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THE IMPACT OF CAPITAL STRUCTURE ON COMPANY PROFITABILITY OF INDUSTRIAL COMPANIES LISTED ON THE JOHANNESBURG STOCK EXCHANGE.

Dissertation by

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DEDICATION

I dedicate this dissertation to my late father Mr B. Zinaka who passed on during the course of my study.

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ABSTRACT

This study empirically examines the impact of capital structure on the profitability of the industrial firms listed on the JSE over a period 2006-2015. The sample consists of 52 industrial companies with a complete data set of at least 8 consecutive years. The effects of capital structure on profitability are estimated on the whole sample, then on large firms and small firms, and lastly on different sub-sectors. This study contributes to literature by providing an in-depth assessment of the impact of capital structure on a more homogeneous sample of industrial firms in South Africa. It also uses different measures of profitability and debt to asset ratios in an integrated framework in order to provide a comprehensive analysis of the problem. The fixed (within) effects regression model is used to estimate the effects of capital structure on profitability. The study also applies the pooled ordinary least squares model (pooled OLS) for robustness checks on the full sample.

The empirical findings of this study reveal that total debt and long-term debt negatively and significantly affect the profitability (NPR, ROA and EPS) of the whole sample. In the case of small and large firms, the results present a statistically significant negative relationship between ROA and debt ratios in small firms while exhibiting a strong negative impact on profitability (ROA, EPS and NPR) for large firms. The results are generally robust to a number of sensitivity tests, including estimations on different sub-sectors and an alternative estimation method (pooled OLS). Total debt and long-term debt have a negative influence on the profitability of all sectors and especially on ROA where the influence is significant. However, short-term debt positively influences the ROA and NPR of the construction and materials sub-sectors, but affects other sectors differently. From the estimations of the pooled OLS regression as an alternative model, the results mostly concur with the findings from the fixed (within) effects where debt negatively affects firm profitability.

Based on the findings of the study, debt appears to be a costly source of financing for industrial firms in South Africa as its increase results in the decline of profits. Firm managers should consider using internally generated funds which are a cheaper source of financing or issuing equity which is less risky since it does not have the fixed monthly interest and principal payments that debt has.

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LIST OF ACRONYMS

ACRONYM	Meaning
AMEX	American Stock Exchange
CFO	Chief Financial Officer
CRSP	Centre for Research in Security Prices
DA	Debt / Assets Ratio
EPS	Earnings per Share
FE	Fixed Effects
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GLS	Generalised Least of Squares
GMM	Generalised Method of Moment
IFRS	International Financial Reporting Standards
JSE	Johannesburg Stock Exchange
LTDA	Long-term Debt to Asset Ratio
ML	Maximum Likelihood
NPR	Net Profit Ratio
NPV	Net Present Value
NYSE	New York Stock Exchange
OLS	Ordinary Least of Squares
Pooled OLS	Pooled Ordinary Least Squares
RE	Random Effects
ROA	Return on Assets
ROE	Return on Equity
SLS	Stage Least of Squares
SME	Small to Medium Enterprises
SPI	Swiss Performing Index
STDA	Short-term Debt to Asset Ratio
USA	United States of America
WACC	Weighted Average Cost of Capital

LIST OF DEFINITIONS

Net Profit Ratio (NPR)	(Net Profit Before Tax / Net Sales)*100%
Return on Equity (ROE)	(Profit after Interest and Taxes / Equity)*100
Return on Assets (ROA)	(Profit after Interest and Tax / Total Assets)*100
Earnings per Share (EPS)	Net income after dividends on preference stock / Ordinary shares
Debt / Equity	Long-term debt / Shareholders' funds Long-term debt includes long-term bonds and other long-term loans that have been borrowed by the company.
Debt / Assets Ratio (DA)	Total debt / Total assets. Total debt is made up of long-term and short-term debt which are the current liabilities like creditors and short-term loans or bank overdrafts. Total assets is made up of all fixed assets and the current assets such as stocks, debtors, investments.
LTDA	Long-term debt comprised of long-term interest bearing debt (exceeding 1 year) to total assets
STDA	Short-term interest bearing debt (not exceeding 1 year) to total assets
Size	Natural logarithm of sales
Sales growth	(Sales in year 1 - Sales in year 0) divide by Sales in year 0

CHAPTER 1: BACKGROUND AND INTRODUCTION

1.1 INTRODUCTION

The choice of optimal capital structure is one of the puzzling issues in corporate finance that has not been fully resolved for quite some time. Many theories have been advanced but the researchers are still not able to utilise the existing theories to explain capital structure choices in practice, or prescribe what constitutes an optimal capital structure. According to Myers (2001:81), there is no single theory that can be applied to fully explain the financing behaviour of firms, no universal theory of capital structure exists, and there is no reason to expect that there should be one. Al-Najjar and Taylor (2008:919) consent that theoretical explanation is still lacking and empirical results are not yet sufficiently consistent to resolve the capital structure conundrum. Although there has been some progress on capital structure theory since Modigliani and Miller's (1958:261) irrelevance theory, the empirical evidence available is still not able to support with agreement the different theories proposed. A lack of consensus continues to exist on the optimal capital structure and how it could affect the profitability of firms, especially in emerging and developing countries. Nevertheless, capital structure decisions are absolutely vital for company profitability and survival.

Capital structure is one of the most critical financing decisions that firm managers should give attention to in order to maximise a firm's returns and also enable it to deal with its competitive environment (Abor, 2005:438). The continual quest for growth and maximising of a firm's value also underlines the need to choose the best financing option available. When a firm has a financial deficit, or faces business challenges that can lead to business failure, it can address these problems by applying strategies and financing decisions that would enhance firm performance, thereby keeping the firm viable. Poor capital structure decisions may increase the cost of capital for the firm, leading to a loss of shareholder value. On the other hand, profitable firms find it easy to finance their expansions or new growth.

It is one of the firm manager's critical responsibilities to choose the best financing option, one that would enhance profitability as well as maximise the value of the firm. Yusuf, Al-Attar and Al-Shattarat, (2015:1) contend that the capital structure which the firm employs affects the value of the firm either positively or negatively.

Capital structure is the distribution of various securities to finance company projects or investments; it is mainly comprised of equity, debt and retained earnings. Managers use different levels of debt and equity as a strategy to improve firm performance (Gleason, Mathur & Marthur, 2000:185). The merits and demerits associated with the use of either debt or equity prompt firm managers to be careful and diligent when applying capital structure decisions. Excessive use of debt can lead to financial distress or bankruptcy. The risk of bankruptcy affects the overall performance of the firm and could erode company profits. As debt levels of a firm continue to rise, the default risk also increases, thereby causing the cost of debt to rise. Companies that are overburdened by debt may end up being unable to service their debt obligations as monthly interest payments increase. On the other hand, debt can be treated as a tax-deductible expense and this contributes well to company profitability. The issuing of equity is associated with high floatation costs, which negatively affect profitability and can dilute the shareholding of the old shareholders of the firm. Retained earnings are an internal source of financing from the reserved profits and are the most affordable source of financing as they carry no costs. All external sources of financing have cost implications.

Considering the pros and cons associated with each type of financing, financial managers need to balance the mixture of these forms of financing. Firm managers need to give proper attention to identifying the ideal composition of capital structure that consists of debt or equity which will minimise the cost of capital and maximise the firm value or shareholder wealth at the same time. This is the overarching objective of financial decisions in business, and it highlights the importance of understanding capital structure. Consequently, it is imperative that firm managers understand capital structure.

1.2 PROBLEM STATEMENT

From time to time, industrial firms need to finance their new projects or deficits. With growing globalisation, coupled with changing global financial architecture, trade and investment conditions, the need for the right balance between debt and equity in corporate financing is vital. This is especially so in emerging market economies. **The problem investigated in this study is to determine how capital structure influences firm profitability.** Considering that profitability is one of the principal objectives of businesses, firm managers always look for ways to improve company profits and increase the value of the firm. Continued profitability is essential for the long-term survival of firms and so the

relationship between capital structure and profitability cannot be underestimated (Gill, Biger & Mathur, 2011:5). While many researchers have studied the dynamics of capital structure, to date no theory has emerged as having the best response to the questions concerning optimal capital structure**.** Financial managers are still grappling to establish an optimal capital structure for their establishments in order to maximise the value of their firm.

The global financial crisis has significantly strained the financing of many companies, with several of them experiencing declining profit margins. This calls for financial managers to remain diligent and properly distribute the capital that will enable the companies to remain competitive and sustainable in the dynamic and volatile global environment. Some firms face bankruptcy due to their debt burden or inappropriate capital mix, others are opting for debt restructuring in order to survive and still others are attempting to go the equity route. In the process, some succeed and some fail. This calls for a closer analysis of the role of the optimal capital structure and how it affects profitability.

A lesson from the global financial crisis is that excessive leverage could lead to financial distress for borrowers, and could even affect the real economy. Findings from Campello, Graham and Harvey (2010:470) indicate that a lot of constrained companies reduced employment by 11%, capital investment by 9%, technology spending by 22%, marketing expenditures by 33% and dividend payments by 14% in 2009. They also found that companies would by-pass attractive investment opportunities because of their inability to borrow externally. Their results mirrored the situation in Europe and Asia which are also stronger economies. This crisis emanated from excessive borrowing which in time led to the crumbling of the global financial markets in 2008.

If a company is more financially leveraged (debt financed), it has increased risk levels, mainly because of the cost of debt which increases with debt levels. In addition, creditors demand high returns because of the amount of risk borne by too much exposure to debt. High interest payments can lead to bankruptcy if not carefully managed. Firm managers have a big responsibility to balance their capital structures in such a way that it will not result in massive debt or underinvestment. Excessive debt means high interest instalments which reduce profitability; underinvestment could mean foregoing profits which the company could have realised if it had utilised the external financing at its disposal. Clearly, this raises the need for further empirical research in order to provide useful insights to firm

managers as benchmarks on their financing decisions in order to maximise the value of the firms and save them from collapsing during turbulent periods.

1.3 PURPOSE STATEMENT

The purpose of this study is to evaluate the impact of capital structure on the financial performance (profitability) of industrial firms listed on the Johannesburg Stock Exchange (JSE). The industrial companies studied are listed in Table 26 in the Appendix. In the evaluation of the impact of capital structure, the study will attempt to answer the following important questions:

- Does capital structure affect firm profitability?
- How does capital structure affect the profitability of firms?
- What is the pattern of financing by industrial firms in South Africa?

By nature, industrial companies need a lot of capital to finance their capital expenditures and operations. As such, they are likely to depend on both debt and equity for their capital needs and so the determination of the optimal capital structure is likely to be crucial. The study considers industrial firms in South Africa because it is one of the emerging market economies with fairly developed financial systems, where firms can have access to both credit from financial institutions and capital from the equity markets without much constraint when compared to other African countries. In addition, industrial firms are likely to have collateral security which makes it easier for them to access funds from financial institutions. South Africa's private sector credit to gross domestic product (GDP) ratio is about 68% compared to the Sub-Saharan average ratio of 19% (World Bank, 2013). Also, the JSE (from where the sample is drawn) is the largest and most liquid stock exchange in Africa where firms can raise equity capital. It thus provides a better sample with which to test the hypotheses. Clearly, in such dynamic markets, the need to optimise debt and equity is paramount. The other motivation is that South Africa has more comprehensive and consistent data. The data also spans longer periods (more than 10 years) when compared with other African countries and so makes it possible to answer the above pertinent questions empirically.

1.4 RESEARCH OBJECTIVES

The main objectives of this study are to:

- Analyse the impact of capital structure on the profitability of listed industrial companies in South Africa.
- Analyse how capital structure influences profitability in different sectors.
- Analyse the pattern of financing and determine how companies can optimise their capital structure.

1.5 IMPORTANCE AND BENEFITS OF THE STUDY

Given the lack of consensus among researchers and financial practitioners on the optimal capital structure and what constitutes it, there is a need for deeper analysis of the capital structure phenomenon. Much of empirical evidence on the role of capital structure on firm performance has been drawn from developed countries such as the United States of America (USA) and Europe. These economies operate in different conditions from those in emerging and developing economies. De Wet (2006:14) notes that an analysis of the capital structures used by companies worldwide indicate that there are significant differences between the capital structures in developed and undeveloped countries. Developed countries have advanced financial markets, relatively better corporate governance structures and have often benefited from better credit ratings when compared to emerging and developing countries that have small capital markets. In addition, the institutional structures, macroeconomic and business conditions between developed and developing countries are different, with most developing countries experiencing conditions that are more volatile. Firms in developed countries benefit from cheaper public and bank debt which have very low interest rates compared to that charged in developing and emerging markets.

The evidence on the role of capital structure on financial performance in emerging and developing countries is still mixed and inconclusive. Figure 17 in the Appendix shows different graphic patterns of the relationship between debt to asset ratios and Return on Assets (ROA) of some of the selected industrial firms in South Africa. The figure shows that debt effects vary from company to company. For example, Kumba Iron Ore's ROA is negatively correlated with total debt and long-term debt whilst a positive relationship is observed between ROA and short-term debt. African Oxygen and Nampak display a

negative relationship between ROA and all forms of debt. For other companies like PPC and Distell and Grindrod, the graphs display an unclear relationship between debt and ROA. These differences reflect how capital structure can impact differently on company profitability even though the companies are operating in the same country and listed as industrial companies on the same stock exchange. This analysis therefore helps firm managers to understand and choose the financing options that are favourable to their companies.

This study contributes to the finance literature in many ways. Firstly, it seeks to unravel the evidence on the role of capital structure on the profitability of industrial companies from an emerging and developing African country perspective, focusing on South Africa. Although there are empirical studies on capital structure done in South Africa, most of them have focused on the determinants and dynamics of capital structure and testing of certain capital structure theories (Ramjee and Gwatidzo, 2012; Moyo, Wolmarans and Brümmer, 2013b; Chipeta, Wolmarans, Vermaak and Proudfoot, 2013). The analysis of the implications of capital structure on the profitability of industrial firms in South Africa has not received much attention. The closest study on capital structure and profitability in South Africa by Abor (2007:364) focused on small and medium enterprises. These firms arguably are likely to depend more on credit from informal credit markets and are likely to be largely credit constrained. This study therefore offers useful insights on how the choice of financing by industrial firms can affect company profitability, whilst enhancing our understanding of the dynamics of capital structure on profitability in South Africa.

Secondly, previous research has produced varied conclusions on the effects of capital structure on company profitability. While some studies have found a negative relationship between profitability and leverage, others have experienced a positive relationship. Some empirical studies support the pecking order theory which predicts a negative correlation between leverage and profitability (Drobetz and Fix, 2003:1, Sbeit, 2010:1), whilst others confirm the trade-off theory which predicts a positive correlation between leverage and profitability (Frank and Goyal, 2003:217, Moyo, Wolmarans and Brümmer, 2013a: 927). As such, this study contributes to the ongoing discourse about the relationship between capital structure and profitability by bringing fresh evidence from recent data on industrial companies in South Africa using different measures of profitability as well as debt to asset ratios. The study therefore brings comprehension and robustness to the analysis of the

relationship between capital structure and profitability in South Africa. Most of the previous studies have mainly used long-term debt as the measure of capital structure ratios. This study goes beyond this by using both short-term and long-term debt to asset ratios (STDA and LTDA as well as the total debt to asset ratios). Gwatidzo and Ojah (2009:1) noted that Sub-Saharan African firms use more short-term loans to finance their deficits, whilst Abor (2005:444) noted that short-term debt represents 85% of total debt financing in Ghana. Hence the use of both short-term and long-term debt ratios provides a holistic picture to the analysis of capital structure as they have different risk and return profiles. This study uses data from 2006-2015, a period which spans through the global financial crisis of 2008-2009. It thus provides better coverage as it analyses the impact of capital structure on company profitability through the whole business cycle in good and bad times.

Thirdly, most previous studies mixed different industries and included in their samples service industries like tourism and banking and retail firms alongside industrial firms in their study of capital structures. For example, Moyo *et al*. (2013a:927) and Gill *et al*. (2011:3) included service and retail firms in their studies. Arguably, service firms usually have a low investment in capital expenditures (machinery and equipment) and this may limit their need for debt. On the contrary, industrial firms are likely to invest in machinery and large equipment which may necessitate the need for both equity and debt to finance vast outlays. Mixing firms from different industries increases the heterogeneity among firms which may result in biased inferences. The level of bias could therefore be reduced by analysing the sectors separately instead of lumping them altogether. The key innovation of this study is therefore to analyse the impact of capital structure on profitability of industrial firms only. Industrial companies exhibit more similar characteristics, especially on debt structures and risks, making the sample relatively homogeneous and good for testing the hypothesis under consideration.

1.6 DELIMITATIONS AND ASSUMPTIONS

The study analyses how capital structure affects the profitability of industrial firms only. The sample size includes all 52 industrial companies listed on the JSE for the period 2006-2015. Since the study does not include unlisted companies, the results of this study might reflect just portion of industrial firms in South Africa leaving the rest uncounted for. Unlisted industrial firms and other small firms including those in the informal sector also contribute to the economy. Further research could include non-listed industrial firms as well. The

study uses, among others, profitability ratios as dependent variables and capital structure ratios as explanatory (independent) variables in the panel regressions.

The main assumptions of the study are:

- Firms seek to maximise profits and therefore will always try to minimise the cost of finance.
- Firms are run by managers who may not be the owners. As such what they do in the company may not be exactly what the owners want and that means that the principal agent problem is possible.
- There is a possibility of information asymmetry in the economies.
- Both equity and debt are available in the market and firms have access to both.
- There are taxes in the economy and these can be imposed on debts, profits and other incomes.
- There are transactions costs in raising funds for the firm.

1.7 STRUCTURE OF THE DISSERTATION

The dissertation is structured as follows:

- Chapter 2 provides an overview of relevant theoretical research and empirical studies that have been done on capital structure in firms in both developed, developing and emerging markets.
- Chapter 3 discusses the research design and methodology used carry out the research.
- Chapter 4 analyses the research findings and provides intuitions of the results.
- Chapter 5 presents conclusions and suggests recommendations based on the results; it also provides direction for possible further research.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

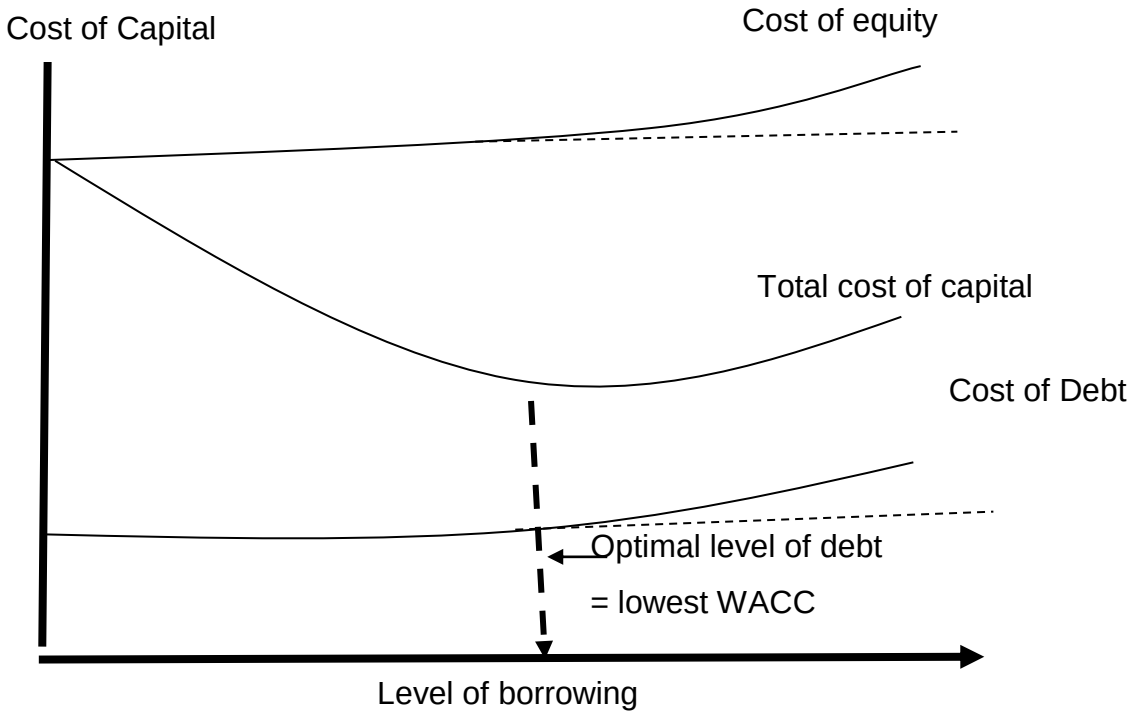
This chapter reviews the relevant literature on capital structure and firm profitability. It elaborates on the key theories of capital structure and empirical studies that were done globally, regionally and within South Africa. The review helps to situate this study within the existing literature and clarify the contribution within the body of knowledge.

2.2 CAPITAL STRUCTURE THEORIES

2.2.1 The traditional view theory of capital structure

Before Modigliani and Miller (1958) introduced the notion that capital structure is irrelevant, financial theorists believed in the 'traditional view' theory of capital structure. This theory posits that a firm should finance its assets through the combination of debt and equity, and chooses an optimum capital structure that maximises the value of the firm. According to the traditional view theory, the optimal capital structure exists when the weighted average cost of capital (WACC) is at its minimum and the value of the firm is maximised (Figure 1). As the firm increases its debt levels above a certain level, the cost of equity rises and the value of the firm starts to reduce. An increase in debt levels exposes the firm to an increase in financial risks making shareholders require a greater rate of return, thus increasing the cost of equity. The theory assumes that the rate of interest on debt is constant while the rate of return required by the shareholders can be constant or can increase gradually. In support of the theory, managers would be required to identify and maintain optimal levels of debt at which their firm's average cost of capital is minimised whilst the value of the firm or its profitability is maximised.

