descriptive statistics section of the NCSS output.

Figure 16: Normal probability plots for D/E versus the price-to-book-ratio



The normal probability plot indicate that both samples have a large number of firm year data points that fall outside the 95% confidence bands indicating that the data is not normally distributed.

Figure 17: Test of assumptions section for D/E versus the price-to-book-ratio

Assumption	Value	Probability	Decision (.050)
Skewness Normality (DE_PB_A)	14.1466	0.000000	Reject normality
Kurtosis Normality (DE_PB_A)	10.1446	0.000000	Reject normality
Omnibus Normality (DE_PB_A)	303.0403	0.000000	Reject normality
Skewness Normality (DE_PB_B)	13.5293	0.000000	Reject normality
Kurtosis Normality (DE_PB_B)	9.8433	0.000000	Reject normality
Omnibus Normality (DE_PB_B)	279.9313	0.000000	Reject normality
Variance-Ratio Equal-Variance Test	1.5835	0.000000	Reject equal variances
Modified-Levene Equal-Variance Test	7.3829	0.006699	Reject equal variances

The test of assumptions section of the NCSS data output confirms the visual inspection of the box and normal probability plots. The assumption of normality in both samples was rejected based on the numerical calculation of the skewness, kurtosis and omnibus normality values. The modified-Levene equal variance test for non-parametric data also rejects the assumption of equal variances.

Figure 18: Hypothesis test for D/E versus the price-to-book-ratio

Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians	Exact Probability		Approximation without Correction			Approximation with Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050
Diff<>0			2.8194	0.004811	Yes	2.8193	0.004812	Yes
Diff<0			2.8194	0.997595	No	2.8195	0.997595	No
Diff>0			2.8194	0.002405	Yes	2.8193	0.002406	Yes

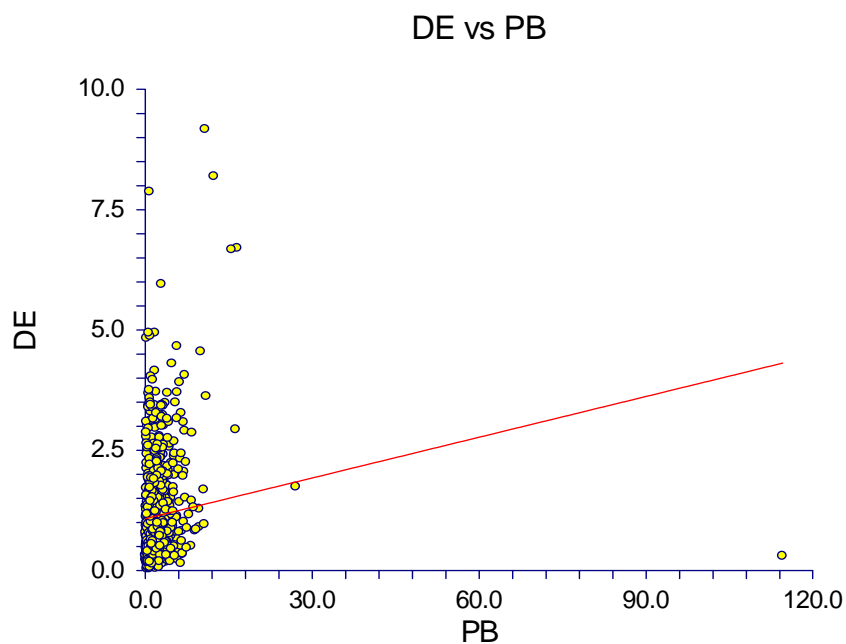
$H_0 = \rho_{\text{leverage,p/book}} \geq 0$  (leverage and the price-to-book ratio is not correlated)

$H_1 = \rho_{\text{leverage,p/book}} < 0$  leverage and the price-to-book ratio is negatively correlated)

The null hypothesis could not be rejected in favour of the alternative hypothesis since the probability level (p-value) is significantly larger than the significance level set for this test ( $\alpha = 0.05$ ).

#### 5.3.4.2. Correlation between D/E and the price-to-book ratio

Figure 19: Scatter diagram for D/E versus the price-to-book-ratio



Visual inspection of the scatter diagram for the debt to equity ratio (dependant variable) versus the price-to-book ratio (independent variable) over the period 1998-2007 shows no obvious linear or non-linear correlation between the variables. At a significance level of 5% ( $\alpha = 0.05$ ) the Spearman rank correlation coefficient was 0.1254 indicating a weak positive correlation between the dependant variable (D/E) and the independent variable (price-to-book). This finding supports the outcome of the t-test.