Figure 1: Traditional view theory of capital structure



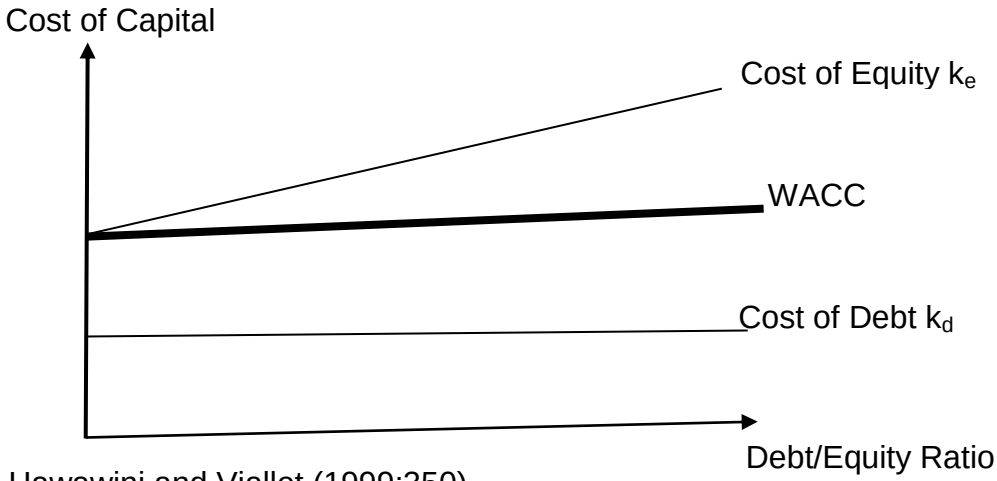
Source: Atrill, 2009:343

2.2.2 Modigliani and Miller's propositions

Modigliani and Miller (1958:261) pioneered the discussion on capital structure when they proposed that capital structure is irrelevant. Their argument (depicted in Figure 2) was based on a restrictive set of assumptions that markets are frictionless, firms and individuals borrow and lend at a risk-free rate, there are no bankruptcy costs, there are no corporate and personal taxes, there are no agency costs, and no information of asymmetry. The Modigliani and Miller (1958:261) theory contends that the value of a leveraged firm (firm which has a mix of debt and equity) is the same as the value of an unleveraged firm (firm which is wholly financed by equity) if the operating profits and future prospects are the same. That is, if an investor purchases shares of a leveraged firm, it would cost him the same as buying the shares of an unleveraged firm. They argue that financial leverage does not affect the market value of the firm. According to this proposition, the value of the firm is determined by its assets and income generated from its business activities. Thus, in a world of frictionless capital markets, there would be no optimal capital structure.

This assumption however does not tally with the real world and the functioning of markets, since no country in the world is tax-free. In addition, many transaction costs are incurred on raising capital. In South Africa and in other countries the world over, various intermediaries charge transaction fees such as brokerage fees, consultation fees, agency fees and even underwriting fees on facilitating transactions. Hence, the analysis of the optimal capital structure in a world of transaction costs would be more realistic and informative.

Figure 2: Modigliani & Miller's proposition of capital structure without taxes and no financial distress costs

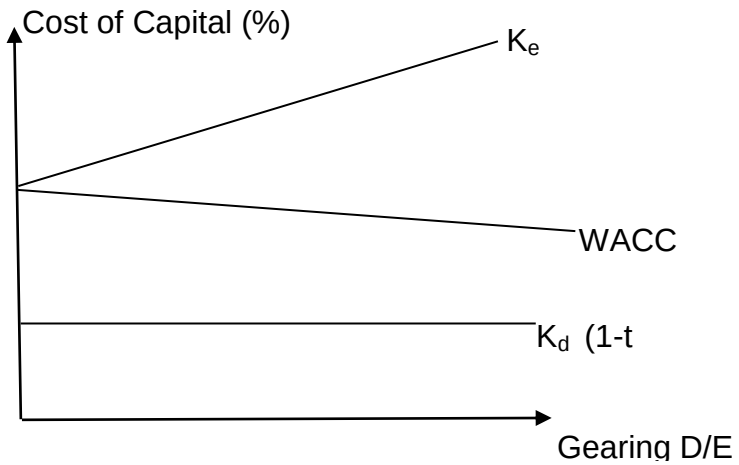


Source: Hawawini and Viallet (1999:350)

Figure 2 illustrates that as the cost of equity increases, the debt to equity ratios increase as well, while the WACC remains constant at all levels of gearing. The increase in WACC due to an increase in cost of equity (k_e) is offset by the decrease in WACC due to the greater weight in the cheaper cost of debt (k_d). Modigliani and Miller (1963:433) reviewed their first position of capital structure irrelevance by incorporating tax benefits as determinants of capital structure in firms. This means that debt finance could be relevant in determining a firm's profitability because of the interest cost of the debt that is allowable for tax deduction purposes in many countries. Interest payments which are tax deductible reduce company tax amounts that are due for payment to the governments, thereby making a saving for the shareholders. This implies that the tax advantage of debt leads to an increase in return on equity (ROE) and value of the firm. Modigliani and Miller (1963) concluded that debt is relevant if the tax benefit is recognised. They even propose that companies should use as much debt as possible in order to improve company profitability

due to the tax-deductible benefits on interest payments. This is demonstrated in Figure 3 below.

Figure 3: Modigliani & Miller's proposition with taxes



Source: Hawawini and Viallet (1999:350)

The introduction of income tax lowers the after-tax cost of debt, thereby reducing WACC with a high level of leverage (figure 3). With the absence of financial distress costs, 100% debt finance will be the best but it is not the reality since excessive debt will lead to financial distress. However, this proposition faced some criticisms because it assumed that personal and corporate borrowings were perfect substitutes. Yet, in practice, corporate companies have a limited liability and have the capacity to borrow funds at more competitive rates than individuals. This proposition also assumes that there are no brokerage costs and no costs associated with financial distress, which is different from the observed practice.

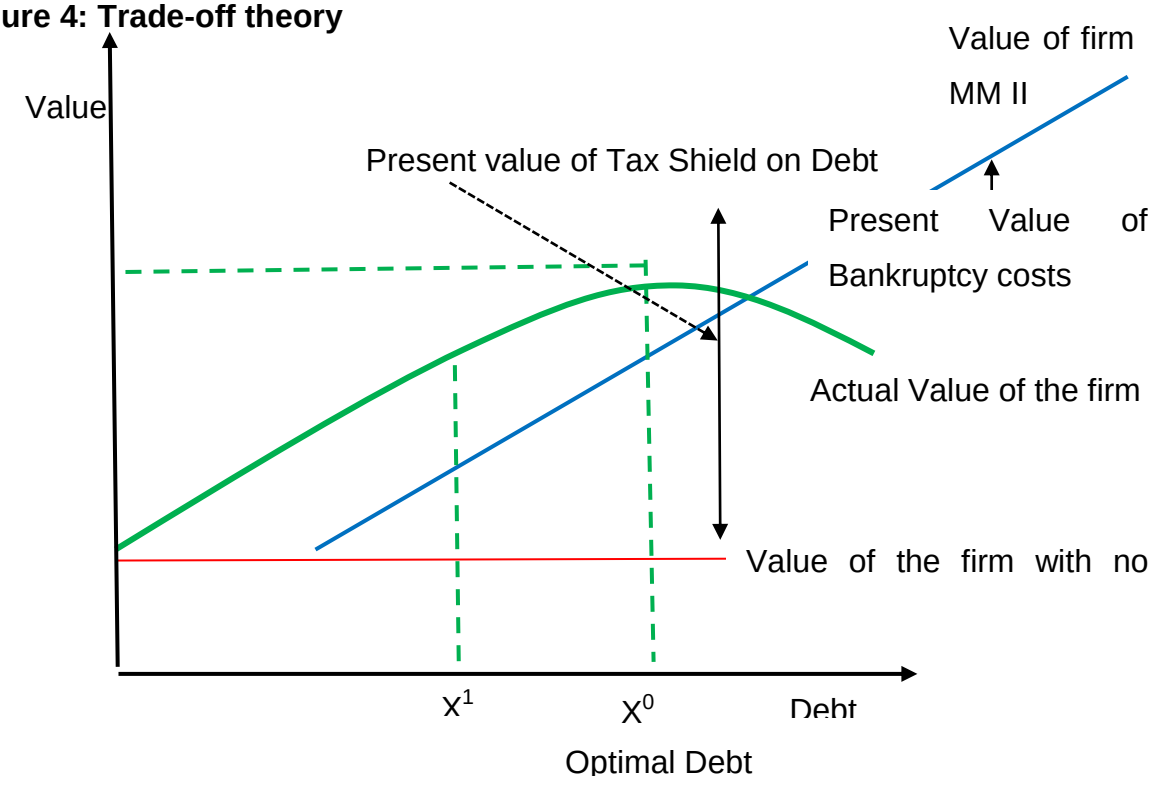
Although Modigliani and Miller's (1963) propositions had shortcomings, it contributed significantly to the capital structure debate by indicating the conditions under which capital structure could be irrelevant. This provides some insight for practitioners to determine what is required for capital structure to be relevant (Brigham & Ehrhardt, 2005:575). Myers (2001:86) suggests that Modigliani and Miller's propositions should be viewed as a benchmark to which the debate on capital structure can refer. Major capital structure

theories like the agency theory, trade-off theory, pecking order theory, signalling theory and market timing theory emerged after Modigliani and Miller's propositions to try to explain how firms are financed.

2.2.3 Trade-off theory

Kraus and Litzenberger (1973:911) proposed the trade-off theory when they introduced interest tax shields associated with debt and financial distress into a state preference model. According to Myers (2001:88), the theory hypothesises that firm managers seek to have an optimal capital structure by striking a balance (trade-off) between the benefits of debt financing (tax shields) and associated costs like financial distress costs and bankruptcy costs. According to this theory, every firm has an optimal debt-equity ratio that maximises its value and minimises the overall cost of capital (Error! Reference source not ound.). Firms set a target debt to value ratio and steadily adjust towards the target ratio to balance the trade-off between tax savings and bankruptcy costs. The major benefit of debt financing is that it provides a tax shield that increases the returns to be distributed to shareholders of equity.

Figure 4: Trade-off theory



Source: Hawawini and Viallet (1999:36)

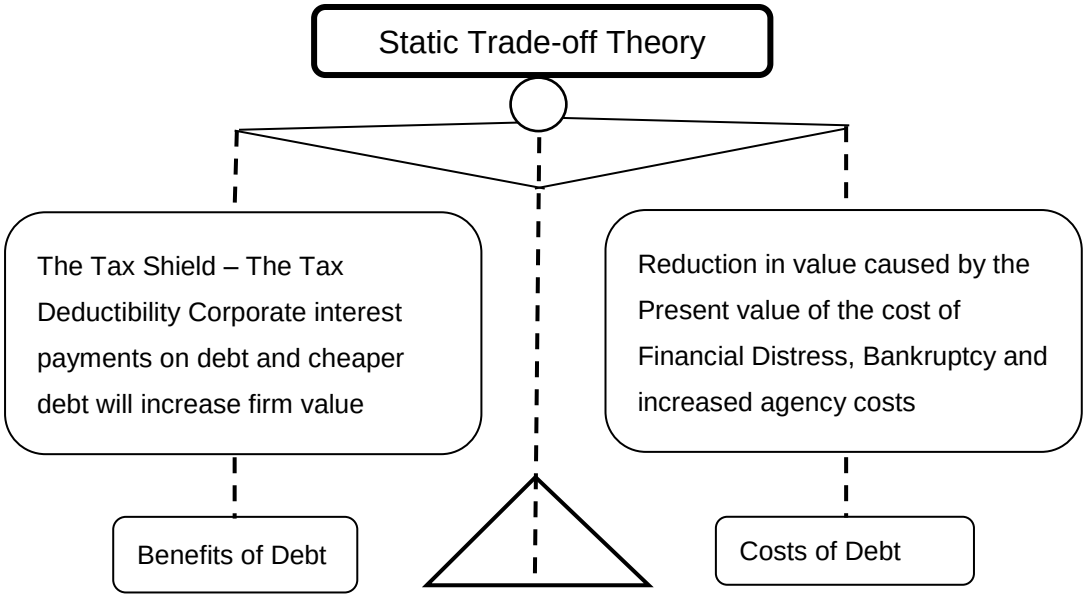
However, the challenge is that as debt financing increases and becomes excessive, the legal obligation to pay monthly interest increases, thereby stretching the cash flows of the business. This also mounts pressure on the operations and survival of the business. The company will start to experience financial distress because it can no longer service its debt obligations. At its worst, financial distress can lead to bankruptcy and liquidation. When a firm has financial distress, the following things are likely to happen:

- there is a possibility of giving up on profitable investment opportunities;
- discretionary costs like research and development and marketing costs are reduced or scrapped, and this has a direct negative impact on sales and the growth of the business;
- key employees may leave the firm;
- customers may move to other suppliers, affecting business sales; and
- suppliers or creditors may refuse to grant credit or will grant credit with very strict terms.

All these, affect negatively on the financial performance (profitability) of the firm as well as reducing the value of the firm.

In determining the optimal capital structure, the company is trading-off between the size of the tax benefits and financial distress costs (**Figure 5**). Firms will target the optimum level of capital structure by means of a trade-off. The assumptions are that when financial distress and agency costs exceed the benefits of debt, firms adjust their debt levels. On the other hand, when the marginal value of the benefits of debt are still greater than the costs associated with the use of debt, firms increase or maintain their debt levels thereby maximising their financial performance.

Figure 5: Static trade-off theory



Source: Kaplan Financial Knowledge Bank

Under this theory, profitability of a firm is positively related to its debt ratio. Moyo *et al*.'s (2013a) study supports the trade-off theory's prediction of a positive relationship between profitability and leverage.

The trade-off theory also predicts that higher marginal tax rates will be associated with higher leverage since interest is a deductible expense. Deductible expenses will be more valuable to firms with higher tax rates. Firms with high profits will have more taxable income to shield and therefore the firm will retain more money to service more debt without much risk of financial distress. Graham (1996:41) finds a statistically significant positive relationship between debt ratios and marginal tax rates suggesting that high marginal tax rates makes it attractive for firms to use more debt in order to benefit from the tax shields from the use of debt. Frank and Goyal (2003:18) assert that a high tax rate is consistently and positively associated with high debt. Further studies by Van Bisbergen, Graham and Yang (2011:55) confirm that the net benefit of using debt is around 4 -13% of the value of the firm. This would actually motivate firm managers to issue more debt in order to maximise the tax shield and this reduces the company's tax bill and increase company profits.

The theory also predicts that firms with tangible assets are less exposed to financial distress costs when compared with firms with risky intangible assets. This is explained by the fact that when a firm has assets that are tangible, it has more collateral or security for the debt providers, thereby reducing the risk and eventually the cost of debt. Therefore, firms with safe tangible assets are expected to have more debt. Frank and Goyal (2009:26) confirmed this prediction in their study of non-financial firms in the USA. This is yet to be determined in this study, since by nature, industrial firms invest much in tangible assets in form of machinery and equipment.

The trade-off theory can be illustrated by the equation below:

$$V = V_u + PV_t - PV_{fd} \quad (1)$$

Where:

V = Value of the firm
V_u = Value of ungeared firm
PV_t = Value of present value of interest tax shields
PV_{fd} = Present value of the financial distress costs

2.2.3.1 Limitations of the trade-off theory

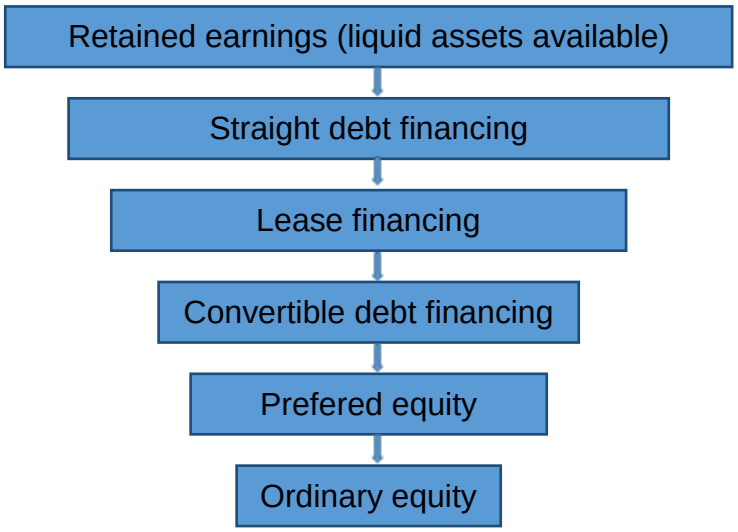
Although the trade-off theory is viewed as the mainstream or a pillar of capital structure theory, it has not gone without criticisms. Fama and French (2002:3) and Shyam-Sunder and Myers (1999:220) argue that while the trade-off theory provides some explanation of the financing behaviour of some firms, the explanatory power of the theory is weak. They note that it only captures a part of what constitutes the financing behaviour of firms. The theory predicts that highly profitable firms have high debt ratios but empirical evidence shows that highly profitable firms in any given industry have low debt ratios, suggesting that they borrow less (Rajan and Zingales 1995:1457, Chen and Strange, 2005:29). Myers (2001:89) concludes that trade off theory cannot account for the correlation between high profitability and low debt ratios. This would make the relationship between leverage very uncertain which is in contrast with what the trade-off theory postulates.

2.2.4 Pecking order theory

The pecking order theory was proposed by Myers and Majluf (1984:187) and is based on the notion of asymmetric information. It argues that managers know more about their company's prospects, risks and value than outside investors. In this case, the capital structure decision is affected by management's choice of a source of capital that gives higher priority to sources that reveal the least amount of information. Asymmetric information therefore affects the choice between internal and external financing and between the issue of debt or equity. When management decide to issue new equity to finance a new project, it may be taken as a negative signal by outside investors indicating, that the firm is overvalued, thereby resulting in fall of the share price and this reduces the value of the firm (Brigham & Ehrhardt, 2008:567). On the contrary, new debt is considered a good signal that the firm's prospects are good.

The theory argues that there exists a sequence or hierarchy (Figure 6) for the financing of new projects. Firms would prefer to use internal financing (retained earnings) first and only afterwards external financing. Retained earnings have no related flotation costs and do not require external supervision by the provider of capital. This theory is a behavioural approach to capital structure and is anchored on the principle that financing decisions are made in a way that is less complicated and less difficult for management. Managers tend to follow the line of least resistance and finance their operations with the least cost of financing (Arnold, 2005:536). According to Shyam-Sunder and Myers (1999:221), the pecking order theory predicts that highly profitable firms are less leveraged than less profitable firms as they will have more internal funds available as retained earnings to finance their deficits. If a firm needs external financing, it will use debt instead of equity and debt is regarded as cheaper than equity. Therefore, changes in a firm's debt ratio are driven by the need for external financing and not by the need to reach optimum capital structure.

Figure 6: Pecking order financing hierarchy



Source: Moyo (2013:63)

The pecking order theory predicts that there is a negative relationship between the level of debt and level of a firm's profits. Leverage is positively correlated to capital expenditure, dividends paid and the growth of the firm according to the pecking order theory. Rajan and Zingales's (1995:1454) findings in seven industrialised countries confirm the predictions of the pecking order theory. Their results show a negative relationship between leverage and profitability. Fama and French (2002:2) also confirmed the pecking order predictions and concluded that leverage is lower for more profitable firms than less profitable ones.

2.2.4.1 Limitations of the pecking order theory

Although the pecking order theory's assertions have been supported by quite a number of empirical findings, this theory does not explain the effect on the influence of taxes and financial distress costs. Neither does it explain how levered firms benefit from the tax shields or suffer from financial distress in the way that the trade-off theory does. It also ignores the agency costs where firm managers focus on their own interests to accumulate much financial slack and become immune to market discipline. Frank and Goyal (2003:217-248) criticised the pecking order theory based on their analysis of the financing patterns of American firms from 1971-1998. They show that there is little evidence to support the pecking order theory and argue that equity issues are closely correlated with the financing of deficits instead of debt. Frank and Goyal (2003:29) found a positive relationship between profitability and book value leverage. This is in contrast with the predictions of the pecking order theory.

2.2.5 Agency cost theory

Jensen and Meckling (1976:305) proposed the principal agent theory which postulates that managers will not always act in the best interest of the shareholders. Managers may pursue their own goals instead of maximising returns for the shareholders. The managers could use the excess free cash flows to invest in projects that bring high profits in a short period in order to award themselves large bonuses instead of increasing the shareholder's returns (Gwatidzo, 2008:86). Agency costs then arise in the principal-agency conflict because of the separation of owners and management. The costs relate to monitoring costs, bonding costs and some residual losses. The theory predicts that a higher level of debt is associated with better firm performance.

Jensen (1986:323) suggested increasing the ownership of the managers in the firm in order to align their interest with that of the shareholders instead of incurring high agency costs. Findings by Agrawal and Mandelker (1987:823) reveal that debt levels normally increase with the level of insider ownership, reflecting a positive relationship between debt as insider ownership. Managers will not issue more equity because they would not like to dilute their shareholding and so they will resort to debt financing for their projects. In a way this would reduce the agency costs since the managers are also part of the shareholders and they will always work hard for the company to make profits which they would be paid later in form of dividends.

As another way to reduce agency costs, Pinegar and Wilbricht (1989) established that the agency problem can be dealt with through capital structure by increasing debt levels. In this case, managers will be expected to work efficiently in order to service the debt obligation, thereby making leveraged firms better for shareholders as debt levels can be used for monitoring managers' efficiency.