### 5.3.5. D/E and default probability

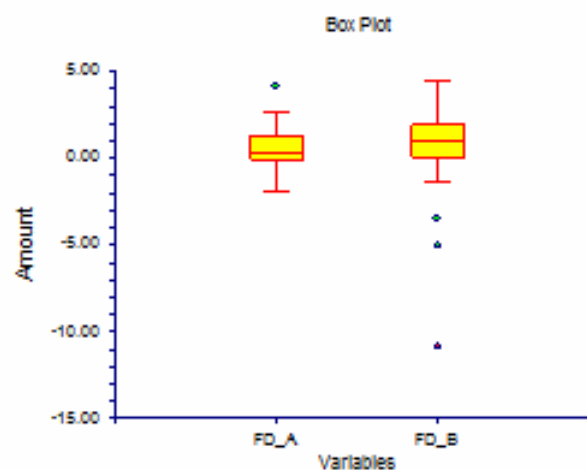
#### 5.3.5.1. T-test for D/E and financial distress probability

Figure 20: Descriptive statistics for D/E versus financial distress probability

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
FD_A	47	0.5852851	1.119133	0.1632424	0.2566952	0.913875
FD_B	47	0.7056587	2.355869	0.3436389	1.394956E-02	1.397368

The total number of firms included in the sample for the relationship between leverage and financial distress was 94. The remaining 8 firms were excluded due to a lack of data availability. The firms were once again divided into two equally sized groups using the independent variable, sorted in descending order, as the grouping variable. Group A included the 50% of companies with the highest D/E ratio while group B included the 50% of companies with the lowest D/E ratio. The dependant variable is the financial distress scores of the companies included in the study.

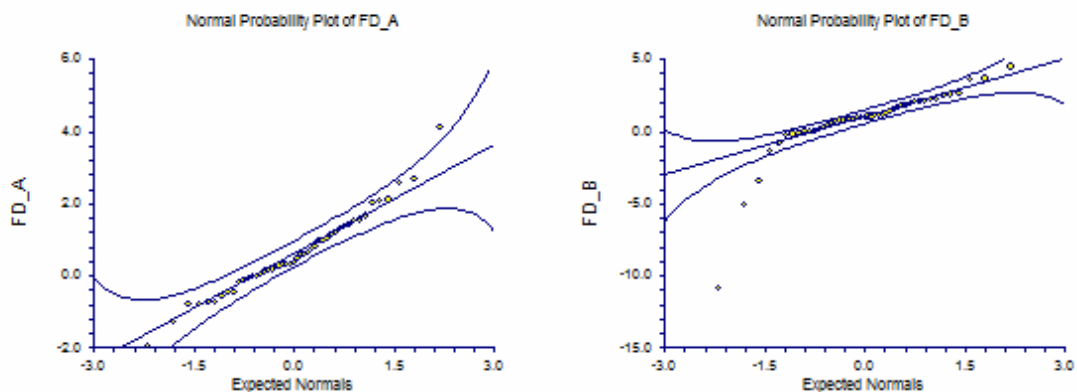
Figure 21: Financial distress scores box plot



The median value for group A is to the left of the centre of the box plot and there is one outlier visible above the box however the visual inspection indicates that the data is reasonably be normally distributed.

The box plot for group B shows three outliers at the bottom of the interquartile range box indicating that the sample is skewed to the left. As indicated by the descriptive statistics section greater variance (i.e. higher standard deviation score) is clearly visible when comparing the box plot for group B with that of Group A. Both groups show some signs of non-normality but this seems only marginal.

**Figure 22: The normal probability plot for the financial distress scores**



With the exception of one outlier all the data points for group A fall within the 95% confidence bands. Group B has three significant outliers below the 95% lower confidence band again indicating that the sample is skewed to the left.