To test the validity of the agency theory, Berger and Bonaccorsi di Patti (2006:1069) developed a performance indicator to measure firm performance and found that high leverage is positively related to profit efficiency. This is consistent with the predictions of the agency theory that high leverage is positively related to profitability. Also, Harvey, Lins and Roper (2004:3) investigated whether debt can control the agency costs effect in emerging market firms and established that the benefits of debt are highly concentrated within the firms with high expected agency costs.

2.2.6 Signalling theory

The signalling theory was established by Ross (1977:23) and is based on information asymmetries between managers and outside investors and shareholders. The theory assumes that managers know more about a company's future prospects than investors who do not have access to the same information. They are motivated to make this information public in order to raise the share price (Besley & Brigham 2003:491). The managers send signals to the market through adjustments to their capital structure. For example, if the managers know that their future cash flows or earnings will be high, they can adopt a high leveraged capital structure. Ross (1977:38) argues that investors or analysts interpret larger levels of debt as a sign of high quality. He supports his argument by saying that since debt is associated with contractual obligations of interest and principal payments, it is a signal that managers are predicting higher future cash flows. He noted that markets normally respond favourably to moderate increases of debt and negatively to new issues of equity. He concludes that investors will view high leverage as a signal of quality and a positive relationship between debt and profitability.

Empirical tests of the signalling theory done by Smith (1986:12) show an average deduction of 3% in the share price of firms that announced equity offerings, compared to an insignificant decline in the share price after a debt issue announcement. In fact, the increases in debt were associated with an increase in share price returns. This supports Ross's (1977:38) conclusions that debt sends a good signal to the market.

However, Moyo *et al.*'s (2013b:673) results contradict the prediction of the signalling theory which postulates that price earnings increase with an increase in the firm's leverage since debt is viewed as a good sign of quality. Their results confirm a negative relationship between earnings per share (EPS) and debt ratios. EPS decreases with an increase in leverage. The increase of interest payments due to the increase of debt reduces the profits, thereby reducing earnings available for shareholders.

2.2.7 Market timing theory

The market timing theory by Baker and Wurgler (2002:1) suggests that managers attempt to time the market by issuing new equity when the share price is assumed to be overpriced and issuing debt when the interest rates are assumed to be very low. On the other hand, when managers believe that the share price is undervalued, they repurchase the shares. Firm managers pay attention to market conditions in an attempt to time the market. Baker

and Wurgler (2002) argue that market timing is the main determinant of a firm's mixture of debt and equity. They contend that firms do not generally care whether they finance with debt or equity as long as they choose the form of financing which is more valued by the market at that point in time. The theory posits that equity market timing has a persistent effect on the capital structure of a firm since there will always be movements either in equity or debt levels.

According to Grullon, Michaely and Swaminathan (2002:387), the theory implies that repurchase announcements should be accompanied by positive price changes and followed by positive news or market perceptions about the future profitability of the firm.

The fact that managers always want to maximise the proceeds from the issue of shares or the benefits that come with share repurchases achieved when the share prices are either over- or under-priced, justifies the basis for market timing. The existence of market timing behaviour among chief financial officers (CFOs) was confirmed by the survey conducted by Graham and Harvey (2001:230).

2.3 EMPIRICAL STUDIES

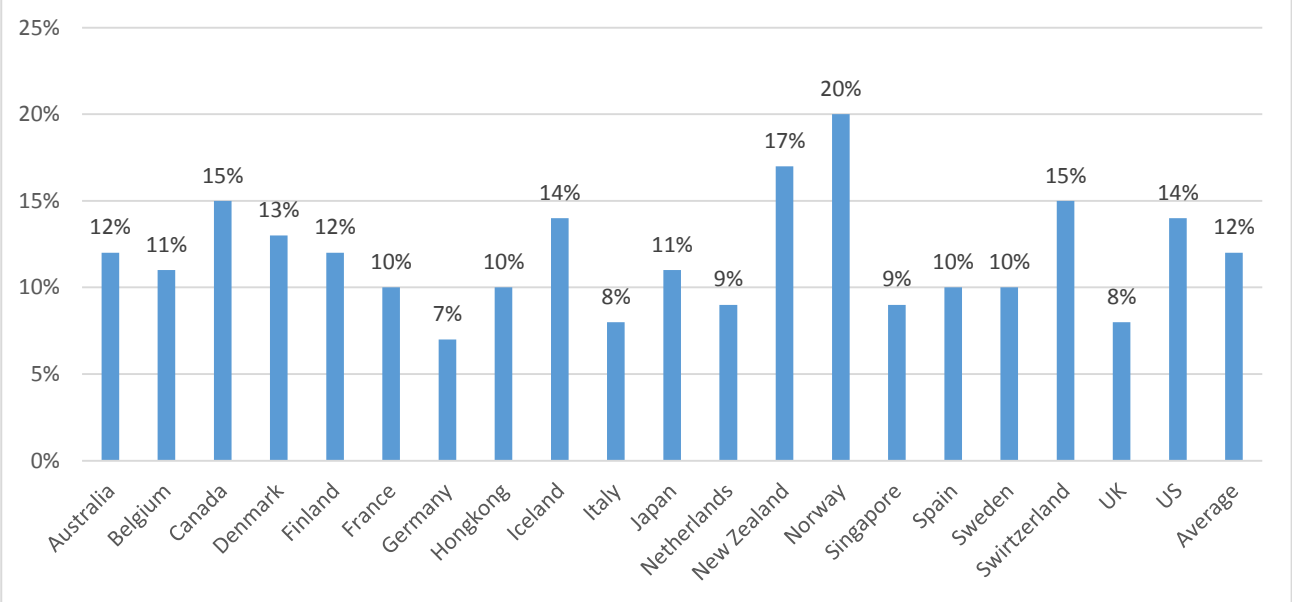
Considerable work on capital structure and firm profitability has been done globally, regionally and within South Africa but the results continue to be mixed and inconclusive. Capital structure theories have been tested to check their relationship with firm profitability and still the findings are contradictory and mixed. The differences can be attributed to firm specific, industry specific and country specific factors as noted by Cook and Tang (2010:86). This section reviews the relevant literature available on the relationship between capital structure and profitability in developed countries, developing countries and in Africa. Also, this section discusses the capital structure patterns in developed countries, developing countries and in Africa

2.3.1 Capital structures in developed markets

Studies of capital structures conducted in developed countries have generally observed that firms in developed markets rely more on retained earnings as the source of financing. Using the flow of funds data for non-financial firms in the United Kingdom (UK) from 1970-1985, Mayer (1988:1172) observed that retained earnings contributed to a bigger portion of the investments. The study of corporate capital structures in Japan, Germany, France,

the UK and the USA by Corbett and Jenkinson (1996:71) also confirmed that firms in these countries use retained earnings as their main source of funds. Furthermore, the review on the Centre for Research in Security Prices (CRSP) and Compustat listed firms by Lemmon and Zender (2010:1161) from 1971-2001 confirms that firms in their sample essentially rely on internally generated funds. These findings support the pecking order theory which posits that managers prefer to use internally generated funds which have no costs when compared to external financing. Figure **7** shows that debt ratios for firms in developed countries vary across countries. De Jong, Kabir and Nguyen's (2008:1957) analysis of the long-term leverage of firms from 42 countries show that long-term debt levels vary from country to country. This confirms Rajan and Zingales's (1995:1430) observation that countries have similar capital markets and financial institutions have different debt levels. Although there are some differences, the financing behaviour confirms that firms in developed countries use more of their retained earnings for financing than debt and equity.

Figure 7: Long-term debt ratios for firms from selected developed countries

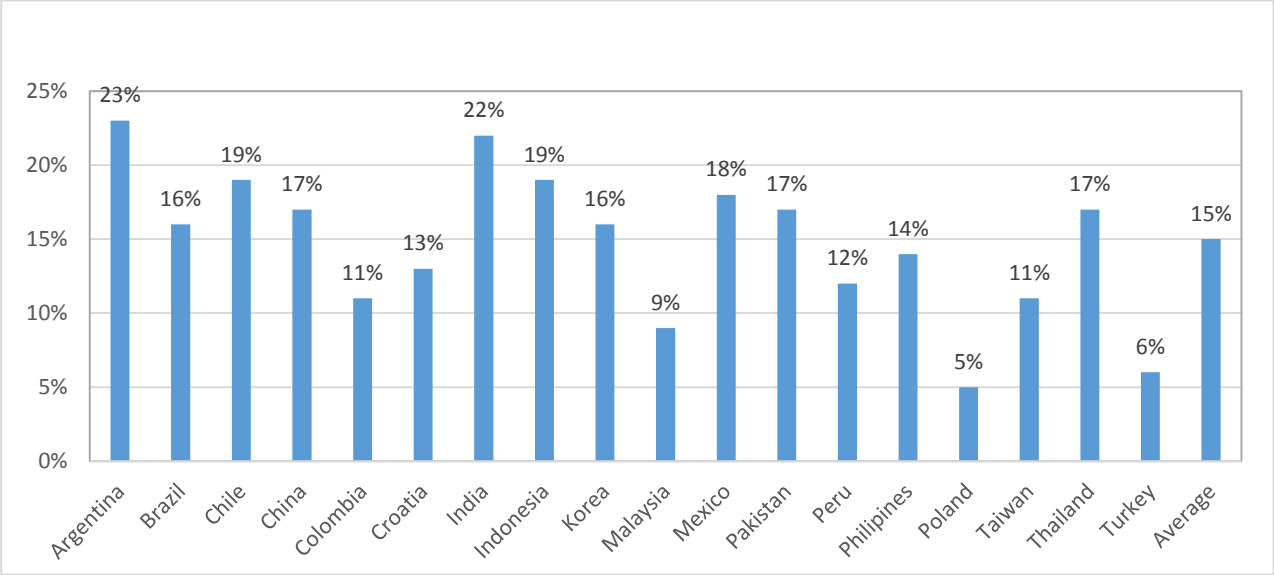


Source: De Jong et al. (2008:1957)

2.3.2 Capital structures in developing countries

Figure **8** shows that firms in developing countries use more long-term debt (external financing) when compared to firms in developed countries. The average long-term debt ratio in developing countries is 15%, compared to 12% in developed countries (De Jong *et al*. 2008:1957). This concurs with Singh and Hamid's (1992:1) findings on the 50 largest manufacturing companies in nine developing countries that firms rely more on external funding than retained earnings. This can be attributed to the lower profitability of firms that they do not have much money set aside from their retained earnings for future financing. Another study by Singh (1995:2) on corporate financing in developing countries reveals that firms use more external financing than internal sources. However, these findings contradict the observations made by Glen and Singh (2004:162) that firms in developing markets are lower leveraged than firms in developed markets.

Figure 8: Long-term debt ratios for firms from selected developing countries

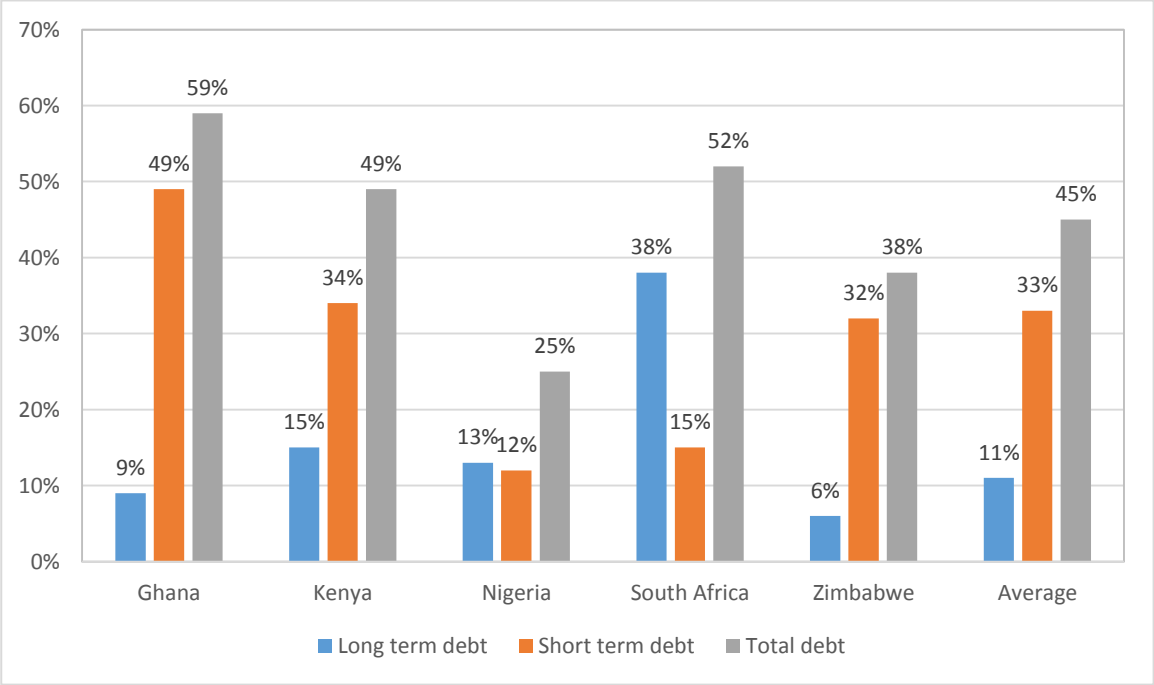


Source: De Jong et al. (2008:1957)

2.3.3 Capital structures in Africa

Figure **9** shows that African firms rely more on short-term debt for external financing which has an average of 49 per cent. This suggests that short-term debt plays a significant role in financing firms. However, South Africa makes use of more long-term debt than short-term debt when compared to other African countries. This is mainly attributed to the more developed financial systems in South Africa where firms have better access to long-term debt. Short-term debt dominates in most African countries mainly because the markets have more short-term deposits which cannot be matched with longer term financing requirements. Gwatidzo and Ojah (2009) observed that in general, Sub-Saharan capital markets are less developed, inefficient and illiquid, with relatively shallow bond markets which are usually dominated by public debt.

Figure 9: Debt ratios for selected African countries



Source: Gwatidzo and Ojah (2009:7)

For firms in Africa, the long-term debt to equity ratio is relatively low (averaging 11%) but the short-term debt to equity ratio is quite high, at 33 per cent. This possibly reflects the nature of their markets which mostly issue short-term instruments. The other implication of this analysis is that firms from developed countries rely less on external financing. This supports the pecking order theory which posits that high profitable firms finance their business with internally generated funds. Firm managers use their accumulated retained earnings in order to avoid costs of information asymmetry associated with external financing. Firms in developing countries largely rely on external financing, especially when they are at stages of growth where they need more capital injections and where internal financing can be insufficient. External financing (debt) has the advantage of tax shields, which reduces tax costs and increases their profits. From the figures above, it is clear that the capital structures in developed markets, developing markets and Africa are different, suggesting that no uniform pattern financing can be generalised in these different markets. This implies that the effects of capital structure on profitability vary between these countries. Further research is therefore warranted for South Africa.

2.3.4 Empirical studies: Capital structure and profitability

Mesquita and Lara (2003) examined the relationship between capital structure and profitability on 70 Brazilian industrial and service companies for the period from 1995-

2001. They used the ordinary least of squares (OLS) method to analyse the impact of long-term debt and short-term debt on the ROE. The results indicated that short-term debt has a positive impact on the ROE whereas long-term debt negatively but insignificantly affects ROE. The positive impact of short-term debt on company profitability has been explained as a practice where most profitable firms use short-term debt which might be cheaper to finance their working capital. Although this study was done before the rapid changes that are happening in the global financial markets, it inspires this study on the use of short-term debt which is likely to make a difference in the financing structures of industrial firms listed on the JSE.

Abor (2005:435) investigated the relationship between capital structure and profitability for 22 Ghanaian non-financial firms listed on the Ghana Stock Exchange from 1998-2002. He used the regression analysis to estimate profitability (ROE) with measures of capital structure (short-term debt, long-term debt and debt to assets). The results show a significant positive relationship between short-term debt and firm profitability as well as a significant positive relationship between debt to assets and profitability. These findings imply that profitable firms rely more on short-term debt for financing, as short-term debt constitutes 85% of debt in the firms. However, they also found a negative relationship between long-term debt and profitability.

Further empirical research findings on Ghana firms conducted by Addae, Nyarko-Baasi and Hughes (2013:224) are consistent with Abor's (2005) findings that firms highly depend on short-term debt. The reasons behind this is that firms have difficulties in accessing longer term credit lines since the Ghana credit market is not well developed. It would be interesting to compare with South African firms which have better access to long-term capital financing as their financial systems are more developed and the JSE is more liquid than the Ghana markets. Abor (2005) used a mix of companies which is likely to be heterogeneous and could face different risks. This current study focuses on industrial companies which should have more similar characteristics.

In a follow-up study, Abor (2007:364) evaluated the relationship between capital structure and the performance of small to medium enterprises (SMEs) from South Africa and Ghana. He found a significant negative relationship between both short-term debt and total assets, and firm performance measured by the gross profit margin. On the other hand, the long-term debt shows a significant positive relationship with total assets and firm

performance. His results also reveal a negative relationship between capital structure and firm performance when measured by the ROA. The research focused on SMEs which are most likely to depend on informal credit lines, unlike industrial firms which by nature could depend on both equity and debt which need some optimisation. An analysis of the capital structure and firm performance for industrial firms in the South African economy is therefore warranted.

A study by Kyreboah-Coleman (2007:56) analyses the relationship between the capital structure and profitability of micro-finance institutions in Sub-Saharan Africa. Using panel data estimations (random and fixed effects models), the findings show that short-term debt is negatively related to firm performance whilst long-term debt is insignificantly positively related to firm performance. These results suggest that the use of short-term debt is more expensive, mainly because the repayment instalments are higher. Debt is paid over a short period, usually within a year. Also, short-term debt is not secured and therefore it is expensive since the interest rate includes a risk premium. Although these results are informative, the study focused on micro-finance institutions while the present study focuses on the industrial firms which have different capital needs to micro-finance institutions.

Gwatidzo and Ojah (2009:1) studied corporate capital structure in Africa using a panel of listed firms in Ghana, Kenya, Nigeria, South Africa and Zimbabwe. Their study mainly focuses on the extent to which firm characteristics and cross country institutional differences influence the way firms raise their capital. They found a negative and significant relationship leverage and profitability in South Africa and Ghana. In Zimbabwe, the relationship between leverage and profitability is negative and significant for short-term debt. Only Nigerian firms show the positive and significant relationship between total and long-term debt and profitability, thereby confirming the trade-off theory of capital structure. Gwatidzo and Ojah's (2009) findings contradict Abor's (2005) findings where short-term debt has a positive influence on firm profitability in Ghana. These conflicting findings justify the need for further research.

In the study of the dynamics in capital structure determinants in South Africa, Ramjee and Gwatidzo (2012:52) showed that asset tangibility, growth size and risk are positively related with leverage while profitability and tax negatively affect leverage. Their sample consisted of 178 firms listed on the JSE and spanned from 1998-2008. While their study is

insightful, it focused more on the determinants of capital structure and the dynamics of adjustment. It does not go deeper into analysing the implications of capital structure for profitability. Our study aims to take a different course and analyse the capital structure and its implications for company performance before, during and after the global financial crisis.

On their analysis of trade-off and pecking order theory, Matemilola, Bany-Ariffin and McGowan Jr (2012:141) used the Generalised Method of Moment (GMM) technique to analyse the top 100 South African listed non-financial firms from 2004-2009. They showed that profit is statistically significant and negatively related to the long-term debt ratio and total debt. This evidence of the negative relationship suggests that South African firm managers follow the pecking order theory on financing new projects. Managers prefer to use retained earnings first which are less costly compared to debt and equity. Although this study was done in South Africa, it differs from the present study which seeks to unravel whether the industrial firms follow the pecking order theory, and examine how short-term debt affects profitability.

Moyo *et al*. (2013a:927) tested the trade off and pecking order theories on the South African manufacturing, mining and retail companies from 2000-2010. They used the generalised least of squares (GLS) random effects, ML random effects (RE), fixed effects (FE), time series regression, Arellano and Bond, and Blundell and Bond estimators. and the random effects Tobit estimators to test the hypotheses. They found that leverage is positively correlated with profitability in support of the trade-off theory, suggesting that firms benefit from the tax benefit that comes with debt thereby contributing positively to the firms' profitability. They also found a negative relationship between non-tax debt shields and profitability, further cementing the trade-off theory. These findings suggest that South African manufacturing, mining and retail firms use debt to finance their deficits. Although these research findings are insightful, their study mainly focused on the trade-off theory and pecking order theory to evaluate if the South African firms apply these theories in financing their deficits. This study however investigates how the South African industrial firms' capital structures influences the profitability of the firms.

A further study by Moyo et al. (2013b:661) investigated the dynamic capital structure determinants using South African firms for the period from 2005-2010. They investigated the relationship between leverage and the key financial performance variables. Their

findings reveal that profitability is positively correlated with firm leverage, indicating that the increase in firm leverage leads to an increase in firm profitability. This implies that highly profitable firms use more debt, a deduction that is consistent with the trade-off theory. Even though their research is informative on the financing patterns of South African firms, our study analyses how capital structure affects firm profitability in industrial firms with the inclusion of short-term debt.

Chipeta *et al.* (2013:68) focused on the determinants of capital structure considering structural breaks in the parameter estimates. They found that the lifting of sanctions and stock market liberalisation had a significant impact on the stabilisation of profits. The book value of total debt (short-term and long-term debt) improved because of the financial liberalisation. Capital account liberalisation has a significant positive impact on profitability for book and market value of the total ratio. The impact is significant and is at 5% and 1% levels, respectively. This implies that changes in the capital structure of the firms emanating from financial reforms result in the improvement of firms' profitability. Their findings provide us with a strong basis to believe that capital structure changes or movements do in fact impact company profitability, hence the need for further research.

In another paper, Chipeta and Mbululu (2013:69) examined the effects of heterogeneity and macro-economic conditions on the adjustment speed towards the target level of capital structure using a sample of 191 firms between 2000 and 2010. Their findings reveal that firm size, asset tangibility, profitability, liquidity and interest cover variables are positively correlated with the speed of adjustment to optimal leverage. Increase in these variables would enable firms to access further capital. There is therefore a need to understand capital structure and profitability relationships to ensure that firms maintain their capital structure levels to optimal levels that help them remain profitable.

Recently, De Wet and Gossel (2016:167) studied South African capital structure decisions. They conducted a survey of 33 CFOs of JSE listed companies and found that large South African firms are more likely to follow the static trade-off theory whereas the smaller firms follow the pecking order theory. These findings suggest that large firms are likely to rely more on debt to finance their new projects but small firms rely more on internal financing. Large firms might be finding it easier to finance using debt because they have the collateral and also would need to benefit from tax shields offered when they acquire debt. Although their findings are informative, the results cannot be generalised to many listed

firms on the JSE since the sample of 33 is very small. Also, the use of a survey only generates information on what the managers think about the financing patterns of their firms. Without doing rigorous tests through regressions analysis, their analysis may not reflect what is actually influencing those capital structure decisions and how different capital structures may affect profitability.

Gill *et al*. (2011:3) studied the effects of capital structure on the profitability of American service and manufacturing companies. A sample of 272 companies listed on the New York Stock Exchange (NYSE) was used for a period 2005-2007. Using correlation and regression analysis, the results show a positive relationship between short-term debt to total assets and profitability for both service and manufacturing industries. These results can be different for industrial companies in emerging economies because of differences in the level of market development. Also, their sample included the service industries which arguably do not invest in machinery and equipment and may not need large capital expenditures compared with the industrial companies in the current study. The results may be different if a longer period is considered for the study. Gill *et al*.'s (2011) study used a shorter period which limits the degrees of freedom in the estimations, and can bias the results. This study spans a longer period (2005-2014).

Using Swiss data for 124 non-financial firms on the Swiss Performance Index (SPI), Drobetz and Fix (2003:1) tested the leverage predictions of the trade-off and pecking order theories. They confirmed the pecking order theory where leverage is negatively correlated to profitability but contradicted the trade-off theory where more profitable firms used less leverage. While these results provide some insights, the study of the South African firms adds more value in checking whether there is a deviation from or support of the capital structure theories on their assumptions about debt and profitability relationship.

Firms operating in the same country can differ in the levels of debt they use for financing. This is confirmed by Fosberg and Ghosh's (2006:56) study of the capital structure of NYSE and American Stock Exchange (AMEX) firms. They found that firms listed on NYSE use 5-8% more debt than firms listed on AMEX. They also found a strong negative relationship between debt and profitability for the NYSE firms while no relationship was found on debt and profitability for the firms listed on AMEX. Their findings are a reflection that capital structure dynamics could not be concluded using one country and therefore this warrants further research.

Empirical evidence from different European countries show mixed results on the effects of leverage on firm performance. Weill (2008:251) studied seven European countries and showed that debt positively affects the profitability of the firms in Spain and Italy. Debt has a negative and significant effect on firms in Germany, Belgium, France and Norway, but is insignificant in Portugal. The results suggest that capital structures vary according to the countries or market environments in which the firms are operating. These mixed findings reflect how inconclusive the optimal capital structure phenomenon is, hence the need for further research.

Yazdanfar and Öman (2015:102) examined debt financing and firm performance using a sample of 15 897 Swedish SMEs in five industries for the period 2009-2012, using the three stage least of squares (3 SLS) and the fixed effects models. The findings confirm that debt ratios (short-term and long-term debt) negatively affect firm profitability. High debt is associated with an increase in agency costs and the risk of losing control of the firm. These costs are likely to squeeze the firms' profits. They reveal what is happening in the SMEs that do not raise their capital from the stock market. The question is whether the effects are different for listed industrial firms in a developing country.

Pandey (2004:78) examined the relationship between the capital structure, profitability and market structure of Malaysian firms listed on the Kuala Lumpur Stock Exchange. The GMM model was applied to a sample of 208 firms from 1994-2000 and both negative and positive relationships between debt and profitability were found. He concludes that debt and profitability have a saucer-shaped relationship because of the trade-off between the effects of asymmetric information, agency costs and tax benefits. The findings suggest that firms increase their profitability ratio using internally generated funds to finance their growth as this minimises the financing costs that are associated with debt financing. As firms become more profitable, they issue debt in order to shield their profits from taxes. Therefore, debt is issued because of the tax shield incentives that the firms enjoy on their high profits. With low profits levels, firms do not have much incentive to issue debt and they opt for other non-debt tax shields from which they benefit without incurring the cost of financing which comes with debt. The results also suggest that firms with high profits issue debt in order to reduce agency costs, as managers would use the available profits to pay off the debt obligations rather than using it on their own interests. Presented with these

findings, it is also worthwhile to study capital structure effects on profitability in South African industrial firms to evaluate if the relationship can be found.

Salim and Yadav (2012:156) studied the capital structure and firm performance of 237 Malaysian listed companies. Their study used ROE, ROA, Tobin's Q and EPS as performance measures. They found a significant negative relationship between performance measures and total debt, long-term debt and short-term debt. These results imply that the increase in debt eats away a firm's profitability and wipes out tax benefits.

Ahmad, Abdullah and Roslan (2012:137) also investigated the effects of capital structure on firm performance by focusing on 58 consumer and industrial sector companies in Malaysia from 2005-2010. They concluded that short-term and total debt has a significant positive relationship with ROA while long-term debt has significant positive relationship with ROE. This implies that an increase in the use of short-term debt or total debt increases the profit levels of the firms. These findings are also consistent with Mesquita and Lara (2003) and Abor (2005) on the positive relationship between short-term debt and ROA. However, the results cannot be generalised for industrial firms in developing countries since capital structures differ from firm to firm or country to country.

Based on 39 Jordanian industrial listed companies, Shubita and Alsawalhah (2012:105) found a significant negative relationship between debt and profitability. This suggests that companies depend more on internal financing. Further studies in Jordan by Ramadan and Ramadan (2015:279) on 72 listed industrial companies confirmed a statistically significant inverse effect of long-term debt and total debt on firm performance (ROA), supporting the findings by Shubita and Alsawalhah. These findings suggest that Jordanian industrial firms should rely less on borrowing to finance their investments. The question is whether this is also the case in other emerging and developing countries like South Africa. Our study also considers the role of short-term debt in the determination of firm profits.

Khan (2012:245) tested the relationship between capital structure decisions with firm performance on 36 engineering firms listed on the Karachi Stock Exchange, Pakistan. Using pooled ordinary least of squares (pooled OLS) regression methodology, he observed that short-term debt and total debt to total assets positively affect firm performance as measured by ROA and gross profit margin. In contrast and also in the Pakistani context, Habib, Khan and Wazir (2016:70) found a negative relationship between

profit and long-term and short-term debt in non-financial firms. The differences in the results obtained even in the same country suggest that the capital structure-profitability debate is far from over and warrants further research in other contexts.

Mohammadzadeh, Rahimi, Aarab and Salamzadeh (2013:573) studied the impact of capital structure on the profitability of 30 pharmaceutical companies listed on the Tehran Stock Exchange in Iran for the period 2001-2010. The study used the net margin profit and debt to asset ratio as indicators of profitability and capital structure respectively and found that capital structure (debt asset ratio) negatively affects profitability. The study suggests that pharmaceutical firms in Iran might be following a pecking order hypothesis, implying that they have a set of ordinal preferences in their capital structures. The results also suggest that the internal financing results in increased profits for the firms as it is less costly and less risky for the firms. The study considers a few indicators of profitability and capital structure (net margin profit and debts to asset ratio) which could raise questions about the robustness of the results.

A study by Saeedi and Mahmoodi (2011:21) on a sample of 320 firms listed on the Teheran Stock Exchange from 2002-2009 considered four performance measures (ROA, ROE, EPS and Tobin's Q) as dependent variables, while total debt, long-term debt and short-term debt (capital structure ratios) were independent variables. They found that EPS and Tobin's Q are significantly and positively related to capital structure, while a negative relationship was observed between capital structure and ROA. No significant relationship was been reported on capital structure and ROE. Although the present study applies almost the same variables, the fact that the analysis is done in a different context could provide further insights on the relationship between capital structure and profitability.

Findings from Sbeiti's (2010:1) study on determinants of capital structure in three of the Gulf Cooperation Council (GCC) countries (Kuwait, Saudi Arabia and Oman) indicate that firm profitability, liquidity and asset tangibility are negatively and significantly related to the leverage ratios. Growth opportunities are positively related to book leverage and negatively related to market leverage. The negative correlation suggests the presence of information asymmetry which leads to pecking order behaviour where firms prefer internal financing. Their data shows that the leverage ratios for the GCC countries are very low when compared to the ones in developed countries. This supports the view that a lack of well-developed financial markets forces firms to rely entirely on internal financing. It is

noteworthy that the study did not incorporate taxes as tax issues are less important in the GCC countries. It is however important to understand the capital structure dynamics in countries where companies pay taxes.

Recent empirical research by Kokstäl and Orman (2015:255) on capital structure determinants in Turkey used a comprehensive data set covering manufacturing and small and large non-manufacturing, publicly traded and private companies. They found that the capital structures of large private firms in non-manufacturing supported the trade-off theory, especially when the environment is economically stable. The results of the study also confirm the positive relationship between debt and profitability. In contrast, their findings on pecking order theory were supported by small publicly traded manufacturing firms, especially in a relatively unstable economic environment. This supports the prediction of a negative relationship between profitability and debt. While the large sample used is statistically helpful, the sample is too diverse and poses heterogeneity challenges in the estimations. The robustness of the estimates is therefore questionable. The present study considers a more homogeneous sample of industrial firms in South Africa.

Gao and Zhu (2015:131) examined the interdependencies of information asymmetry, capital structure and cost of capital for 39 countries with both developed and developing markets. Using the regression analysis for the estimations, the results show that information asymmetry is positively related to leverage and firms with levels of information asymmetry rely more on short-term debt than on long-term debt. A high level of information asymmetry negatively affects the cost at which a firm would access external financing. Equity capital is also costly to access because of high information asymmetry costs. Firms resort to debt for external financing which is not significantly affected by the information asymmetry. This is because firm managers choose the financing option that minimises the overall cost of capital in order to maximise the value of the firm, which is one of their most important financial objectives. However, profitability and leverage are inversely related, suggesting that highly profitable firms use internal financing first and resort to debt when there are deficits and when they would like to avoid the information asymmetry costs associated with external financing. Information asymmetry costs reduce the value of firms and so there is a need to avoid incurring them. These findings are consistent with the pecking order theory. Gao and Zhu's study is informative to the present

study, especially as it concerns the financing behaviour of industrial firms if they are also influenced by information asymmetry.

Ebaid (2009:447) empirically investigated the impact of capital structure choices on firm performance in Egypt. He applied multiple regression analysis to estimate the relationship of leverage level and firm performance (measured by ROE, ROA and GPM) and found no, or a weak impact of capital structure choice on firm performance. As the present study focuses on industrial firms, the results could be different. Although Egypt is an emerging market economy, its capital market is less developed and more segmented, with higher information asymmetry than in South Africa. This could arguably mask the correct relationship between capital structure and profitability.

Marobhe (2014:96) evaluated the influence of capital structure on 12 manufacturing firms listed on various Stock Exchanges in East Africa. Using multiple regression analysis to establish the relationship between performance ratios and capital structure ratios, the study confirmed a negative relationship between profitability and capital structure using ROA whereas ROE and EPS showed an insignificant relationship. Although these findings are recent and were conducted within an African context, East African capital markets are very small and not as active as the JSE. Because of illiquid markets, the East African financial markets are likely to have significant credit constraints which would limit a firm's access to finance.

In a quest to understand the relationship of capital structure in the financial sector, Yegon, Cheruiyot, Sang and Cheruiyot (2014) studied banking institutions listed on the Nairobi Stock Exchange. They used panel data methods for the period 2004-2012 and confirmed a significant positive relationship between short-term debt and profitability. However, the study also observed a significant negative relationship between long-term debt and profitability. The results seem to confirm the pecking order theory as banking firms prefer to use internal funds first and only then resort to long-term debt financing. Similarly, the positive effects of short-term debt on profitability seem to confirm the trade-off theory. The results show that total debt has no effect on a bank's profitability. While this study is interesting, the application to banks may not reveal much, as banks are usually less constrained in raising debt financing than equity when compared with non-banking institutions. The present study considers industrial firms that are likely to use both debt and equity and so the determination of the optimal capital structure is an important decision.

Another study in Kenya by Mwangi, Makau and Kosimbei (2014:72) on non-financial companies listed on the Nairobi Stock Exchange show that financial leverage is negatively related to performance as measured by ROA and ROE. The evidence suggests that firms in undeveloped capital markets rely on internal finance because of illiquid and inactive capital markets. It is imperative to further investigate a much larger and active stock market like the JSE, which is the trendsetting capital market in Africa.

In a study, which focuses on 62 non-banking firms on the Nigerian Stock Exchange, Igbinosa (2015:1) found that the studied firms made use of long-term debt in the short run to boost their profitability and earnings. However, in the long run and as they became more profitable, they resorted to internal sources of funding. This implies that long-term debt has a positive impact on a firm's profitability in the short-run. Although the combination of debt and equity that optimises ROA differs from the one that optimises ROE alone, the study confirms that long-term debt contributes significantly and positively to the enhancement of returns on equity.

Hasan, Ahsan, Rahaman and Alam (2014:184) investigated the influence of capital structure on the firm performance of 36 Bangladesh firms listed on the Dhaka Stock Exchange during the period 2007-2012. They used the pooled OLS regression method and four performance measures (EPS, ROA, ROE and Tobin's Q) as the dependent variables, and short-term debt, long-term debt and total debt (capital structure ratios) as independent variables. They found that EPS and ROA are significantly and positively related to short-term debt, but significantly and negatively related to long-term debt. They also found no statistically significant relationship between capital structure ratios and ROE or Tobin's Q. These results are consistent with the pecking order theory, possibly due to the high costs of debt attributed to the underdeveloped equity and debt markets in Bangladesh. Firms resort to short-term debt which might be available to finance their projects. The present study investigates whether South African firms also benefit from short-term debt.

In Sri Lanka, Premkanth, Abdul Aziz and Le (2015:250) used simple descriptive statistics and regression methods to examine the relationship between capital structure and profitability within 15 manufacturing companies listed on the Colombo Stock Exchange. They found that the debt to equity ratio has a strong relationship with EPS, ROE and ROA and concluded that there is a strong positive relationship between capital structure and

profitability. Based on these findings, it can be concluded that the use of debt in the manufacturing sector leads to an increase in firm profitability. The sample size of 15 manufacturing companies is however too small to provide robust results and so cannot be generalised to other sectors or firms in different countries.

Using a sample of 422 Indian manufacturing companies listed on the Bombay Stock Exchange, Chadha and Sharma (2015:295) analysed the relationship between leverage and firm performance (ROE, ROA and Tobin's Q) and found that financial leverage has no impact on both ROA and Tobin's Q. However, the results show that leverage is significantly and negatively related to ROE. This suggests that there are other factors that affect the Indian manufacturing firms' profitability which are firm- or sector-specific and not only related to their capital structures. This is an important finding for this study, as it helps to broaden the view on the determinants of profitability.

In summary, the empirical studies concerning the effects of capital structure on company profitability have provided varied and contradicting evidence in developed countries, developing countries and even in the same region or country. Hence, this study seeks to extend the available literature by empirically examining the effects of capital structure on the company profitability of industrial companies in developing country where few studies exist that focus on industrial companies.

2.4 CHAPTER SUMMARY

In this chapter, the theories of capital structure and empirical studies that have been conducted globally, regionally (Africa) and within South Africa were discussed. Modigliani and Miller 1958's capital structure irrelevant proposition opened the debate on capital structure as it led to the development of many capital structure theories such as the trade-off, pecking order, agency, signalling and market timing theories. Various empirical studies tested the validity of these theories, and especially the two leading theories: the trade-off and pecking order theories. The studies were conducted in developed, developing and emerging markets. The results are mixed and varied, depending on market conditions, geographical locations, study sample selection and time periods identified. Researchers have argued that different theories applied to different firms under different circumstances are the reasons behind the different outcomes found.

Corporate capital structures in developed, developing and African countries have been discussed. Some empirical evidence available shows that capital structures are different depending on the markets the firms are operating in. Financing behaviours in developed, developing or emerging markets are completely different. Also, the pattern of financing decisions has changed over the decades and it is therefore important to examine changes in capital structures over time. The general conclusion is that firms in developing or emerging economies rely more on external financing when compared to firms in developed economies.

Most of the prior empirical studies on capital structure and profitability found a negative relationship between long-term debt and profitability, but when firms opt for short-term debt, some results show a positive relationship between short-term debt and profitability. These results differ depending on the type of industry, firm size, ownership structure and method used to analyse the relationship. For example, some scholars measure leverage using book values whilst others vouch for market values.

There is still no consensus on optimal capital structure and its implications for firm profitability. Despite the advancement of several theories and their consideration of various complex and dynamic business and economic issues, the puzzle remains unsolved. The conflicting literature and inconclusive empirical results warrants further empirical research in order to provide additional evidence on what the most ideal capital structure composition to maximise firm value should be.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter describes the research design and methodology used in the study. The chapter begins by formulating the hypotheses of the study and then explains the strategy and research design or panel data models used to analyse the data and estimate the relationship between capital structure and firm profitability. The appropriate tests required to choose the ideal model that perfectly suits this study are also explained. In addition, data issues including data collection methods, data sample and data sources are discussed, as are the key variables used in the analysis: profitability and capital structure ratios.

3.2 HYPOTHESES

To achieve the objectives of the study (which is to examine the impact of capital structure on profitability), the study formulates the testable hypotheses based on the literature reviewed in the previous chapters. The formulated hypotheses are based on three debt to asset ratios (total debt, long-term debt and short-term debt) to asset ratios and profitability measures (net profit, ROE, ROA and EPS).

Hypothesis 1: Total debt to asset ratio (DA) has a significant positive impact on profitability of the listed industrial firms.

Modigliani and Miller's proposition II (MM II) posits that firm value is maximised as the firm continually increases its debt levels because cheaper debt will lower the overall cost of capital (WACC) of the firm. The interest on debt is treated as a tax allowable expense and therefore it reduces the tax amount to be paid by the firm, resulting in an increase in profits available to ordinary shareholders and raising EPS. This proposition also argues for the use of more debt when there are no financial distress and bankruptcy costs in order to maximise the value of the firm. However, the continued increase in debt raises interest payable, thereby decreasing the net income attributable to shareholders.

Trade-off theory predicts that highly profitable firms use debt for financing activities and a positive relationship between debt and profitability. Profitable firms find it easy to borrow for financing because they have the ability to pay back the money borrowed with its interest. Profitable firms can access debt on favourable borrowing terms whereby the cost of debt may be lower when compared to the rate offered to an unprofitable firm which is

assumed to have a high risk of default. The theory asserts that higher profitability reduces the expected costs of distress and permits the firms to increase their tax benefits by increasing leverage.

On the other hand, the pecking order theory asserts that profitable firms use minimal debt and predict a negative relationship between profitability and leverage. As the firm's profit increases, the debt levels are reduced because the firm will have more cash to repay the loans, thus reducing interest expenses. Lower or no interest expenses means more excess returns available to the shareholders. Profitable firms use internal funds which are less costly and therefore are not affected by the charges that are associated with external financing. These charges reduce the firm's profits available to the shareholders. According to the signalling theory, debt is regarded as a sign of good quality. When a firm takes out some debt, investors view it as sign that the firm is expecting cash inflows in the near future that it would be able to pay off its obligations. The firm's share price rises because of this good signal, thereby increasing the EPS.

***Hypothesis 2**:* Long-term debt to asset ratio has a significant positive impact on profitability of listed industrial firms

Firms normally use long-term debt to invest in fixed assets such as machinery and equipment that helps to generate income over a period of time. Marsh (1982:121) noted that large firms usually opt to use long-term loans because of the bargaining power they have to the creditors as well as large assets base which can be used as collateral. Large firms can therefore access long-term debt at favourable interest rates and can repay over a long period of time, thereby reducing the possibilities of financial distress costs. However, the excessive use of debt is associated with increased interest payments which can adversely affect the firm's net profits.

Hypothesis 3: Short-term debt to asset ratio has a significant positive impact on profitability of listed industrial firms.

Myers (1977:147) observed that firms that have more growth and investment opportunities employ shorter maturity debt. More growth and new investment opportunities result in increased revenues, thereby improving firm profitability. Abor's (2008:27) findings concur with Myers's observations that some firms use debt (especially short-term debt) in order to

finance the sales growth. The study by Baum, Schäfer and Talavera (2006:10) of a sample of German industrial sector firms reports that firm profitability increases as the firm uses more short-term debt than long-term debt in their capital structures. This is attributed to close monitoring and control because of the shorter maturity period of the short-term debt. Close monitoring may improve firm efficiency which could also result in an increase in profitability.

Marsh (1982:121) noted that small firms more often access short-term debt while large firms opt for long-term debt. In support of this, Whited (1992:1425) states that small firms' growth opportunities usually exceed their available assets for collateral, thereby making it difficult for them to access long-term loans. According to Gwatidzo and Ojah (2009) and Abor (2005), there are many constraints to accessing long-term debt in most African countries, forcing firms to rely more on short-term debt in financing. Short-term debt may be more expensive than other forms of financing since the repayment period is short and the interest is high to reflect a higher risk premium. However, small firms and illiquid firms usually use it since it is the readily available financing option for them.