Table 13: Test of assumptions for the financial distress scores

Assumption	Value	Probability	Decision (.050)
Skewness Normality (FD_A)	1.7430	0.081326	Cannot reject normality
Kurtosis Normality (FD_A)	1.6055	0.108390	Cannot reject normality
Omnibus Normality (FD_A)	5.6157	0.060334	Cannot reject normality
Skewness Normality (FD_B)	-5.5854	0.000000	Reject normality
Kurtosis Normality (FD_B)	4.7535	0.000002	Reject normality
Omnibus Normality (FD_B)	53.7919	0.000000	Reject normality
Variance-Ratio Equal-Variance Test	4.4314	0.000001	Reject equal variances
Modified-Levene Equal-Variance Test	2.1299	0.147859	Cannot reject equal variances

The analysis above is confirmed by the test of assumptions section. The probability (p-value) for the test of normality clearly indicates that the null hypothesis for normality cannot be rejected for group A while it is rejected for group B. Since one of the two samples (Group B) is not normal a non-parametric test will be used to test for the difference between means.

Table 14: Hypothesis test section for D/E versus financial distress probability

**Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians**

Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
FD_A	859	1987	2232.5	132.2419
FD_B	1350	2478	2232.5	132.2419

Number Sets of Ties = 0, Multiplicity Factor = 0

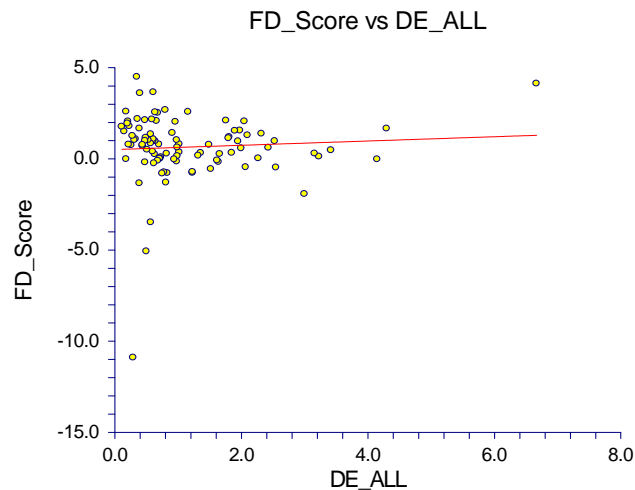
Alternative Hypothesis	Exact Probability		Approximation without Correction			Approximation with Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050
Diff<>0			-1.8564	0.063390	No	-1.8527	0.063930	No
Diff<0			-1.8564	0.031695	Yes	-1.8527	0.031965	Yes
Diff>0			-1.8564	0.968305	No	-1.8602	0.968573	No

$H_0 = \rho_{\text{fin-distress},D/E} \leq 0$  (the financial distress score of firms making aggressive use of debt is no different than firms making conservative use of debt financing in their capital structures)

$H_1 = \rho_{\text{fin-distress},D/E} > 0$  (the financial distress score of firms making aggressive use of debt is greater than firms making conservative use of debt financing in their capital structures)

The null hypothesis could not be rejected in favour of the alternative hypothesis at a confidence level of 5% ( $\alpha = 0.05$ ). This is evident based on the fact that the p-value for the right sided tail test is larger than the value for Alpha ( $0.968573 > 0.05$ ).

#### 5.3.5.2. Correlation between D/E and default probability



Visual inspection of the scatter diagram for the financial distress scores (dependant variable) and the firm's D/E ratio (independent variable) indicates no obvious linear or non-linear correlation between the variables. At a significance level of 5% ( $\alpha = 0.05$ ) the Spearman rank correlation coefficient was  $-0.2037$  indicating a weak negative relationship between D/E and the firm's financial distress scores. This finding supports the outcome of the t-test.

#### 5.3.5.3. Additional analysis for default probability

Due to the completely unexpected result above it was necessary to try and determine whether it is not debt per say but rather the structure of the firm's debt and the conditions associated with that debt that could lead to an increase in the likelihood of

financial distress. Since financial distress would imply that a firm would not be able to meet its obligations as they become due the t-test was repeated using the interest coverage ratio as a predicting variable for financial distress rather than the D/E ratio. It is expected that should firms have both high debt levels and a high ratio of interest payments they would be at high risk of financial default following an external financial or economic shock.

$H_0 = \rho_{\text{findistress,intcov}} \leq 0$  (Financial distress and interest coverage is not correlated)

$H_1 = \rho_{\text{findistress,intcov}} > 0$  (Financial distress and interest coverage positively correlated)

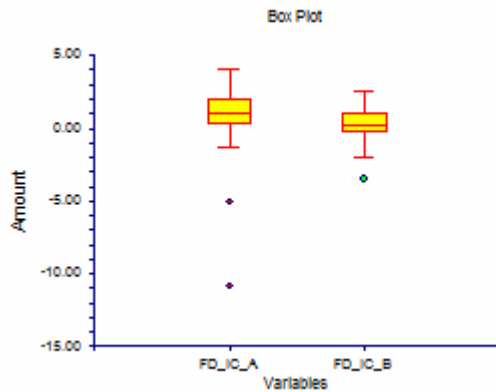
**Table 15: Descriptive statistics for financial distress versus interest coverage**

Descriptive Statistics Section						
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
FD_IC_A	46	0.8475861	2.281579	0.3364005	0.1700406	1.525132
FD_IC_B	46	0.335063	1.121979	0.1654267	1.876557E-03	0.6682495

All firms that had an interest coverage ratio available for the year 2007 were included in the sample. The interest coverage ratio (independent variable) was sorted in descending order and the information used to divide the firms into two equal groups based on their interest cover ratio ranking. Group A represent the financial distress ratio of the firms that had the highest interest coverage ratio and group B represent the firms that had the lowest interest coverage ratio. Group A has a larger mean value (0.846) but also shows a more pronounced variation about the mean. This can

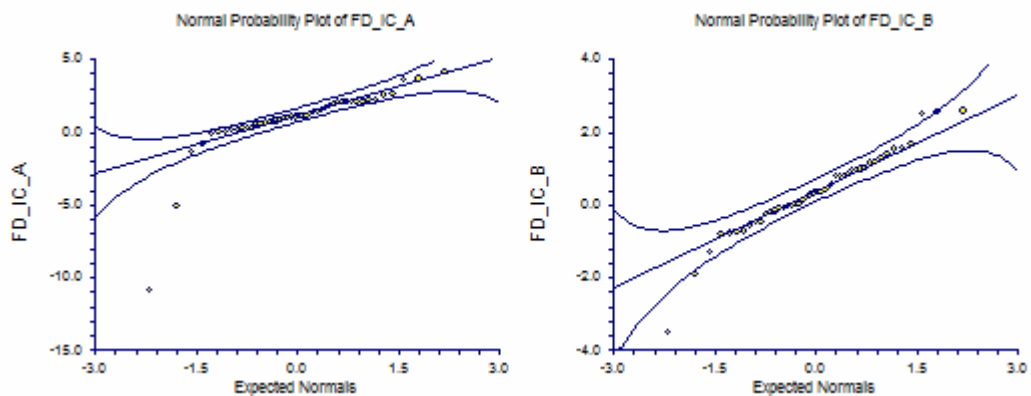
be visually confirmed by an inspection of the box plots for financial distress versus interest coverage (figure 22).

Figure 23: Box plots for financial distress versus interest coverage



Both box plots shows signs of non-normality with the mean values not located in the centre of the interquartile box plots. In both cases negative outliers are present.

Figure 24: Normal probability plots for financial distress versus interest coverage



Inspection of the normal probability plots does not show significant deviation beyond the 95% confidence bands with the exception of isolated outlier values in both samples.

Table 16: Test of assumptions section for financial distress versus interest coverage

Assumption	Value	Probability	Decision (.050)
Skewness Normality (FD_IC_A)	-5.9644	0.000000	Reject normality
Kurtosis Normality (FD_IC_A)	5.0253	0.000001	Reject normality
Omnibus Normality (FD_IC_A)	60.8277	0.000000	Reject normality
Skewness Normality (FD_IC_B)	-1.7158	0.086204	Cannot reject normality
Kurtosis Normality (FD_IC_B)	2.2819	0.022497	Reject normality
Omnibus Normality (FD_IC_B)	8.1508	0.016985	Reject normality
Variance-Ratio Equal-Variance Test	4.1353	0.000005	Reject equal variances
Modified-Levene Equal-Variance Test	1.6480	0.202522	cannot reject equal variances

The test of assumptions sections (table 16) indicates overwhelming support that the assumption of normality should be rejected in both groups with the exception skewness in group B. The modified-Levene test for equal variance could not be rejected.

Table 17: Hypothesis test for financial distress versus interest coverage

**Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians**

Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
FD_IC_A	1458	2539	2139	128.0586
FD_IC_B	658	1739	2139	128.0586

Number Sets of Ties = 0, Multiplicity Factor = 0

Alternative Hypothesis	Exact Probability		Approximation Without Correction			Approximation With Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050
Diff<>0			3.1236	0.001787	Yes	3.1197	0.001811	Yes
Diff<0			3.1236	0.999107	No	3.1275	0.999118	No
Diff>0			3.1236	0.000893	Yes	3.1197	0.000905	Yes

The hypothesis test section (figure 17) indicates that the null hypothesis can be rejected in favour of the alternative hypothesis at a significance level of 5% ( $\alpha = 0.05$ ).