3.3 RESEARCH STRATEGY AND BROAD RESEARCH DESIGN

This study utilises exploratory and quantitative techniques to analyse the impact of capital structure on profitability. Exploratory analysis involves using descriptive statistics such as mean, median and standard deviation and correlation coefficients among others. Empirical quantitative techniques used include panel data techniques.

The study utilises secondary data, largely sourced from the INET BFA database which provides the audited and published financial statements of the companies listed on the JSE. The financial statements have been produced in accordance with the international financial reporting standards (IFRS). This research seeks to provide further insights into the impact of capital structure on company profitability by analysing the relationship between the variables. The study uses panel data which combines cross sectional (companies) and longitudinal (years) dimensions of data. Quantitative financial data is used in calculations of capital structure and profitability ratios.

3.3.1 Panel data estimations

To achieve the objectives of the study, panel data techniques are used to estimate the impact of capital structure on company profitability. Panel data techniques are considered

to be much stronger than other methods because they combine the cross sectional and time series nature of data sets, which enlarges the sample size and improves inferences. Panel data is better than single time series for a number of reasons. Panel data analysis helps to control for individual heterogeneity (unobserved firm specific effects), unlike time-series or cross-sectional which helps to reduce bias in the results. The possibility of the estimation of the within estimator allows explanatory variables (capital structure ratios) to be related to individual firm effects. According to Baltagi (2005:125), the within estimator is the best linear unbiased estimator.

Panel data provides more informative data, thereby increasing degrees of freedom, reducing collinearity within the variables and increasing efficiency (Klevmarken, 1989; Hsiao, 2005:3). In this way, it eliminates potential large sources of bias. To a greater extent, panel data analysis is better able to identify and measure the effects that are simply not detectable in pure cross-section or pure time-series data. Moreover, panel data models can detect the dynamics of adjustment and allows the researcher to construct and test more complicated models than does purely cross-section or time-series data. The widely-used panel data estimations are the fixed effects model, random effects model and the pooled ordinary least square.

The general panel data model is estimated:

$$Y_{it} = \alpha + \beta X_{it} + \mu_i + v_{it} \qquad (2)$$

$I = 1\ldots\ldots N;\ t = 1,\ldots..T$

Where:

Y_{it} is the dependent variable
X_{it} are the explanatory variables
μ_i denotes unobservable firm specific effects
v_{it} denotes the idiosyncratic disturbance term
i denotes firms and t denotes time in years

3.3.1.1 Fixed effects (FE) model

The FE panel regression model assumes that the individual firm specific effects (unobservable factors) are correlated with the explanatory or independent variables. That is: Cov $(X_{it},\mu_i) \neq 0$. The fixed effects exploit within-group variation over time by holding constant (fixes) the average effects of each firm. As such, it controls for other characteristics of firms that might affect the dependent variables in the regression

(profitability ratios), such as management quality. While dealing with heterogeneity bias, the FE model helps in reducing the omitted variable bias and controls for unobservable factors that are correlated with the variables included in the regression. The FE model helps to control for individual heterogeneity which may be present among firms

3.3.1.2 Random effects (RE) model

The RE model assumes that the unobservable factors are not correlated with the explanatory variables, that is: Cov (X_{it}, μ_i) = 0. According to Wooldridge (2010:286), the estimators allow for zero correlation between unobserved heterogeneity and observed explanatory variables, implying that individual specific effects are uncorrelated with the independent variables. In this case, unobservable factors are treated as random variables. The estimator is regarded as biased if Cov (Cov (X_{it}, μ_i) ≠ 0.

The individual differences in the firm intercepts are captured by the error term. The RE model is more appropriate when estimations are done with a randomly selected large sample or where individual specific effects are considered to be uncorrelated with other covariates or observed variables of the model. This is the case when we do not assume a common effect firm effect on firm performance. Also, the random effects model can include the invariant variables such as gender where as in fixed effects, the invariant variables are absorbed by the intercept.

The random effects model is estimated as follows:-

$$Y_{it} = \beta X_{it} + \alpha + \upsilon_{it} + \varepsilon_{it} \quad (3)$$

Where:

Y_{it} is the dependent variable
β is the regression co-efficient of explanatory variable
X_{it} are the explanatory variables
υ_{it} is between entity error.
ε_{it} is within entity error

3.3.1.3 Pooled ordinary least squares (OLS) model

The pooled OLS model assumes that there are no unobservable effects. It omits the μ_i variables in the estimations. It is regarded as the most restrictive model and therefore it is estimated as follows:-

$$Y_{it} = \alpha + \beta X_{it} + v_{it} \quad (4)$$

Where:

Y_{it} = dependent variable
β = regression co-efficient of explanatory variable
X_{it} = explanatory variable in period *i*
v_{it} = disturbance term in period *i*

3.3.3 Tests for the specification in panel data model for the study

This section highlights some important tests to be carried out in order to choose the most ideal panel data model to be applied and which suits the data of this study well. The tests include the multicollinearity test and the Hausman (1978:1251) specification test.

Multicollinearity tests

Usually, the multicollinearity problem arises when the explanatory variables in the equation are highly correlated. The correlation matrix can be used to determine the variables which show the multicollinearity problem.

Hausman specification test

To decide which of the FE and RE models is the appropriate model to use, a formal test by Hausman (1978:1251) is applied. The null hypothesis of the test is that the preferred model is the RE model and the alternative hypothesis is that the FE model is preferred. If the null hypothesis is true then the RE model is most appropriate and if it is rejected, then the FE model will be the more appropriate one to use in the study. This means that if the p-value of the test is less than 0.05 then the FE regression model is accepted and if the p-value is more than 0.05, it means that the RE regression model is the favourable one.

Multiple panel regressions, based on different profitability measures and debt ratios are performed to investigate the impact of capital structure on profitability. All debt ratios (DA, LTDA and STDA) were used separately to test their impact on each of the profitability measures used in the study. This study has adopted the similar regression models used by Ebaid (2009:482) and Abor (2005:442) in their previous studies on the relationship between capital structure and profitability. The following specific equations are estimated:

$$NPR_{it} = \beta_0 + \beta_1 \left(\frac{D}{A}\right)_{it} + \beta_2 Size_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (5)$$

$$NPR_{it} = \beta_0 + \beta_1 \left(\frac{LTD}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ growth)_{it} + \varepsilon_{it} \quad (6)$$

$$NPR_{it} = \beta_0 + \beta_1 \left(\frac{STD}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (7)$$

$$ROA_{it} = \beta_0 + \beta_1 \left(\frac{D}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (8)$$

$$ROA_{it} = \beta_0 + \beta_1 \left(\frac{LTD}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (9)$$

$$ROA_{it} = \beta_0 + \beta_1 \left(\frac{STD}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (10)$$

$$ROE_{it} = \beta_0 + \beta_1 \left(\frac{D}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (11)$$

$$ROE_{it} = \beta_0 + \beta_1 \left(\frac{LTD}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (12)$$

$$ROE_{it} = \beta_0 + \beta_1 \left(\frac{STD}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (13)$$

$$EPS_{it} = \beta_0 + \beta_1 \left(\frac{D}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (14)$$

$$EPS_{it} = \beta_0 + \beta_1 \left(\frac{LTD}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (15)$$

$$EPS_{it} = \beta_0 + \beta_1 \left(\frac{STD}{A}\right)_{it} + \beta_2 (Size)_{it} + \beta_3 (Sales\ Growth)_{it} + \varepsilon_{it} \quad (16)$$

Where:

ε_{it} is the error term, which is the sum of the unobserved effects and idiosyncratic error term
β_0 = constant of the regression equation
β_1, β_2 and β_3 = coefficients of debt ratios, company size and sales growth
DA = total debt / total assets for firm *i* in year t
LTDA = long-term debt / total assets for firm *i* in year t
STDA = short-term debt / total assets for firm *i* in year t
Size is the natural logarithm of the firm's total assets
Sales Growth is the current year sales minus previous year sales divided by previous year's sales

Profitability ratios of firms are measured by Net Profit Ratio (NPR), ROA, ROE and EPS.

Based on the above regression model NPR, ROE, ROA and EPS (profitability ratios) are the dependent variables of the various equations. The independent or explanatory variables are DA, LTDA and STDA (capital structure ratios) and they are used in the different regressions. Size and Sales Growth are the control variables.

3.4 DATA SAMPLE

The sample consists of 52 industrial companies listed on the JSE (see Table 24 in the Appendix). Industrial companies by their nature are likely to spend more on capital expenditure, hence there is a need for external financing. The selection of the companies is based on the companies with complete data sets for at least eight consecutive years. The reference period of the study is 10 years, spanning from 2006 to 2015. The study uses income statements, balance sheets and the financial ratios of the companies in the sample to evaluate the impact of capital structure on a firm's profitability. The sample excludes financial firms and insurance firms because of their way of reporting leverage which differs from the non-financial firms. Retail firms and firms in the service industries are also excluded because they normally do not invest much in large capital expenditures as do industrial companies.

While the majority of firms have complete data for 10 years, data for some companies is available for less than 10 years. The firms in the sample have reported and published their financial statements for at least eight consecutive years. 44 companies have published financial statements for 10 years, while 6 companies have published data for 9 years and 2 companies have published financial statements for 8 years. Therefore, this study uses an unbalanced panel data. The sample has a total of 510 observations. This data set is wide enough to produce meaningful results.

Although the initial and main estimations are done with the whole sample, the sample is further divided between large and small firms. Small firms are defined as firms with an average total value of assets less than the median whereas large firms have an average total value of the assets above the median.

To ensure the robustness of the analysis, the sample is further divided into sub-sectors which are: basic resources, industrial goods, consumer goods, construction and materials, and chemicals. To address the possibility of endogeneity, particularly reverse causality problems whereby in this study profitability can be a driver of capital structure, the capital structure variables will be lagged by one year. This will be done under robustness checks and will be done for the whole sample. Also, the study covers the period of the global financial crisis. During this period, the performance of firms could have been adversely affected. Therefore, this study will include a dummy variable (fin crisis) in some

estimations to capture the effects of the crisis as a potential control variable. This will also be shown under robustness checks and will be done on the full sample to ensure the consistency of the results.

3.5 DATA SOURCES AND COLLECTION METHOD

The data for this research has been extracted from the INET BFA database. The database is widely used for research on South African data. It provides financial information such as the audited and published annual financial statements and key financial ratios of all firms listed on the JSE. The information from the INET BFA is comprehensive and reliable as it is verified by the Bureau of Financial Analysis which standardises the data and ensures that it is good quality data.

3.6 VARIABLES

This study follows previous studies in specifying the profitability–capital structure relations. It makes use of profitability ratios as the dependent variables and the capital structure ratios as the independent or explanatory variables as was done in Abor (2005:442), Ebaid (2009:481) and Gill *et al*. (2011:7) among others.

3.6.1 Dependent variables

The profitability ratios are the dependent variables. The following profitability ratios are used:

Net Profit Ratio (NPR): measures how much of every dollar of sales in the company is translated into profits.

NPR is calculated as: $\frac{\text{Net profit before tax}}{\text{Sales}} \text{ X } 100$

Return on Equity (ROE): measures the profitability of a firm in relation to the equity it utilises to generate the profit.

ROE is calculated as: $\frac{\text{Net profit after tax}}{\text{Total shareholder's interest}} X\ 100$

Return on Assets (ROA): measures the profitability of the firm in relation to the assets it uses to generate the profit and therefore it shows how effectively the firm uses its assets.

ROA is expressed as: $\frac{\text{Net profit after tax}}{\text{Total Assets}} X\ 100$

Earnings per Share (EPS): measures the overall profit generated per share over a period of time. It is one of the key measurements of determining the value generated for the shareholders.

EPS is defined as: $\frac{\text{Net income} - \text{pref stock dividends}}{\text{Average of outstanding ordinary shares}}$

3.6.2 Independent variables

This study uses the capital structure ratios as the independent or explanatory variables. The aim of using the capital structure ratios is to determine how they affect the profitability of the firm. The following debt ratios have been used:

Debt to Asset Ratio (DA): measures a proportion of debt that has been used to finance company assets. Higher ratio suggests high risk, meaning that the company may end up facing problems to service its debt due to high monthly interest payments.

DA is calculated as: $\frac{\text{Long-term \& short-term interest bearing loans}}{\text{Total Assets}}$

Long-term Debt to Asset Ratio (LTDA): measures the portion of long-term interest bearing loans or bonds borrowed by the firm and is repaid over a period of at least 12 months. Higher ratios mean that the company has more liabilities and less equity.

LTDA is expressed as: $\frac{\text{Long-term interest bearing debt}}{\text{Total Assets}}$

Short-term Debt to Asset Ratio (STDA): is usually comprised of short-term bank loans advanced to a company and falls due in a period of 1 year. Higher short-term debt suggests that the company may have liquidity challenges and could have problems in paying off its short-term obligations. STDA can be used to finance the company's working capital.

STDA is calculated as: $\frac{\text{Short-term interest bearing debt}}{\text{Total Assets}}$

3.6.3 Control variables

Previous research suggests that there are other variables that may also influence the profitability of firms. Growth and firm size have mostly been used as key control variables. Frank and Goyal (2003) noted that large firms normally enjoy economies of scale which can also influence the results and statistical inferences. This study therefore includes the size and growth to control for other factors which may affect profitability.

Growth of sales: is measured by: $\frac{\text{Sales}_{\text{t}} - \text{Sales}_{\text{t}-1}}{\text{Sales}_{\text{t}-1}}$

Firm size: The pecking order theory posits that larger firms tend to be highly profitable, suggesting that firm size influences firm profitability.

Firm size is measured as the Natural Logarithm of sales: NLog ($Sales_{it}$)

3.6.4 Measurement of variables

This study uses the book values for the calculation of ratios used as the variables which are reported in the financial statements. Book values are used because they are the ones which are available. Myers (1977:147) argues that most managers tend to use book leverage because it is supported by assets in place. Market values are not usually available and they fluctuate markedly over time due to price changes. This needs to be accounted for in order to have the correct market value. In fact, the use of market values requires that several calculations be done in order to determine the ratios, a process which can be cumbersome (Chipeta, 2012:98). Also, the profitability measurement is based on the income statements which use the book values.

However, some corporate finance literature suggests that firms should use market values to determine capital structures in the firms. For instance, Bowman (1980:242) argues that the use of book values or market value does not make a big difference since both measures are highly correlated. Chipeta (2012:99) reported that book values and market values of leverage for South African data are highly correlated. For example, the correlation between book and market value of the debt to equity ratio is 0.78. Marsh (1982:131) and Hovakimian, Opler and Titman (2001:5) note that the use of both book and market value to model capital structure generally produced the same results.

3.7 CHAPTER SUMMARY

This chapter discussed the research design which has been adopted in this study as well as the hypotheses tested. Data, sampling methods and the variables used have also been discussed and explained in detail. The chapter highlighted the use of panel data techniques which are considered to be stronger because of their ability to combine cross sectional and time series data. The multiple regressions to be used and the variables in the regression as well as the specification tests conducted in order to choose the suitable panel data model to use in the study, have also been discussed.

The statistical procedures and the estimation models discussed in this chapter are applied in the following chapter where the results of the empirical study are presented.

CHAPTER 4: ANALYSIS OF DATA AND EMPIRICAL RESULTS

4.1 INTRODUCTION

The aim of this chapter is to analyse, report and discuss the results obtained from the statistical tests and estimations performed on the data sample in accordance with the objectives of the study. Firstly, the results of the basic statistical tests performed on the full sample data of 52 industrial companies with 510 observations are presented. Thereafter descriptive statistics are reported on the full sample, sample divisions of big and small companies and also on sub-sectors. Secondly, the Hausman specification tests to choose a suitable model (between the FE and RE models) are presented. Thirdly, the chapter reports on the regression outputs based on the model chosen, and the results are discussed. Lastly, the robustness checks are presented. These include lagged variables for capital structure ratios, inclusion of a dummy variable to capture for the financial crisis period, different sub-sectors and the application of an alternative estimation method (the pooled OLS model) on the full sample to evaluate the consistency of the results.

4.2 DATA ANALYSIS

4.2.1 Descriptive statistics: Full sample

Table 1 presents the summary statistics for the total data sample for the period 2006-2015. The descriptive summary statistics include the mean, median, minimum, maximum and the standard deviation of the variables used on the total data sample. The mean of the NPR of the sample is 7.4% which is higher than the median (5.95%), suggesting that NPR is positively skewed. This also applies to ROA, which averages 13.21% against the median of 11.32 per cent. On average ROE is larger than NPR and ROA, at 16.07%, reflecting a good sign to attract investors who normally expect a higher return on their investment (equity). The EPS averages 545c, higher than the median of 248c, implying that most the firms' EPS was on the high side. The positive profitability ratios indicate that on average companies have been profitable for the period under consideration, although the average masks variabilities between companies, as a few companies could have been operating at losses. The standard deviation of NPR is 10.9, while that of ROA is 13.56 and 37.46. This is much lower than that for EPS which has a standard deviation of 847, suggesting that EPS is more volatile. The volatility of EPS could be attributed to share price fluctuations. Debt ratios have a low measure of central tendency with a mean and

median of 0,18 and 0,16 respectively for total debt to asset ratio. The average and median for long-term debt ratios are smaller than for total debt, 0,11 and 0.08 respectively. This is quite surprising given the low measures for short-term debt ratios with mean and median of 0.07 and 0,06 respectively. In all cases, the averages are larger than the medians, suggesting positive skewness of the debt ratios. The debt ratios are relatively stable, as reflected by their standard deviations of 0.13, 0.12 and 0,07 for total, long-term and short-term debt ratios respectively. The observations do not deviate much from the averages. This suggests that firms have target debt ratios which they seek to maintain.

Table 1: Summary statistics of 510 observations for all variables

	NPR	ROA	ROE	EPS/c	DA	LTDA	STDA	Growth	Size
Mean	7.44	13.21	16.07	545.16	0.18	0.11	0.07	12.75	6.88
Median	5.95	11.32	14.49	248.40	0.15	0.08	0.06	10.00	6.88
Minimum	-41.84	-37.94	-657.18	-1338.00	0.00	0.00	0.00	-51.00	4.79
Maximum	139.45	131.38	235.43	6016.00	0.62	0.61	0.51	270.00	8.76
Standard deviation	10.90	13.36	37.46	847.92	0.1325	0.1160	0.0669	27.89	0.6707

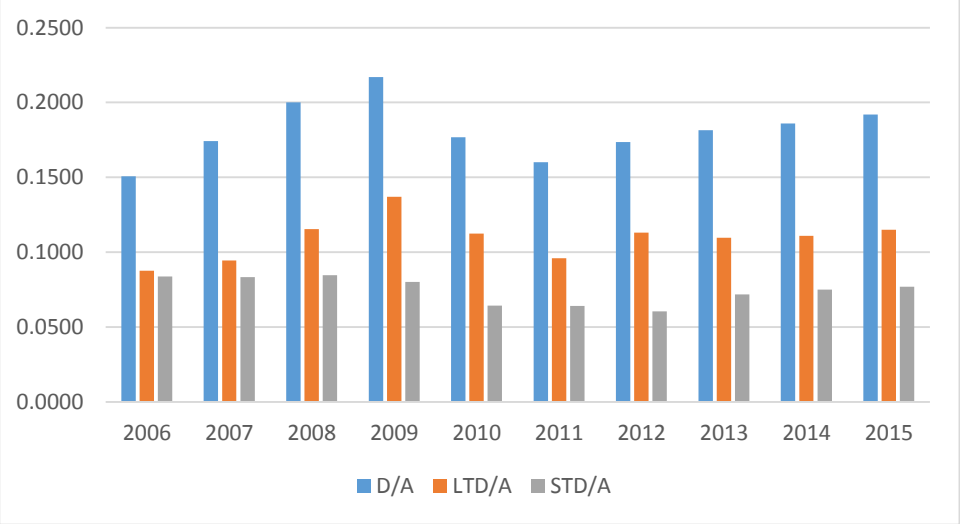
Source: Author's computation

The descriptive statistics in Figure 10 below, suggest that industrial firms in South Africa finance their businesses with more long-term debt as compared to short-term debt, as the former is higher than the latter for all the years (2006-2015). This possibly reflects more efficient capital markets and fairly developed financial systems, where firms can access credit from financial institutions. The use of more long-term debt suggests that industrial firms have the collateral required by financial institutions to access debt. The capital structure ratios (see Table 25 in the Appendix) have been steady over the period with the debt to asset ratios ranging from 0.15 to 0.21. Long-term debt ratios and short-term debt ratios range from 0.08 to 0.13 and 0.06 to 0.08 respectively. These debt ratios indicate that companies target almost similar ranges on their debt structures. The use of more long-term debt by South African industrial firms concurs with the previous findings by Gwatidzo and Ojah (2009:7) that South African companies use more long-term debt than short-term debt.

Compared to other firms in developed markets whose ratios are above 0,5 (noted by Rajan and Zingales (1995:1421)), South African firms have lower debt ratios. This

observation is consistent with the findings by Correia and Cramer (2008:31) that South African firms have considerably low debt ratios. The lower debt ratios suggest that the South African industrial firms follow an under-leveraging policy, probably to avoid the financial distress costs and in order to maintain their financial flexibility. This implies that the firms tend to rely on internal financing or equity for financing.

Figure 10: Debt to asset ratios for the sample over the period



Source: Author's computation from INET BFA database

Figure 11 explains the relationship between debt and profitability of industrial firms in the sample. This analysis shows that the increase in total debt is associated with the decline in NPR, ROA and ROE, implying that debt proves to be costly and erodes the firm's profitability. Long-term debt increase also deteriorates the industrial firm's profits (NPR, ROA and ROE). This relationship supports the pecking order theory which predicts a negative relationship between debt and profitability. For financing or recapitalisation, the industrial firms should utilise their retained earnings which are the cheapest source of finance. There is no clear relationship between short-term debt and profitability, implying that the use of short-term debt has no significance in industrial firms' profitability.

Figure 11: Debt and profitability ratios

Source: Author's computation from the data set

Table 2 presents a correlation matrix for all the variables. Total debt to asset (DA) is negatively correlated to NPR, ROA and EPS, while it exhibits a positive correlation with ROE. This implies that higher debt levels generally reduce profits. These correlations confirm the pecking order theory which predicts a negative relationship between debt and profitability. Long-term debt shows a weak positive relationship with NPR and ROE but is negatively correlated to ROA and EPS. This implies that costs associated with long-term debt exceed the returns from the use of assets. Also, excess debt results in high interest obligations that directly reduce the earnings available; hence the reduction of EPS. The

difference displayed on the long-term debt relationship to NPR and ROE can be attributed to the way profitability ratios are measured. For example, NPR is measured as profit before tax while ROE is the profit available for ordinary shareholders after deduction of preference shareholders' interest. Short-term debt is positively correlated to ROA and ROE but the relationship is weak, while the relationship with NPR and EPS is negative. Growth and size are positively correlated to NPR, ROA, ROE and EPS. The positive correlations between the control variables and the profitability suggest that the control variables play an important role in explaining firm profitability. The table shows high correlations of profitability ratios, which is intuitive as they measure the same thing. Also, the debt ratios are highly correlated and this confirms that there is high probability of multicollinearity if the same ratios are combined in the same regression.

Table 2: Correlations for all variables

	NPR	ROA	ROE	EPS	DA	LTDA	STDA	GROWTH	SIZE
NPR	1								
ROA	0.7653	1							
ROE	0.6091	0.5425	1						
EPS	0.365	0.4267	0.2197	1					
DA	-0.0053	-0.0408	0.0744	-0.0943	1				
LTDA	0.0129	-0.0771	0.051	-0.0393	0.8617	1			
STDA	-0.0328	0.0535	0.058	-0.1174	0.4741	-0.0382	1		
GROWTH	0.1492	0.1624	0.1097	0.0546	-0.0067	0.0028	-0.0181	1	
SIZE	0.103	0.0112	0.0109	0.4767	0.1991	0.2201	0.0102	-0.1231	1

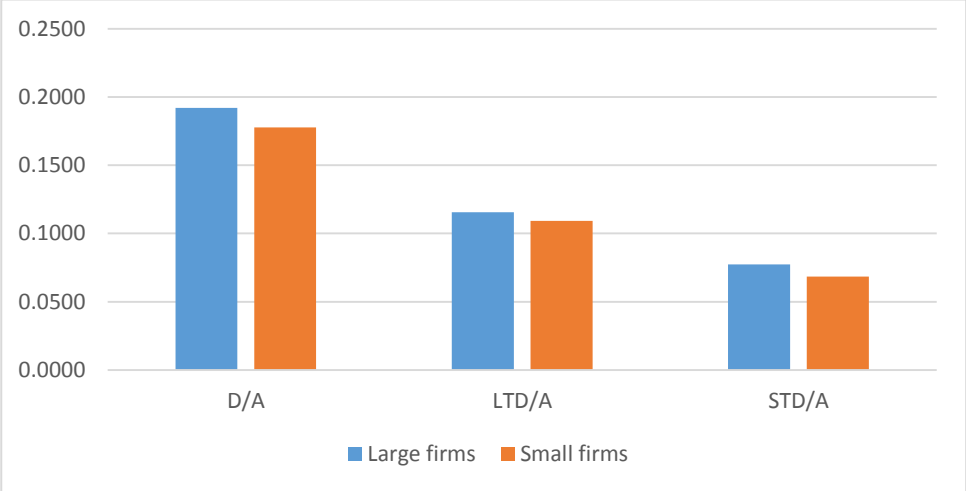
Source: Author's computation

4.2.2 Large and small firms' average debt and profitability ratios

Figure 12 show the average debt ratios for large companies and small companies respectively. Large companies have an average of total debt to asset of 0,1928. Their long- and short-term debt are 0,1128 and 0,0792. Small companies' total debt to asset is 0,1792 while long- and short-term debt average 0,1093 and 0.068 respectively. This analysis suggests that big companies use more debt compared to small companies. The analysis confirms Chipeta's (2012:182) findings that large companies have a better capacity to assume more debt and they can negotiate for loans on favourable terms. Rajan and Zingales (1995:1421) also note that large firms are likely to be more diversified and less prone to bankruptcy. They are likely to incur lower direct costs on debt or equity

issuing and therefore expected to employ more debt than small firms. Larger firms are also viewed as less risky than smaller firms and therefore banks prefer to lend them more funds (Eriotis, Vasiliou & Ventoura-Neokosmidi 2007:325). Lemmon and Zender (2010:1163) weighed in supporting that smaller and high growth firms face debt capacity constraints and this is evidenced by frequent equity issues as it is difficult to access debt to finance their growth.

Figure 12: Average debt to asset ratios for large and small firms

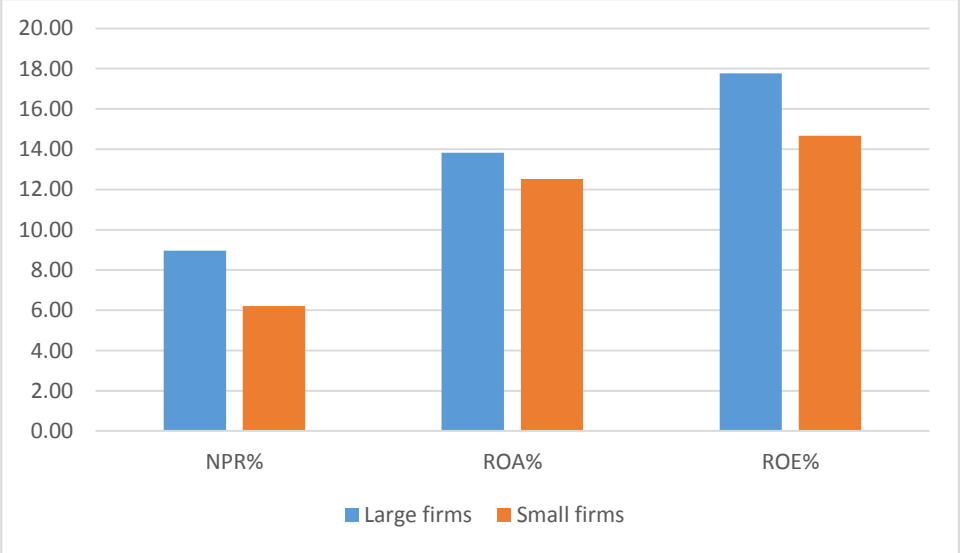


Source: Author's computation from the data sample

4.2.3 Profitability ratios for large and small firms

Figure 13 shows the average profitability ratios for large and small companies. Large companies have an average NPR of 8,96%, ROA of 13,82%, ROE of 17,76% and an EPS of 857c per share while the small companies' NPR, ROA, ROE and EPS are 6,21%, 11,52%, 15,03% and 139c respectively. Clearly this shows that size matters for profitability. Large firms tend to have a bigger market share implying a large volume of sales. They are more diversified than smaller firms and this implies they are better positioned to withstand shocks and manage risks. Buzzell, Gale and Sultan (1975:97) noted that enterprises with high market share are considerably more profitable than their smaller rivals.

Figure 13: Profitability ratios for large and small firms



Source: Author's computation from the data sample

4.2.4 Sub-sectors' average debt and profitability ratios

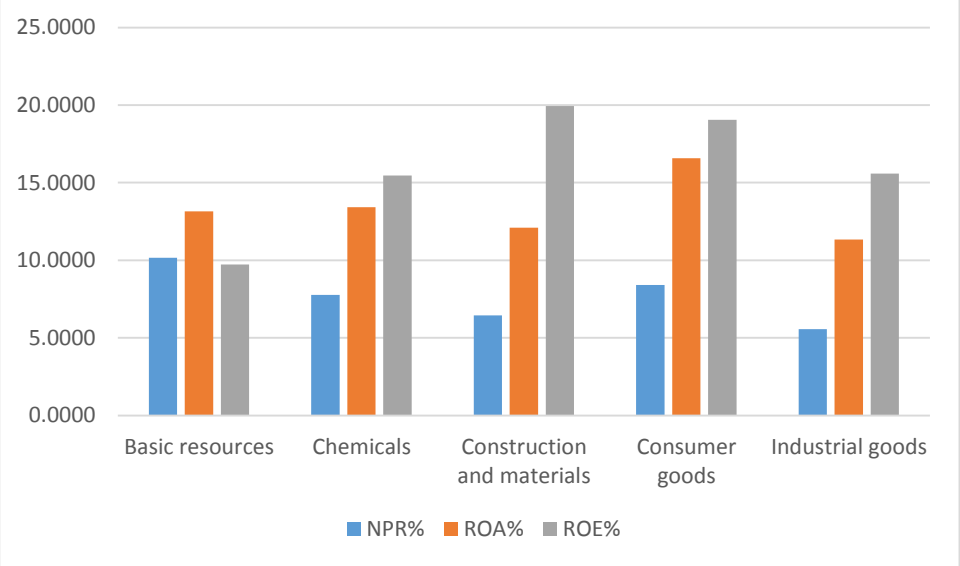
Debt and profitability ratios are also analysed for different sub-sectors. Figure 14 and figure 15 show the profitability and debt ratios for the different sectors in the sample. Construction and materials sector firms have the highest ROE suggesting that shareholders of the construction and material sectors realise the highest returns from their investment. The consumer goods sector has the highest ROA implying that the use of the assets generates more income as compared to other sectors. The basic resources sector is trailing behind other sectors in terms of profitability, possibly reflecting the decline of commodity prices globally during the global financial crisis and from 2014.

Although consumer goods sector has higher profitability ratios, their debt ratios are the lowest in average to other sectors. The consumer goods sector uses more short-term debt compared to long-debt. This sector needs more working capital in order to produce the consumer goods which are used almost on a day to day basis. Normally, working capital is financed through short-term debt. Therefore, consumer goods firms can match the short-term loan repayments with the incomes they get from the sales of their goods. Their credit periods may not exceed 90 days. They quickly realise their returns when they invest in working capital as compared to the firms that invest in large capital expenditures.

The industrial goods sector's debt ratios top across all the sectors with an average of 0,22 for debt to asset ratio, 0.13 for long-term debt and 0.08 for short-term debt. Firms in

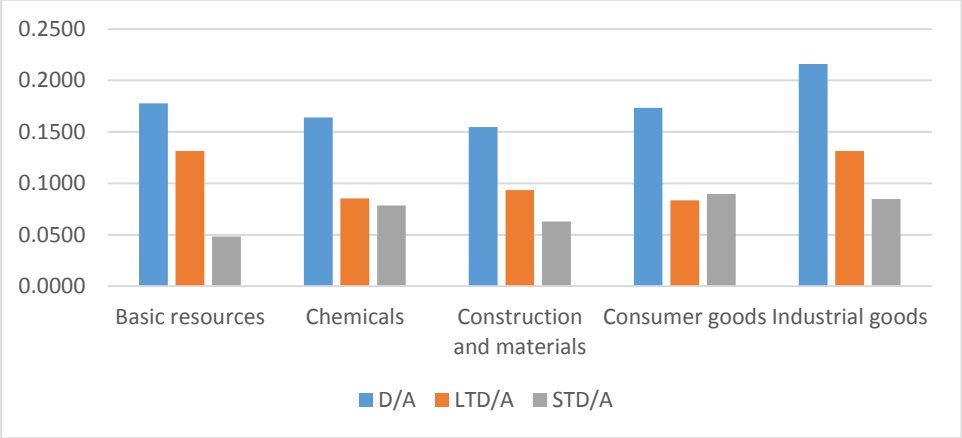
industrial goods use more debt compared to other sectors mainly because of the need for the huge machinery in which they invest for the production of industrial goods. The basic resources sector's debt ratios are next to the industrial goods debt ratios in order of ranking and these firms invest in large machinery (capital expenditure) for the extraction of the resources. The analysis shows that both industrial goods and basic resources sectors use much more long-term debt. They invest more in capital expenditure and it is advisable to finance it by long-term debt where the repayment is spread over a long period of time, usually the lifetime of the machinery or equipment. The returns on such investments are realised over the life time of the asset.

Figure 14: Profitability ratios for the sub-sectors over the period



Source: Author's computation from the data sample

Figure 15: Debt ratios for different sub-sectors



Source: Author's computation from the sample data

4.3 REGRESSION RESULTS

This section firstly presents the results of the Hausman (1978:1251) specification tests and recommends on the regression model (fixed or random effects) to be used in the study. Secondly it presents the regression outputs and discusses the empirical findings on the impact of capital structure on profitability in industrial firms. The main results cover the whole sample as well as for small and large firms, for different profitability indicators and debt to asset ratios. Thirdly, this section conducts robustness tests, to evaluate the sensitivity of the results to a number of considerations such as different sub sectors and an alternative panel estimation method (the pooled OLS method).

Table 3: Hausman test: Whole sample

	Coefficients			
	(b)	(B)	(b-B) sqrt(diag(V b-V_B))	
	fixed	random	Difference	S.E
da	-25.24753	-18.08588	-7.16	2.9572
growth	.0818288	.0828726	-.001	
size	-11.36777	-3.452746	-7.92	1.699

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 28.07
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Source: Author's computation

.

Table 3 shows that the p-values of the Hausman test are statistically significant at a 1% level for the total debt to asset ratios and ROA for the whole sample. Therefore, the null hypothesis is rejected in favour of the FE model. The FE model is therefore used in this study. The choice of the FE model is intuitive given the nature of data which is likely to contain unobservable firm specific effects which might affect firm profits. Also, tests for the sample for small firms in Table 26 and large sample in Table 27 have p-values below 0.05 and thus confirm the FE model as the suitable one in this study.

4.3.1 Results for the whole sample

Table 4 reports on the regression results of the full sample on the effects of DA, LTDA and STDA to the firms' net profit using the fixed effects (within) regression model. The results indicate a negative relationship between DA and NPR. The co-efficient of DA (-10.2) is negative and significant at a 10% significance level (Model 1). This suggests that the increase in total debt is associated with the decrease in net profits. This could be attributed to the costs of debt which has a direct impact in reducing the net profits through payment of interest obligations to debt providers. The results also show a negative but weak relationship between LTDA and NPR, as well as STDA and NPR. Growth displays a positive and significant effect on profitability: a unit growth of the company raises profits by 0.6 units. This is theoretically expected since the growth is measured by the change in sales which positively influences profitability. Unexpectedly, firm size is negatively and significantly related to NPR at 5% level. This may reflect diseconomies of scale which are sometimes found in large firms, possibly suggesting that large firms have an influence on the results. From the analysis, it can be concluded that debt negatively affects a firm's net profit.

Table 4: Fixed effects regression results for all firms: Effects of debt / asset ratios on net profit ratio

Dependent variable: NPR

Variable	Model 1	Model 2	Model 3
DA	-10.702		
	(0.073)*		
LTDA		-5.4398	
		(0.390)	
STDA			-11.445
			(0.170)
Growth	0.583	0.584	0.578
	(0.000)***	(0.000)***	(0.000)***
Size	-5.295	-5.248	-6.091
	(0.012)**	(0.015)**	(0.004)***
Constant	45.12	43.424	49.488
	(0.003)***	(0.001)***	(0.001)***
Observations	510	510	510
R Sq	0.0539	0.0488	0.0511
F	4.96	4.90	4.92
Prob > F	0.0000	0.0000	0.000

Table 4 reports on fixed effects regression results for the impact of capital structure on net profit ratio. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses and ***, **, * indicate the level of significance at 1%, 5% and 10% respectively.

Table 5 reports on the results on capital structure and ROA for the full sample and the FE regression model was applied. The results indicate a significant negative relationship between total debt (DA) and ROA. The coefficient of DA is negative and statistically significant at 1% level. The increase in debt levels result in a decrease of ROA as debt costs reduce the returns that are realised from the assets invested. From the statistics, the ROA average is 13,2% which is relatively low while the average cost of debt ranges between 8% and 15%. This result corroborates the findings of Abor (2007:364), Ebaid (2009: 483) and Gwatidzo and Ojah (2009: 9) who reported statistically significant negative relationships between DA and ROA and also STDA and ROA. LTDA and ROA results indicate a negative relationship at a 5% level of significance and this evidence proves that

increased long-term debt is costly and erodes the ROA of the firms as well as overriding the tax benefits from the debt. This result is consistent with the findings by Yazdanfar and Öhman (2015:102) and backs up the pecking order theory that postulates that profitable firms tend to use retained earnings to finance their activities. The results also show a negative but insignificant relationship between short-term debt and ROA. The use of short-term debt has no impact on ROA.

Growth of sales positively influences ROA and the effect is significant at a 1% level as expected. But firm size negatively and significantly affects ROA. The result for growth and ROA confirm the findings by Salim and Yadav (2012:161) while the result of the influence of firm size on ROA contradicts their findings.

Table 5: Fixed effects regression results: Effects of debt / asset ratios on ROA

Dependent variable: ROA			
Variable			
	Model 1	Model 2	Model 3
DA	-25.248		
	(0.000)***		
LTDA		-21.965	
		(0.002)***	
STDA			-11.099
			(0.229)
Growth	0.818	0.8248	0.8115
	(0.000)***	(0.000)***	(0.000)***
Size	-11368	-10.603	-12.616
	(0.000)***	(0.000)***	(0.000)***
Constant	95.067	87.562	99.841
	(0.000)***	(0.000)***	(0.000)***
Observations	510	510	510
R Sq	0.1338	0.1244	0.1079
F	8.74	8.45	8.21
Prob > F	0.0000	0.0000	0.0000

Table 5 reports on fixed effects regression results for the impact of capital structure on ROA. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses, ***, **, *indicate the level of significance at 1%, 5% and 10% respectively

Table 6 presents the results of the relationship between capital structure measures (DA, LTDA and STDA) and ROE. The results indicate that all capital structure measures have a positive but insignificant effect on ROE. This implies that debt has a very weak effect on shareholder's returns. This result is consistent with Ebaid (2009:484), Saeedi and Mahmoodi (2011:28) and Marobhe's (2014:97) findings that show an insignificant relationship between capital structure and ROE. On the other hand, the result contradicts the prior findings by Abor (2005:438), Gill *et al*. (2011:10), Salim and Yadav (2012:162) and Moyo et al. (2013b:661) who found a significant positive effect of debt on ROE. Also, the results show a significant positive relationship between growth and ROE implying that an increase in growth results in an increase in ROE. Increase in growth improves the firm's sales thereby increasing the profits available for the shareholders. Firm size has a negative and significant influence on ROE, consistent with the above regression results.

Table 6: Fixed effects regression results: Effects of debt / asset ratios on ROE

Dependent variable: ROE			
Variable	Model 1	Model 2	Model 3
DA	13.923		
	(0.534)		
LTDA		1.8466	
		(0.938)	
STDA			23.985
			(0.443)
Growth	0.1465	0.1466	0.1477
	(0.012)**	(0.012)**	(0.012)**
Size	-19.102	-18.788	-17.705
	(0.016)**	(0.020)**	(0.026)**
Constant	143.148	143.3427	134.304
	(0.008)***	(0.009)***	(0.015)**
Observations	510	510	510
R Sq	0.0281	0.0273	0.0285
F	2.93	2.96	2.95
Prob>F	0.0000	0.0000	0.0000

Table 6 reports on fixed effects regression results of ROE on capital structure and other control variables. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively.

Table 7 presents the results on the relationship between capital structure and EPS. The results exhibit a significant negative relationship between capital structure and EPS. Salim and Yadav (2012:156) found a negative relationship between capital structure and profitability measured by EPS which has also been found in this study. The result also corroborates with Moyo et al.'s (2013b:673) findings where a negative relationship between debt and EPS was found. This result implies that debt affects the share price earnings negatively. As the firms increase their debt, the costs associated with debt eat up the shareholder's earnings, thereby reducing the earnings to be realised by shareholders. Also, too much exposure to debt can increase the firm's risk and that alone can negatively affect the share value of the firm. However, the results are contrary to the findings by Frank and Goyal (2003:217) which show a positive relationship between capital structure and EPS. This can be attributed to the different samples used in the analysis.

According to the signalling theory, debt is signalled as a good sign that the firm is doing well and expecting to have increased cash flows because it is this expectation that underlies the decision to take on more debt. The share price is expected to rise as debt increases since investors read it as a good signal. Therefore, the debt influence in industrial firms in South Africa contradicts the assertions of the signalling theory.

On the other hand, there is a significant (at 1% level) positive relationship between both control variables (growth and size) and EPS. This implies that as the firm experiences growth, the shareholders' earnings also increase. The positive relationship between size and EPS supports the submissions by Frank and Goyal (2003:217) and Ebaid (2009:482) that firm size may influence its performance, as a large firm can have more capacity and capabilities, which may drive profitability.

Table 7: Fixed effects regression results: Effects of debt / asset ratios on EPS

Dependent variable: EPS			
Variable	**Model 1**	**Model 2**	**Model 3**
DA	-1606.54		
	(0.000)***		
LTDA		-1380.73	
		(0.000)***	
STDA			-735.76
			(0.109)
Growth	3.907	3.138	3.054
	(0.000)***	(0.000)***	(0.000)***
Size	489.712	537.142	409.107
	(0.000)***	(0.000)***	(0.000)***
Constant	-2570.42	-3041.48	-2255.578
	(0.001)***	(0.000)***	(0.005)***
Observations	510	510	510
R Sq	0.1031	0.0861	0.0587
F	12.92	12.96	12.57
Prob > F	0.0000	0.0000	0.0000

Table 7 reports on fixed effects regression results of EPS on capital structure and other control variables. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively.