## **6. Chapter Six - Discussion of results**

### **6.1. Introduction**

In chapter six the outcome of the statistical of results obtained in chapter five will be discussed in terms of both the research hypotheses and the literature review in order to determine whether support is warranted for the aforementioned capital structure theories and research hypothesis based on the available evidence. Each research hypothesis will be discussed individually on the basis of the expected outcome of the hypothesis test, the actual outcome and finally positing potential reasons for the observed outcomes.

### **6.2. Discussion of results**

#### **6.2.1. Research hypothesis one: the relationship between profitability and debt**

The trade-off theory and the pecking order theory suggest that increased profitability will have different impacts on the financing decisions of the firm. According to the trade-off theory increased profitability will lead to an increase in debt in an effort to maximise the income tax shield obtained through the tax deductibility of interest payments. The pecking order theory suggest that firms will prefer to make use of internal funds over external funds and therefore will require less costly external debt in times of increased profitability. Similarly firms will prefer to retire costly external debt in times of good profitability.



### **Research hypothesis 1a:**

$H_{0a} = \rho_{\text{leverage,profitability}} \leq 0$  (Profitability and leverage is not correlated or negatively correlated)

$H_{1a} = \rho_{\text{leverage,profitability}} > 0$  (Profitability and leverage is positively correlated)

At a significance level of 5% ( $\alpha = 0.05$ ) the null hypothesis could not be rejected.

### **Research hypothesis 1b:**

$H_{0b} = \rho_{\text{leverage,profitability}} \geq 0$  (Profitability and leverage is not correlated or positively correlated)

$H_{1b} = \rho_{\text{leverage,profitability}} < 0$  (Profitability and leverage is negatively correlated)

At a significance level of 5% ( $\alpha = 0.05$ ) the null hypothesis was rejected in favour of the alternative hypothesis.

The outcome of the first research hypothesis supports the pecking order theory which states that there will be a negative correlation between debt and profitability.

This finding is supported by the two sample t-test which divided the sample data into two fifty percentile groups based on profitability. The most profitable 50% of firm year data displayed a lower median debt level (0.69) than the least profitable firm year data points (1.03). This indicates that the median debt level for the least profitable 50% of firm year data points is nearly one half greater than that of the 50% most profitable firm year data points. This result may indicate that firms either use their profits to retire debt during profitable years, fund projects internally during profitable years or some combination of both.

This outcome is supported by the correlation analysis which indicated a weak negative correlation between profitability and debt. The correlation was however much weaker than expected. One potential reason for this may be the fact that there are significant outliers present in the data that may have skewed the outcome of the correlation analysis.

Overall the outcome of the T-test is regarded as much more objective than that of the correlation analysis and the difference in the median debt levels can be regarded as both statistically and practically significant since the most profitable firm year data points indicated nearly 50% less debt than the least profitable firm year data points.

#### 6.2.2. Research hypothesis two: difference between industry median debt levels

According to Frank and Goyal (2010) industry affiliation is a core determinant of firm specific leverage. Firms that operate in industries that display high median debt levels will tend to have high levels of debt. Hovakimian, Opler and Titman (2002) cite examples of industries in which the costs associated with debt can be so high that firms will finance themselves primarily through equity (the bio-technology and software industries) whereas firms with low research and development cost, highly tangible assets and relatively large market capitalisation are expected to have high debt levels.

$H_0 = \mu_1 = \mu_2 = \dots \mu_8$  (Industry median debt levels are homogenous)

$H_1 = \mu_1 \neq \mu_2 \neq \dots \mu_8$  (Industry median debt levels are heterogeneous)

At a significance level of 5% ( $\alpha = 0.05$ ) the null hypothesis was rejected indicating that South African firms also display a significant difference in industry median debt levels. The technology sector showed the most pronounced levels of debt with the median firm year debt-to-equity ratio being 1.51, more than double that of the basic materials, consumer goods, consumer services and oil & gas median firm year debt levels. The underlying factors, such as asset tangibility and research and development cost, that drives this behaviour did not form a part of this study. The structure, maturity and type of debt instruments issued, was also not investigated as a part of this research project. Both of these factors could give significant insight into the reason for the industry specific debt levels especially when compared to with the macro-economic cycle, relative maturity and competitive dynamics in each industry. This finding offers some support for the optimal capital structure theory.

6.2.3. Research hypothesis three: the relationship between earnings volatility and debt

$H_0 = \rho_{\text{leverage, stdev ROA}} \geq 0$  (There is no correlation between debt and earnings volatility)

$H_1 = \rho_{\text{leverage, stdev ROA}} < 0$  (Earnings volatility and debt is negatively correlated)

The null hypothesis was rejected in favour of the alternative hypothesis.

One of the key factors in deciding on the amount of leverage in a firm's capital structure is the firm's business risk. Business risk can be defined as those factor that are typically driven by the firms operating strategy, industry dynamics and exposure

to economics fluctuations that would include factors such as the interest rate, changes in commodity prices and the rate of exchange (Opler *et al*, 1997). Since South African firms (and the developing economies of the world in general) are in many instances especially dependant on both commodity prices and the rate of exchange for both exports and the importation of capital goods it was expected that earnings volatility would play a major role in the debt financing decisions of South African firms.

Both the optimal capital structure theory and the pecking order theory predicted that leverage will decrease as earnings volatility increases.

6.2.4. Research hypothesis four: the relationship between the price-to-book ratio and debt

$H_0 = \rho_{\text{leverage,p/book}} \geq 0$  (leverage and the price-to-book ratio is not correlated)

$H_1 = \rho_{\text{leverage,p/book}} < 0$  leverage and the price-to-book ratio is negatively correlated)

The null hypothesis could not be rejected in favour of the alternative hypothesis since the probability level (p-value) was larger than the specified significance level defined for the hypothesis test ( $0.997595 > 0.05$ .)

The notion that the market value of the firm's assets less liabilities (net worth) and leverage is negatively correlated has been expressed by Frank and Goyal (2010) as reliable capital structure relationship. Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001) however question the portability of capital structure theory,

especially when concepts are transferred from the developed to the developing world. One exception they found was that related to the price-to-book ratio of firms. Booth *et al* (2001) found that the price-to-book value varied from trading to a discount to trading at a premium in different developing countries and therefore the correlation will vary across countries depending on the accounting principles adopted. In general the factors that affect capital structure are similar for developed and developing countries however in the case of business risk and the price-to book ratio the signs are often the opposite of what we would expect. One possible reason might be the fact that firms in developing countries have a greater dependence on short-term debt and trade credit (Booth *et al*, 2001). This view is supported by Nagesh (2001) who states that long term debt generally constitutes only a small percentage of total assets, often less than 10% of total assets, probably because few corporate debt securities are publicly traded in South Africa.

6.2.5. Research hypothesis five: the relationship between debt and the probability of financial distress

$H_0 = \rho_{\text{fin distress}, D/E} \leq 0$  (the financial distress score of firms making aggressive use of debt is no different than firms making conservative use of debt financing in their capital structures)

$H_1 = \rho_{\text{fin-distress}, D/E} > 0$  (the financial distress score of firms making aggressive use of debt is greater than firms making conservative use of debt financing in their capital structures)

The null hypothesis could not be rejected in favour of the alternative hypothesis.

This result was completely unexpected as logic predicts, and evidence suggest, that firms with highly leveraged balance sheets would be more susceptible to financial distress during a period of reduction in the demand for their products or adverse external financial and economic shocks. This view is supported by Opler *et al* (1997) who states that firms with highly leveraged balance sheet are likely to suffer disproportionately during industry downturns.

The most likely cause for the result is that spurious correlations might have been formed on the basis of a single aberrant industry or outlier values in more than one industry. In order to test this theory a second t-test was run using the interest coverage ratio as a proxy for leverage as it is assumed that all debt would be interest bearing. The hypothesis for this test is stated below:

$H_0 = \rho_{\text{findistress,intcov}} = 0$  (Financial distress and interest coverage is not correlated)

$H_1 = \rho_{\text{findistress,intcov}} > 0$  (Financial distress and interest coverage positively correlated)

In this instance it was possible to reject the null hypothesis in favour of the alternative hypothesis. Although this does not conclusively answer the question of whether high levels of debt will lead to a high probability of financial distress it does point in that direction. It is therefore possible to reasonably deduct that both the levels and structure (trade creditors and short-term versus long-term sources) of debt plays an important role in the probability of financial default.