Bringing together the analysis of results for the whole sample, the results indicate that debt has a significant negative influence on the industrial firm's ROA and EPS while it shows no significant impact on ROE and NPR. The use of debt results in declining profits of the industrial companies. These results imply that debt costs erode the tax benefits that are associated with debt. According to the static trade-off theory, the negative effect could be explained by the marginal tax value of tax shields on additional debt which is outweighed by the increase in the present value of financial distress costs.

As the level of debt increases, the interest cover ratio decreases, resulting in the increase in debt costs. Debt providers charge more because of the possibility of high default risks the firm has when it has high debt ratios. According to Moyo (2013:134), high debt costs

can be associated with the credit rating of the firms whereby firms that have higher credit ratings normally incur lower loan spreads, whereas those with poor credit ratings incur higher loan spreads. Firms should always aim for the highest credit rating so that they can keep the borrowing costs at very minimal levels.

The results also show that the use of either long-term or short-term debt has a negative effect on company profitability. This suggests that managers should be indifferent in their choices between short-term debt and long-term debt for financing options because of the same effect they have on profitability.

These findings suggest that industrial firms should rely on internally generated funds or equity for financing since they are regarded as the safest and cheapest source of financing. This supports the pecking order theory. According to this theory, firms should build and reserve financial flexibility until they have sufficient internally generated funds to finance their growth options. From their retained earnings, firms can invest capital expenditure where they will benefit from non-debt tax shields like depreciation which can perfectly substitute tax shield benefits from debt.

4.3.2 Regression results for small firms

The sample was also divided into small and large firms to check if there is any differential effect of capital structure on profitability. Tables 8-11 report on the results of the effects of capital structure on profitability for small firms. The results show that debt ratios (total debt, long-term debt and short-term debt) negatively affect net profit, but that the effects are not significant. Growth plays an important role in determining net profit, as reflected by positive and significant coefficients. Firm size is negative but not significantly related to the net profit of the small firms.

With respect to the relationship between capital structure and ROA, the results show that ROA negatively responds to total debt (DA) and the coefficient is statistically significant at 10 per cent. LTDA has a negative relationship with ROA at a 5% level of significance, implying that as small firms increase their total debt levels or the long-term debt levels, their ROA decline. Long-term debt proves to be costly to small firms. They may face collateral challenges in accessing debt as the debt providers tend to charge more because of their high risk. Degryse, de Goeji and Kappert (2012:431) noted that collateral reduces

bankruptcy costs and credit risk. They also found that collateral is positively correlated to long-term debt. This confirms the findings of Ramachandran and Candasamy (2011:384) who showed that an increase in debt results in a decline of ROA in small sized IT firms in India.

However, the findings of this study reveal that short-term debt is positively but not significantly related to ROA implying that the use of short-term debt in the firm's capital structure does not have any impact on the small firm's ROA. The findings suggest that small firms rely more on internal financing thereby supporting the pecking order theory which postulates that profitable firms rely on internal financing. Concerning the two control variables, growth positively affects ROA while firm size exerts a negative influence.

Table 8: Fixed effects regression results: Effects of debt / asset ratio on NPR – Small companies

Variable	Model 1	Model 2	Model 3
DA	-1.329		
	(0.832)		
LTDA		-1.326	
		(0.840)	
STDA			-0.30
			(0.975)
Growth	0.4206	0.4193	0.042
	(0.007)***	(0.007)**	(0.007)**
Size	-2.9286	-2.910	-2.984
	(0.215)	(0.220)	(0.205)
Constant	24.573	24.367	24.715
	(0.103)	(0.108)	(0.103)
Observations	235	235	235
R Sq	0.0434	0.0434	0.0432
F	2.77	2.77	2.90
Prob > F	0.0001	0.0001	0.0000

Table 8 reports on fixed effects regression results of NPR on capital structure and other control variables. Model 1 uses total debt to asset ratio Model, 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively.

Table 9: Fixed effects regression results: Effects of debt / asset ratio on ROA – Small companies

Variable	Model 1	Model 2	Model 3
DA	-12.251		
	(0.079)*		
LTDA		-20.805	
		(0.004)***	
STDA			15.518
			(0.146)
Growth	0.0482	0.0469	0.457
	(0.006)***	(0.006)**	(0.009)**
Size	-12.010	-11.39	12.270
	(0.000)***	(0.000)***	(0.000)***
Constant	91.065	87.215	89.529
	(0.000)***	(0.000)***	(0.000)***
Observations	235	235	235
R Sq	0.1452	0.1660	0.1412
F	8.71	9.05	8.30
Prob > F	0.0000	0.0000	0.0000

Table 9 reports on fixed effects regression results of ROA on capital structure and other control variables. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively

Table 10 shows the relationship between debt and ROE. The results show a positive but not significant relationship between debt (total debt, long-term debt and short-debt) and ROE. The implication of the results is that although the small companies use some debt in their capital structure, it does not have any impact on the ROE. Both control variables (growth and size of small firms) have no significant impact on ROE.

Table 10: Fixed effects regression results: Effects of debt / asset ratio on ROE – Small companies

Variable	Model 1	Model 2	Model 3
DA	35.334		
	(0.359)		
LTDA		13.380	
		(0.741)	
STDA			53.914
			(0.358)
Growth	0.1211	0.1242	0.119
	(0.205)	(0.195)	(0.214)
Size	-13.056	12.389	-10.936
	(0.368)	(0.396)	(0.049)
Constant	90.489	90.995	79.561
	(0.328)	(0.328)	(0.392)
Observations	235	235	235
R Sq	0.0158	0.0123	0.0158
F	2.16	2.21	2.31
Prob > F	0.0024	0.0019	0.0010

Table 10 reports on fixed effects regression results of ROE on capital structure and other control variables. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively

Table 11 presents results of the relationship between capital structure and EPS. As shown in the table, the results indicate that total debt (DA) and short-term debt have no significant relationship with EPS. This suggests that the issue or increase in short-term debt has no impact on the share price. However, the table shows a negative relationship between long-term debt and the EPS of small firms. The relationship is at a 10% significance level. The result implies that EPS decreases with an increase in leverage. The increase of interest payments due to the increased debt reduces the profits, thereby reducing earnings available for the shareholders.

Table 11: Fixed effects regression results: Effects of debt / asset ratio on EPS – Small companies

Variable	Model 1	Model 2	Model 3
DA	-257.37		
	(0.314)		
LTDA		-451.17	
		(0.092)*	
STDA			355.49
			(0.362)
Growth	1.268	1.241	1.213
	(0.047)**	(0.050)**	(0.057)*
Size	3.888	17.661	-1.173
	(0.968)	(0.855)	(0.990)
Constant	612.608	197.13	244.36
	(0.647)	(0.748)	(0.692)
Observations	235	235	235
R Sq	0.0232	0.0318	0.0223
F	8.04	8.20	8.0
Prob > F	0.0000	0.0000	0.0000

Table 11 reports on fixed effects regression results of EPS on capital structure and other control variables. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively

For small firms, generally long-term debt negatively and significantly affects ROA and EPS while total and short-term debts have no significant effect on profitability. This could imply that it is expensive for small firms to use long-term debt because debt providers view small firms as being associated with high risk and bankruptcy, and therefore they charge more on debt. Due to these unfavourable borrowing costs, small firms tend to rely more on equity financing or retained earnings than debt.

According to Stewart, Smith, Ikenberry, Nayer, McVey and Anda (2005), small and fast-growing firms try to avoid the under-investment problem as well maintain their financial flexibility. This results in them opting for using retained earnings and equity for financing. Therefore, they become less geared. Also, small firms and growing firms are known to generate less profit because of the growth expenses they normally incur and therefore

they are left with minimum tax shield benefits. They benefit from non-debt tax shields from their heavy capital investment and they perfectly substitute debt tax shields.

In order to build up reserves for internally generated funds, small companies are expected not to pay dividends or have sticky dividend policies. If they reduce their dividend pay-outs, there will be room for small firms to build up their pool of retained earnings.

4.3.3 Results for large firms

According to Eriotis *et al*. (2007:325), large firms are usually more diversified, making them to be able to manage risk better. Their probability of default is likely to be low and so banks are more willing to lend money to large firms. Larger firms may be able to negotiate transaction costs and interest rates on debt. Therefore, the large firms' debt ratios are expected to be positively related to the firm's profitability if they can access debt at lower rates. Tables 12-15 report on the regression results of the relationship between the capital structure and profitability of large companies.

Table 12 reports on the effects of debt on net profit and the results indicate a negative relationship between total debt (DA) and net profit (NPR) at a 5% level of significance. The increase in total debt in large firms reduces the net profits. Interest obligations increase as the debt increases, thereby reducing the net profit. However, long-term debt and short-term debt have a negative but not significant relationship with the firm's net profit. Growth is positively related to net profit at a 5% significance level. However, size is negatively related to the firm's net profit at a 5% significance level and this is possibly due to diseconomies of scale.

Table 12: Fixed effects regression results: Effects of debt / asset ratios on NPR – Large companies

Variable	Model 1	Model 2	Model 3
DA	-25.50		
	(0.024)**		
LTDA		-13.25	
		(0.281)	
STDA			-23.11
			(0.110)
Growth	0.892	0.095	0.086
	(0.007)***	(0.005)**	(0.011)**
Size	-7.919	-7.147	-10.20
	(0.030)**	(0.064)**	(0.008)***
Constant	71.052	61.89	84.89
	(0.008)**	(0.028)**	(0.003)***
Observations	256	256	256
R Sq	0.0788	0.0627	0.0685
F	6.08	5.79	6.02
Prob > F	0.0000	0.0000	0.0000

Table 12 reports on fixed effects regression results of NPR on capital structure and other control variables. Model 1 uses the total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively.

In terms of the effects of capital structure on the ROA of large firms, the results in Table 13 reveal a negative and significant impact of capital structure on ROA. This is the case for all the measures of capital structure: total debt (DA), LTDA and STDA. The study shows that any form of debt issued by large firms results in the decline of the returns realised on the utilisation of assets (ROA). This result is consistent with the findings by Ramachandran and Candasamy (2011:388) who noted that large IT firms never relied on debt to fund their capital structure, as the use of more debt tends to reduce the profits. In fact, the results suggest that large firms tend to use internal financing, as proposed by the pecking order theory. Growth is positive and significantly related to ROA, while size has a negative effect on ROA.

Table 13: Fixed effects regression results: Effects of debt / asset ratios on ROA – Large companies

Variable	Model 1	Model 2	Model 3
DA	-45.055		
	(0.000)***		
LTDA		-27.85	
		(0.037)**	
STDA			-34.667
			(0.027)**
Growth	0.1476	0.158	0.144
	(0.000)***	(0.000)***	(0.000)**
Size	-10.663	-8.871	-14.22
	(0.006)***	(0.033)**	(0.001)***
Constant	99.55	80.686	120
	(0.001)***	(0.008)***	(0.000)***
Observations	256	256	256
R Sq	0.1628	0.1276	0.1296
F	9.31	8.47	8.66
Prob > F	0.0000	0.0000	0.0000

Table 13 reports on fixed effects regression results of ROA on capital structure and other control variables. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively

Table 14 reports on the regression results of capital structure effects on ROE. The results show that capital structure has a negative but insignificant impact on the returns available to the shareholders (ROE). The issue or increase in any form of debt does not significantly impact ROE. These results are similar to the results shown for the whole sample. Growth has a significant and positive impact on ROE for large firms, while firm size indicates a negative and significant relationship at 1% with ROE.

Table 14: Fixed effects regression results: Effects of debt / asset ratios on ROE – Large companies

Variable	Model 1	Model 2	Model 3
DA	-21.54		
	(0.299)		
LTDA		-16.52	
		(0.463)	
STDA			-12.141
			(0.647)
Growth	0.196	0.201	0.195
	(0.002)***	(0.001)***	(0.000)***
Size	-27.00	-25.83	-28.36
	(0.000)***	(0.001)***	(0.002)***
Constant	219.13	208.061	255.913
	(0.000)***	(0.000)***	(0.000)***
Observations	256	256	256
R Sq	0.1189	0.1168	0.1155
F	6.37	6.26	6.35
Prob > F	0.0000	0.0000	0.0000

Table 14 reports on fixed effects regression results of ROE on capital structure and other control variables. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively

Table 15 reports on the capital structure impact on EPS for the large industrial firms. The table shows that the growth of total debt (DA) and long-term debt significantly reduces firms' EPS. The debt costs in the form of interest payments reduce the earnings available to the shareholders. As for short-term debt and EPS, the results reveal a negative but not significant relationship. The increase in short-term debt in large firms does not affect the earnings available for the shareholders.

At a 1% level of significance, growth and size have a positive and significant relationship with EPS. As the large firms experience some growth and expansion, the current shareholders seem to gain from the expansion of the firm. Firm expansion improves the

earnings available to the shareholders, thereby increasing earnings that each current shareholder will receive.

Table 15: Fixed effects regression results: Effects of debt / asset ratios on EPS – Large companies

Variable	Model 1	Model 2	Model 3
DA	-3644.66		
	(0.000)***		
LTDA		-3428.48	
		(0.000)***	
STDA			-1207.14
			(0.155)
Growth	6.389	7.855	6.993
	(0.000)***	(0.000)***	(0.000)***
Size	1076.47	1334.74	910.516
	(0.000)***	(0.000)***	(0.000)***
Constant	6501.93	8738.57	-5885. 193
	(0.000)***	(0.000)***	(0.000)***
Observations	256	256	256
R Sq	0.2449	0.2155	0.1368
F	14.73	13.15	13.97
Prob > F	0.0000	0.0000	0.0000

Table 15 reports on fixed effects regression results of EPS on capital structure and other control variables. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses ***, **, *indicate the level of significance at 1%, 5% and 10% respectively

Although large firms are known to have an advantage in accessing debt when compared to smaller firms, they do not seem to rely on it as expected. This is possibly because of the depressing effects on large firm's profits, especially when it reaches high levels. Debt negatively affects the profitability of large firms. These findings suggest that large firms support the pecking order theory which asserts that debt is negatively related to profitability. The theory implies that value firms are less leveraged because they use their retained earnings for financing. The results for large firms are consistent with the results of the full sample.

4.3.4 Robustness and sensitivity tests

This section analyses the sensitivity of the results to some robustness tests:- estimations for the full sample considering the lagged values of the capital structure ratios, estimations with a dummy variable to cater for the financial crisis period, estimations in sub-sectors and alternative estimation methods. For sub-sectors, five sub-sectors are considered and for alternative estimation methods, the pooled OLS regression model is applied on the whole sample.

4.3.5 Regression results: full sample – Lagged values for capital structure

The relationship between capital structure and firm profitability is likely to display reverse causality. Theoretically, capital structure is likely to affect performance of firms, but at the same time it is also possible that firm performance could be a driver of capital structure, which may induce simultaneity bias. To overcome this possibility, the study considered the lagged values of debt to asset ratio to control for potential endogeneity between debt to asset ratios and profitability. The results are reported in Table 16 andTable 16 show that debt negatively affects profitability. However short-term debt exhibits a positive impact on ROE. This sensitivity test did not alter the conclusion of the baseline case of the fixed effects model that debt generally impacts firm performance negatively. This suggest that debt is costly to companies as a way of financing.

4.3.6 Regression results: full sample – with dummy variable to capture for financial crisis

The study sample covers the period 2006-2015, which includes the global financial crisis of 2007-2008. Firm performance of a number of firms was affected by the crisis, which could affect the results in this study. To control for the effects of the global financial crisis, this study included a dummy variable (fin crisis) which takes a value of 1 for 2007 and 2008, the years of global financial crisis and zero for all the other years. The regression results are presented in Table 17. The dummy variable is significant for regressions on NPR and ROA. The results also show that total debt and long-term debt negatively and significantly affect firm profitability, while short-term debt has no significant effect on profitability. This is in line with the main results. Therefore, our conclusion of a general negative relationship between debt to asset ratios and firm performance still holds.

Table 16:Fixed effects regression results for all firms (lagged debt asset ratio) - Effects of debt /asset ratios on profitability

	NPR			ROA			ROE			EPS		
Variables	**Model 1**	**Model 2**	**Mode3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
DA_1	-0.535			-0.981			28.044			-366.007		
	(0.914)			(0.859)			(0.136)			(0.184)		
LTDA_1		-3.803			-7.0634			10.0711			-206.19	
		(0.491)			(0.249)			(0.629)			(0.500)	
STDA_1			6.848			12.972			52.462			-521.484
			(0.397)			(0.148)			(0.096)*			(0.244)
Growth	0.0625	0.0626	0.064	0.084	0.0844	0.0865	0.153	0.148	0.157	3.151	3.211	3.121
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.011)**	(0.013)**	(0.009)***	(0.000)***	(0.000)***	(0.000)***
Size	-5.081	-4.810	-4.878	-11.719	-11.210	-11.329	-19.764	-19.285	-16.787	489.886	489.438	456.435
	(0.021)**	(0.031)**	(0.026)**	(0.000)***	(0.000)***	(0.000)***	(0.017)**	(0.022)**	(0.043)**	(0.000)***	(0.000)***	(0.000)***
Constant	41.704	43.424	39.70	93.018	90.117	89.184	145.22	146.019	125.89	-2800.13	-2841.16	-2596
	(0.006)***	(0.009)***	(0.009)***	(0.000)***	(0.000)***	(0.000)***	(0.011)**	(0.011)**	(0.029)**	(0.001)***	(0.001)***	(0.002)***
Observ-ations	502	502	502	502	502	502	502	502	502	502	502	502
R Sq	0.0495	0.0505	0.0510	0.1040	0.1066	0.1081	0.0319	0.0276	0.0335	0.0597	0.0569	0.0588
F	4.84	4.90	4.83	8.09	8.06	7.90	2.87	2.90	2.87	12.37	12.51	12.37
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table reports on fixed effects regression results (lagged debt to asset ratio) for all firms on the impact of capital structure on profitability. Model 1 uses the lagged total debt to asset ratio, Model 2 uses lagged long-term debt to asset ratio and Model 3 uses lagged short-term debt to asset ratio. Lagged debt to asset ratios are depicted by an underscore _1. P-values are shown in parentheses and ***, **, * indicate the level of significance at 1%, 5% and 10% respectively.

Table 17:Fixed effects regression results for all firms (with dummy variable for financial crisis) - Effects of debt /asset ratios on profitability

	NPR			ROA			ROE			EPS		
Variables	**Model 1**	**Model 2**	**Mode 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
DA	-11.961			-26.748			15.2058			-1602.55		
	(0.044)**			(0.000)***			(0.499)			(0.000)***		
LTDA		-6.142			-22.788			2.546			-1375.41	
		(0.329)			(0.001)***			(0.915)			(0.000)***	
STDA			-12.598			-12.398			25.176			-725.16
			(0.129)			(0.177)			(0.422)			(0.115)
Growth	0.0467	0.0473	0.0465	0.068	0.0694	0.0683	0.158	0.158	0.159	3.134	3.222	3.158
	(0.004)***	(0.003)***	(0.0004***	(0.000)***	(0.000)***	(0.000)***	(0.009)***	(0.010)***	(0.009)***	(0.000)***	(0.000)***	(0.000)***
Size	-3.148	-3.176	-4.087	-8.808	-8.178	-10.358	-21.290	-20.850	-19.776	482.916	521.438	390.676
	(0.157)	(0.162)**	(0.068)*	(0.000)***	(0.001)***	(0.000)***	(0.012)**	(0.015)**	(0.019)**	(0.000)***	(0.000)***	(0.002)***
Fincrisis	3.075	2.951	2.992	3.666	3.454	3.371	-3.134	-2.937	3.091	-9.736	-22.368	-27.520
	(0.006)***	(0.008)***	(0.007)***	(0.002)***	(0.004)***	(0.006)***	(0.454)	(0.482)	(0.459)	(0.871)	(0.711)	(0.653)
Constant	30.102	28.791	35.326	77.168	70.434	83.896	158.452	157.91	148.935	-2522.89	-2930.56	-2125.31
	(0.050)**	(0.065)*	(0.023)**	(0.000)***	(0.000)***	(0.000)***	(0.006)***	(0.007)***	(0.011)**	(0.002)***	(0.001)***	(0.014)**
Observat-ions	510	510	510	510	510	510	510	510	510	510	510	510
R Sq	0.0698	0.0635	0.0662	0.1511	0.1399	0.1226	0.0293	0.0284	0.0297	0.1032	0.0864	0.0592
F	4.92	4.84	4.86	8.65	8.34	8.10	2.94	2.96	2.96	12.89	12.94	12.55
Prob >F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table reports on fixed effects regression results (with dummy variable for financial crisis) for all firms on the impact of capital structure on profitability. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt to asset ratio. P-values are shown in parentheses and ***, **, * indicate the level of significance at 1%, 5% and 10% respectively.

4.3.7 Regression results on sub-sectors

Regressions are done on five different sub-sectors from the sample, namely: basic materials sector, chemicals sector, construction and materials, consumer goods sector and the industrial goods sector. The results are shown in Tables 16-19 below. Theorists widely believe that industry factors are more important to the firms' capital structure and the available evidence shows that there is a wide variation in financial structures. Mackay and Philips (2005:1434) examine extensive cross-sectional variations in the financial leverage of 315 competitive manufacturing industries and found that most of the variations in financial structure arise within industries.