It is recommended that this research hypothesis be further unpacked, by industry and firm, in order to better understand this unexpected result. Specific attention

should be paid to industry characteristics, firm level characteristics and the nature of debt with which the firm is encumbered (i.e. the structure of the debt). The financial and economic downturn of 2007/8 gives researchers a unique opportunity to further investigate the relationship between leverage and the probability of financial distress. Unfortunately due to space and time constraints this goal cannot be achieved as a part of this research project.

## **7. Chapter seven – Conclusion and recommendations**

### **7.1. Introduction**

The concluding chapter of this research report aims to succinctly summarise some of the main findings and learning that has occurred as a consequence of this process. The summary of key findings will be followed by recommendations for practitioners before concluding with suggestions for further research.

### **7.2. Summary of key findings**

It has been said that in some areas theory leads practise and in others theory follows practise, capital structure research seems to follow practise and still lacks a singular overarching theory with both goods explanatory and predictive power. It is probably this shortcoming that has lead researchers like Myers (1984) to conclude that we know little about how managers make capital structure decisions. One of the challenges faced by capital structure theory is the fact that the theories are often diametrically opposed to one another (Barclay & Smith, 1999).

Two possible reasons can be postulated for this: Firstly it has been argued that much of the empirical research have often been conducted with the specific aim of finding support for a particular theory thereby biasing the outcome of the research (Frank & Goyal, 2003) and secondly the practise of capital structure has proven to be a very contextual matter impacted by the firm, the industry in which the firm operates and the broader macro-economic and legal environment (Booth *et al*, 2001).



Despite these challenges there is a belief that progress is being made and that the continuous interaction between theory and empirical testing will lead to more sophisticated models able to give corporate finance practitioners better guidance. One of the challenges that will have to be overcome during this process is the difficulty of measuring the variables thought to affect capital structure however researchers will continue to seek and find better proxy variables for key corporate financing decisions (Barclay & Smith, 1999).

To develop a more thorough understanding of capital structure it is necessary, at least partially, to break free from the constraints of quantitative research methods in an effort to learn more from corporate finance practitioners. This view was championed by Norton (1991) who stated that it is unlikely that capital structure theory will make any significant progress until such time that greater attention is placed on the decision making processes of financial managers.

The relationship between leverage and debt was unexpected and are most likely erroneous. Support for this argument can be found in the fact that the correlation between the interest coverage ratio of firms and their financial distress probability is positively correlated. This result may have been caused by a single industry skewing the overall result of the test or alternatively by a number of outliers present in the data across industries. There is without doubt also some element of bias in the data as all firms with a D/E ratio greater than 10 were excluded from the sample. Several firms reported D/E ratios of several hundred to one and including these in the sample would have contaminated the efforts of the research project.

The positive relationship between the price-to-book ratio and leverage was also surprising as it is often believed that the South African financial and capital markets exhibit characteristics more like that of the developed rather than the developing world. One potential reason for this might be the fact that South Africa has a highly developed stock market, comparable to that of the Western world, but our debt market is still relatively under traded. This gives rise to the fact that South African listed firms have relatively low long term debt to net asset ratios.

As expected earnings volatility and leverage was negatively correlated. This factor suggests that firms that earn most of their revenue through either imports or exports are subjected to the vicissitudes of the Rand as well as the commodity price cycles are likely to exhibit chronically lower debt levels than firms that operate more domestically. Those Firms' dependant on imported capital machinery can of course always time the purchase of capital goods to coincide with favourable exchange rate conditions but this would offer limited shelter at best.

Finally, since this research project has found support for both the optimal capital structure theory and the pecking order theory the outcome concurs with the findings of Myers (2002) that capital structure theories are conditional, not general, and are at best dependent on firm, industry and country specific factors.

### **7.3. Recommendations**

#### **7.3.1. Recommendations for practitioners**

Capital structure theory is a developing area of corporate finance and as such has very few general prescriptions it can offer to practitioners, however the following guidelines does offer valuable insight:

- I. Firms should match their leverage levels with their earnings volatility. Firms with greater earnings volatility should use less leverage in their capital structures than firms with relatively stable earnings.
- II. To the extent that earnings are mean reverting firms can increase their leverage.
- III. The commonly expressed notion that South African firms are underleveraged should be viewed with at least some scepticism. The Asian crisis showed that the difference in leverage between firms that became financially distressed and those that remained financially sound were very small. Individual operating characteristics seem to matter at least as much as capital structure and market and economic conditions.
- IV. There is some evidence that South African firms underutilise long term debt in their capital structures. Changing the structure of debt can have potentially beneficial effect on the firms risk profile and cost of capital.

### **7.3.2. Recommendations for researchers**

- I. Continuing to seek empirical evidence in support of existing capital structure theories has reached a point of diminishing returns. These theories offer at best conditional explanatory and predictive power and cannot be transferred across firms, industries and countries without encountering some serious caveats. Some combination of qualitative and quantitative research probably offers the greatest probability of progress. The fact that capital structure theory has so little practical value to offer practitioners should be an indication that this area of research is ready for disruptive rather than evolutionary thinking.

### **7.4. Suggestions for further research**

Capital structure theory offer rich opportunities for further research. There are numerous methods in which this research can be advanced further as well as some additional suggestions based on experiences gained during the completion of this research report:

- i. This study made use of quantitative data in an effort to explain the observed capital structures of firms over the 1998-2007 time period. Norton (1991) indicated that there are limitations associated with using empirical data to determine which factors account for the capital structure decisions that managers of firms make. One way to overcome this problem would be to adopt a qualitative or survey based approach in order to ask managers/practitioners what factors affect the way in which they structure the capital structures of their firms rather than to use proxy variables and

- ii. The relationship between economic variables and the observed capital structure of firms could potentially offer significant insight into the behaviour of South African firms. The major macro-economic variables; gross domestic product, consumer inflation rate, production inflation rate, the prime interest and repo rates and exchange rates immediately come to mind. The motivation for such a study would be an effort to understand how the macro-economic environment affects the earnings volatility and capital structure of firms. It will be of particular importance to gain insight into how the behaviour of exchange rate dependant firms (importers and resellers and those firms dependent on exports for the majority of their revenues) are impacted versus firms that source and sell locally and are consequently somewhat less affected by the vicissitudes of the South African Rand.

- iii. The relationship between observed leverage levels and the probability of financial distress warrants further investigation, especially in the light of the recurring statement that South African firms are under leveraged. The 2007/8 financial crisis is the perfect backdrop for such research to take place as it allows researchers a unique opportunity to evaluate the impact of external financial and economic shocks on firms with heterogeneous capital structures.
- iv. Most studies of capital structure in South Africa are driven by data availability which bias them toward large and mature firms listed on the main board of the Johannesburg Stock Exchange. In order to better understand the capital market frictions experienced by smaller firms early in their life cycles it would be meaningful to conduct capital structure research on companies listed on the Alternative Exchange (Alt-X) of the Johannesburg Stock Exchange. Given the desperate need for entrepreneurship and the fact that most small enterprises in South Africa are under capitalised this area of capital structure research might prove especially meaningful from both a theoretical and practical perspective.

## **7.5. Conclusion**

Since the introduction of Modigliani and Miller's capital structure irrelevance proposition the subject of how and why firms choose a specific capital structure have remained a controversial topic (Myers, 1984). Unfortunately it would seem that the capital structure literature of the past five decades has not been able to emulate the success that corporate finance research have been able to achieve in the area of

capital budgeting (Graham & Harvey, 2002) and therefore practitioners have been left with a set of heuristics or rules of thumb to make decisions about their choices of debt, equity and other hybrid financing instruments (Myers, 2001). Researchers like Barclay and Smith (1999) do however indicate that significant strides are being made in the quality of the empirical studies being conducted in the area of capital structure research.

Much of the debate to date have centred around the argument of debt versus equity in the observed capital structure of firms but in addition to explaining the basic leverage choice (i.e. how much debt a company should use) Barclay and Smith (1999) states that useful capital structure theories should address issues such as the structure of debt (i.e. debt maturity, options and debt covenants etc.). According to Barclay and Smith (1999) companies don't only choose a level of leverage but rather they decide on a coherent package of financial policies and instruments. Under such conditions it is foreseeable that the context of the firm will become even more important in explaining existing leverage choices in an effort to offer meaningful guidance for future policy decisions. The target debt-to-equity ratio should include factors such as the company's projected investment requirements; the level and stability of its operating cash flows; its tax status; the possible loss of value should the company be unable to make positive net present value investments or be forced into financial distress and the ability to raise capital on short notice without excessive ownership dilution.

In the South African context this equates to significant research opportunities and increased collaboration between practitioners and academia.

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