Basic resources sector

Table 18 shows that the total debt to asset ratio (DA) negatively affects NPR and the effect is significant at 10% in the basic resources sector while long-term debt and short-term debt have no significant effect on NPR. On ROA, total debt and long-term debt significantly affect ROA at a 1% and 5% level of significance but short-term debt has no significant effect on ROA. All debt however has an insignificant effect on ROE. EPS is negatively affected by all forms of debt and the effect is significant. Growth is positively related to profitability (NPR and ROA) while size does not matter. Generally, debt ratios have a negative impact on profitability ratios in the basic resource sub-sector, despite the fact that the basic resources sector normally invests in large machinery and equipment for the extraction and processing of natural resources which would ordinarily require debt. This suggests that the sector should rely on either internally generated funds or equity to finance their growth options or capital expenditures. These results are consistent with the benchmark results in the full sample.

Chemicals sector

Results for the chemicals sector show that total debt and long-term debt have a significant and negative relationship with NPR, ROA and ROE, but that it is not significant for EPS. No significant relationship between short-term debt and all four measures of profitability was observed, suggesting that the sector relies more on long-term debt. Growth of firms generally raises profitability (NPR and ROA), but the relationship is weak for ROE and

EPS. However, the size of the firm negatively influences profitability, possibly reflecting diseconomies of scale which could arise when the firm grows large.

Construction and materials sector

For the construction and materials sector, the results confirm a positive and significant relationship of short-term debt and profitability (NPR and ROA). This is intuitive considering that the construction and materials subsector uses more short-term debt in their financing (order financing, trade financing and working capital). The returns realised from the use of assets and the net profits realised are enough to cover for the costs associated with the short-term debt. Construction firms are normally paid after completing different stages of projects, and would need bridging finance to cover costs. However, a weak but positive relationship is shown for short-term debt on ROE and EPS. As for total debt (DA) and long-term debt, they exhibit a negative influence on NPR, ROA and EPS with the exception of ROE where the influence is positive but insignificant. Growth is positively related to profitability while firm size reveals a negative relationship.

Consumer goods sector

In the consumer goods sector, there seems to be no significant relationship between capital structure (DA, LTDA, STDA) and profitability (NPR, ROA, ROE, EPS). These findings suggest that firms in the consumer goods sector tend to use internal financing instead of debt. Growth does not seem to matter for profitability, while firm size has a negative influence on profitability (ROA and ROE).

Industrial goods sector

In the industrial goods sub-sector, total debt, long-term debt and short-term debt ratios exhibit a negative influence on profitability (especially ROA). Although the industrial goods sector invests in heavy equipment and machinery for the production of the goods, the results suggest that the sector tends to rely on other sources of financing since the use of debt reduces profitability. Growth in the industrial goods sub sector strongly and positively influences the firm's profitability, while firm size has no significant effect.

From the results obtained from different sub-sectors, it can be concluded that increase in debt to asset ratios generally reduces profitability. This is despite there being a few cases

in the construction and materials sector where some debt ratios (short-term debt) exhibit positive effects on ROA. Across the full sample, short-term debt had a negative impact on all the profitability ratios.

Table 18: Regression results all sub-sectors: Capital structure effects on NPR

	Basic resources			Chemicals			Construction & materials			Consumer goods			Industrial goods		
	Model 1	Model2	Model3	Model1	Model2	Model3	Model1	Model2	Model3	Model1	Model2	Model3	Model1	Model2	Model3
Variables															
DA	-39.768			-25.533			-10.873			3.402			4.556		
	(0.073)*			(0.044)**			(0.304)			(0.670)			(0.426)		
LTDA		-48.951			-22.60			-13.998			7.773			11.745	
		(0.122)			(0.067)*			(0.072)*			(0.432)			(0.036)**	
STDA			-30.797			-2.928			28.130			-2.005			-18.606
			(0.327)			(0.876)			(0.053)*			(0.819)			(0.037)**
Growth	0.136	0.127	0.146	-0.0054	-.0258	-0.179	0.0256	0.291	0.0291	-0.722	-0.073	-0.0685	0.083	0.0801	0.0788
	(0.060)*	(0.083)*	(0.046)**	(0.880)	(0.473)	(0.659)	(0.058)*	(0.046)**	(0.030)**	(0.059)*	(0.055)*	(0.070)*	(0.00)***	(0.00)***	(0.00)***
Size	-12.277	-9.416	-11.777	-2.181	-1.189	-0.367	-7.491	-7.074	-6.913	-3.251	-4.193	-3.201	-3.597	-4.350	-4.350
	(0.170)	(0.287)	(0.201)	(0.566)	(0.751)	(0.926)	(0.002)***	(0.003)***	(0.003)***	(0.183)	(0.135)	(0.201)	(0.175)	(0.094)*	(0.272)
Constant	105.85	84.312	96.457	27.72	18.503	10.81	57.55	54.343	50.127	31.09	37.565	31.479	27.493	31.953	24.581
	(0.111)	(0.194)	(0.155)	(0.323)	(0.497)	(0.708)	(0.000)***	(0.001)***	(0.002)***	(0.063)*	(0.05)**	(0.074)*	(0.112)	(0.061)*	(0.141)
Observations	98	98	98	40	40	40	96	96	96	118	118	118	158	158	158
R Sq	0.0932	0.0844	0.0687	0.1251	0.1061	0.0098	0.1869	0.2081	0.2128	0.0522	0.0562	0.0510	0.1502	0.1730	0.1726
F	4.12	4.08	4.16	3.49	3.55	2.21	5.72	7.48	5.93	5.11	6.59	4.59	4.19	4.34	3.98
Prob>F	0.0002	0.0002	0.0002	0.026	0.0247	0.1052	0.0002	0.0002	0.0000	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000

Table 19: Regression results all sub-sectors: Capital structure effects on ROA

	Basic resources			Chemicals			Construction			Consumer goods			Industrial goods		
	Model 1	**Model2**	**Model3**	**Model1**	**Model2**	**Model3**	**Model1**	**Model2**	**Model3**	**Model1**	**Model2**	**Model3**	**Model1**	**Model2**	**Model3**
Variables															
DA	-60.343			-32.246			-17.467			-10.350			-14.426		
	(0.008)***			(0.049)**			(0.274)			(0.289)			(0.039)**		
LTDA		-71.726			-29.667			-26.739			12.269			-13.206	
		(0.027)**			(0.063)*			(0.022)**			(0.311)			(0.055)*	
STDA			-49.226			-1.256			60.094			-22.166			-2.080
			(0.127)			(0.876)			(0.006)***			(0.037)**			(0.851)
Growth	0.176	0.163	0.1924	0.069	0.0432	0.0513	0.0400	0.042	0.0469	0.023	0.0162	0.0308	0.0873	0.09	0.086
	(0.016)**	(0.029)**	(0.011)**	(0.145)	(0.35)	(0.331)	(0.050)**	(0.037)**	(0.018)**	(0.518)	(0.724)	(0.495)	(0.000)***	(0.000)***	(0.000)***
Size	-20.410	-16.078	-19.828	-12.874	-11.667	-10.50	-15.744	-14.896	-14.42	-10.168	-12.669	-12.718	-3.754	-4.09	-5.558
	(0.025)**	(0.075)*	(0.037)**	(0.012)**	(0.021)**	(0.047)**	(0.000)***	(0.000)***	(0.000)***	(0.001)***	(0.000)***	(0.000)***	(0.242)	(0.200)	(0.077)*
Constant	171.664	138.694	158.813	110.868	99.652	88.730	119.002	113.063	103.47	88.585	103.25	106.451	38.36	39.168	47.381
	(0.011)**	(0.037)**	(0.023)**	(0.004)***	(0.007)***	(0.022)**	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.067)*	(0.062)*	(0.023)**
Observations	98	98	98	40	40	40	96	96	96	118	118	118	158	158	158
R Sq	0.1761	0.1543	0.1280	0.2423	0.2330	0.1469	0.2731	0.3078	0.3277	0.1289	0.1281	0.1557	0.1505	0.1469	0.1241
F	9.00	8.40	4.16	3.23	3.46	2.91	10.39	11.78	8.32	8.39	7.35	8.96	5.88	6.45	6.10
Prob>F	0.0000	0.0000	0.0000	0.0346	0.0273	0.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 20: Regression results all sub-sectors: Capital structure effects on ROE

	Basic resources			Chemicals			Construction			Consumer goods			Industrial goods		
	Model 1	Model2	Model3	Model1	Model2	Model3	Model1	Model2	Model3	Model1	Model2	Model3	Model1	Model2	Model3
Variables															
DA	-4.097			-43.141			80.9995			28.042			-4.235		
	(0.965)			(0.069)*			(0.114)			(0.152)			(0.682)		
LTDA		-56.469			-37.97			39.940			32.451			-2.664	
		(0.666)			(0.099)*			(0.136)			(0.181)			(0.794)	
STDA			47.298			-5.41			16.052			8.354			-3.701
			(0.715)			(0.876)			(0.750)			(0.699)			(0.820)
Growth	0.376	0.360	0.369	0.106	0.0717	0.085	0.0893	0.082	0.083	-0.0845	-0.0742	-0.065	0.137	0.1373	0.136
	(0.212)	(0.235)	(0.221)	(0.124)	(0.289)	(0.263)	(0.049)**	(0.074)**	(0.075)**	(0.362)	(0.419)	(0.485)	(0.000)***	(0.000)***	(0.000)***
Size	-34.850	-34.376	-31.208	-15.817	-14.133	-12.768	-23.906	-24.335	-22.244	-24.94	-27.98	-22.421	4.976	4.7397	4.488
	(0.351)	(0.351)	(0.411)	(0.032)**	(0.051)*	(0.089)*	(0.002)***	(0.003)***	(0.007)***	(0.005)***	(0.000)***	(0.00)***	(0.299)	(0.318)	(0.331)
Constant	261.953	265.31	232.383	135.557	119.897	107.123	164.726	176.71	165.42	188.021	-211.14	174.46	-18.001	-17.009	-15.363
	(0.344)	(0.326)	(0.405)	(0.013)**	(0.024)**	(0.052)*	(0.002)***	(0.001)***	(0.003)***	(0.00)***	(0.00)***	(0.00)***	(0.564)	(0.585)	(0.614)
Observations	98	98	98	40	40	40	96	96	96	118	118	118	158	158	158
R Sq	0.0302	0.0323	0.0317	0.2082	0.1934	0.1238	0.1921	0.1632	0.1414	0.1560	0.1538	0.1402	0.1270	0.1265	0.1263
F	1.77	1.81	1.75	2.01	2.05	1.74	5.40	7.72	8.77	5.28	5.52	4.27	16.80	17.00	14.57
Prob>F	0.0859	0.0779	0.0912	0.1314	0.1266	0.1788	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 21: Regression results all sub-sectors: Capital structure effects on EPS

	Basic resources			Chemicals			Construction			Consumer goods			Industrial goods		
	Model 1	**Model2**	**Model3**	**Model1**	**Model2**	**Model3**	**Model1**	**Model2**	**Model3**	**Model1**	**Model2**	**Model3**	**Model1**	**Model2**	**Model3**
Variables															
DA	-4220.35			-2868.47			-2214.36			-284.029			225.70		
	(0.000)***			(0.147)			(0.000)***			(0.657)			(0.281)		
LTDA		-5513.33			-2350.25			-1593.44			-173.82			286.52	
		(0.000)***			(0.222)			(0.000)***			(0.827)			(0.165)	
STDA			-2956.51			-734.69			1320.20			-206.69			-170.18
			(0.049)**			(0.798)			(0.118)			(0.769)			(0.606)
Growth	10.645	9.578	11.715	6.186	3.943	5.113	0.374	0.571	0.694	3.422	3.255	3.273	1.362	1.302	1.328
	(0.001)***	(0.004)***	(0.001)***	(0.282)	(0.487)	(0.414)	(0.601)	(0.426)	(0.368)	(0.261)	(0.281)	(0.278)	(0.033)**	(0.042)**	(0.040)**
Size	194.329	499.044	269.583	2939.21	3058.35	3129.12	99.518	132.18	100.653	564.134	571.78	528.26	198.094	194.275	229.085
	(0.623)	(0.210)	(0.535)	(0.000)***	(0.000)***	(0.000)***	(0.418)	(0.289)	(0.450)	(0.005)***	(0.012)**	(0.009)***	(0.042)**	(0.043)**	(0.015)**
Constant	-40.667	-2292.738	-1215.074	-19421.3	-20529.25	-21192.88	-34.745	-455.171	-479.614	-3280.64	-3366.64	-3061.03	-1039.96	-1002.86	-1181.77
	(0.989)	(0.431)	(0.704)	(0.000)***	(0.000)***	(0.00)***	(0.966)	(0.583)	(0.596)	(0.015)**	(0.029)**	(0.031)**	(0.100)	(0.111)	(0.057)*
Observations	98	98	98	40	40	40	96	96	96	118	118	118	158	158	158
R Sq	0.2763	0.2513	0.1558	0.4954	0.4858	0.4627	0.1654	0.1563	0.0373	0.0894	0.0881	0.0884	0.0792	0.0843	0.0733
F	10.86	9.92	9.05	1.87	3.24	4.13	12.16	11.65	10.25	7.56	8.34	8.82	17.97	17.19	16.55
Prob>F	0.0000	0.0000	0.0000	0.1544	0.0343	0.0136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0140	0.0000

4.3.8 Alternative estimation method: The pooled OLS regressions is considered

To check for consistency and robustness of the results, the study also applied the pooled OLS regression model on the full sample. Tables 20-23 report on the results of the pooled OLS regression model for the impact of capital structure on the company profitability of industrial firms. Debt ratios display inverse and generally significant relationships with profitability indicators (especially ROA and EPS) except for ROE where the relationship is positive but insignificant. This is consistent with the regression outputs of the fixed effects model. In both of the regression models applied, growth positively and significantly influenced profitability in industrial firms. Firm size shows a positive and significant influence on EPS, but a negative influence on ROA and ROE in the pooled OLS model. The results for the control variables are generally consistent with the main results of the FE model. The only difference found is on NPR where firm size has a positive effect under the pooled OLS model while it shows a negative and significant impact under the FE model.

Table 22: Regression results (pooled OLS): Capital structure effects on NPR – Full sample

Variables	Model 1	Model 2	Model 3
DA	-2.474		
	(0.502)		
LTDA		-1.45	
		(0.730)	
STDA			-5.068
			(0.476)
Growth	0.0645	0.0645	0.0641
	(0.000)***	(0.000)***	(0.000)***
Size	2.101	2.059	2.0069
	(0.004)***	(0.005)***	(0.005)***
Constant	-7.384	-7.393	-6.812
	(0.139)	(0.141)	(0.173)
Observations	510	510	510
R Sq	0.0381	0.0374	0.0382
F	6.68	6.56	6.70
Prob > F	0.0002	0.0002	0.0002

Table 20 reports on the results pooled ordinary least of squares model for the impact of capital structure on all the industrial firms using net profit ratio as the measure of profitability. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and

Model 3 uses short-term debt ratio. P-values are shown in parentheses and ***, **, * indicate the level of significance at 1%, 5% and 10% respectively

Table 23: Regression results (pooled OLS): Capital structure effects on ROA – Full sample

Variables	Model 1	Model 2	Model 3
DA	-4.861		
	(0.284)		
LTDA		-10.2397	
		(0.045)**	
STDA			11.223
			(0.200)
Growth	0.0801	0.0809	0.0801
	(0.000)***	(0.000)***	(0.000)***
Size	0.8232	1.0276	0.6219
	(0.359)	(0.254)	(0.479)
Constant	7.4163	6.226	7.0746
	(0.227)	(0.312)	(0.250)
Observations	510	510	510
R Sq	0.0296	0.0349	0.0305
F	5.14	6.10	5.31
Prob > F	0.0017	0.0004	0.0013

Table 21 shows the results of pooled ordinary least of squares models for the impact of capital structure on all the industrial firms using ROA as the measure of profitability. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt ratio. P-values are shown in parentheses and ***, **, * indicate the level of significance at 1%, 5% and 10% respectively

Table 24: Regression results (pooled OLS): Capital structure effects on ROE – Full sample

Variables	Model 1	Model 2	Model 3
DA	20.8098		
	(0.104)		
LTDA		15.362	
		(0.294)	
STDA			33.528
			(0.175)
Growth	0.1497	0.1496	0.1529
	(0.012)**	(0.013)**	(0.011)**
Size	0.5643	0.792	1.36
	(0.824)	(0.756)	(0.584)
Constant	6.454	7.0294	2.2713
	(0.709)	(0.687)	(0.896)
Observations	510	510	510
R Sq	0.0178	0.0148	0.0162
F	3.05	2.53	2.78
Prob > F	0.0281	0.0563	0.0405

Table 22 shows the results of pooled ordinary least of squares model for the impact of capital structure on all the industrial firms using ROE as the measure of profitability. Model 1 uses total debt to asset ratio, Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt ratio. Standard errors are shown in parentheses and ***, **, * indicate the level of significance at 1%, 5% and 10% respectively.

Table 25: Regression results (pooled OLS): Capital structure effects on EPS – Full sample

Variables	Model 1	Model 2	Model 3
DA	-1282.494		
	(0.000)***		
LTDA		-1135.228	
		(0.000)***	
STDA			-1526.191
			(0.002)***
Growth	3.607	3.641	3.435
	(0.002)***	(0.002)***	(0.004)***
Size	671.33	664.60	621.86
	(0.000)****	(0.000)***	(0.000)***
Constant	-3386.827	-3592.224	-3666.445
	(0.000)***	(0.000)***	(0.000)****
Observations	510	510	510
R Sq	0.2784	0.2633	0.2548
F	65.07	60.27	57.67
Prob > F	0.0000	0.0000	0.0000

Table 23 reports on results of pooled ordinary least of squares models for the impact of capital structure on all the industrial firms using EPS as the measure of profitability. Model 1 uses total debt to asset ratio Model 2 uses long-term debt to asset ratio and Model 3 uses short-term debt ratio. P-values are shown in parentheses and ***, **, * indicate the level of significance at 1%, 5% and 10% respectively

In general, the robustness checks on the sub-sectors show that debt to asset ratios have a negative influence on profitability for most of the sectors. The results from the pooled OLS estimation method also confirm the benchmark results, implying that the results are robust.

4.4 CHAPTER SUMMARY

In this chapter, the descriptive statistics and empirical findings of the study were presented and discussed. In general, industrial firms have been profitable for the period under consideration. The capital structure analysis reveals that South African industrial firms have lower debt / asset ratios when compared to other firms in developing countries. Also, South African industrial firms utilise more long-term debt than short-term debt, possibly due to fairly developed financial systems and efficient capital markets. This confirms findings by previous authors. Increases in debt / asset ratios is associated with a decline in profitability, especially for total debt and long-term debt, possibly reflecting the fact that the

cost of using debt outweighs the tax benefits derived from the use of debt. When the sample is divided into large and small firms, large firms appear to have more debt than smaller firms, as they possibly have the capacity to absorb large amounts of debt as well as the ability to negotiate favourable credit terms. Small firms may have collateral challenges to access credit. The analysis of subsectors reveals that the construction and consumer foods sectors have higher profitability ratios than the basic resources sector, due to global commodity price fluctuations, while the industrial goods sector and the basic resources sector have the highest debt ratios, due to high investment in heavy machinery and equipment.

The empirical findings of this study reveal that total debt and long-term debt negatively and significantly affect profitability (NPR, ROA and EPS) while short-term debt shows a negative but insignificant relationship to profitability in the whole sample. As for the small firms, the results show that debt negatively affects profitability in small firms and the results are statistically significant on ROA. In the case for large firms, the results exhibit a strong negative impact on profitability (ROA, EPS and NPR). Also for robustness measures, the sample was divided into five sub-sectors and the results showed that total debt and long-term debt have a negative influence on the profitability in all sectors, especially on ROA where the influence is significant. However, short-term debt positively influences the ROA and NPR of the construction and materials sub-sectors, but affects other sectors differently. From the estimations of the pooled OLS regression as an alternative model, the results mostly concur with the findings from the fixed (within) effects where debt negatively affects firm profitability.

The overall interpretation of the results indicates that increasing the debt proportion in the capital structure reduces the profitability of the company. The next chapter concludes the study and discusses possible avenues for further research.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The main purpose of this study was to investigate the impact of capital structure on the company profitability of industrial firms listed on the JSE, and to examine how capital structure influences profitability. The research focused on 52 industrial companies listed on the JSE over the period 2006-2015. This chapter summarises the main findings of the study and highlights the contribution of the study to the existing body of knowledge on the effects of capital structure on company profitability. It also suggests areas for further research.

5.2 SUMMARY OF FINDINGS

The capital structure discussion started by Modigliani and Miller's (1958) capital structure irrelevant theory is still ongoing. A number theories for example the trade-off theory, pecking order theory, signalling theory, agency costs theory and market timing theory have been developed over the years, but continue to present conflicting predictions and conclusions on what constitutes the ultimate optimal capital structure of a firm and how capital structure could affect profitability. Despite the revision of capital structure irrelevance theory by Modigliani and Miller (1963) to accommodate real world conditions, the debate continues. The trade-off theory, agency costs theory and market signalling theory predict a positive relationship between debt and profitability, while the pecking order theory predicts a negative relationship between debt and profitability. There is a lot of empirical work that has been conducted to test the validity of these theories but the available evidence remains mixed with conflicting results, raising the need for further research.

The analysis shows that South African firms generally have low debt ratios as compared to other developing countries. With respect to the composition, South African firms use more long-term debt than short-term debt, possibly because of the relatively developed financial systems compared to other Sub-Saharan African countries. The ranges for the debt ratios suggest the existence of a low target of leverage ratio in South African industrial firms. Large firms appear to have higher debt ratios compared to small firms, reflecting a large capacity to absorb higher leverage with lower financial distress costs and better positions to raise collateral securities.

The findings from the regression results show that debt negatively affects the profits of industrial firms. This picture is observed in the analysis of the whole sample, as well for small and large firms. As the firms' issue debt, their profitability generally declines. For the whole sample, total debt and long-term debt significantly and negatively affect the NPR, ROA and EPS while the effect of short-term debt on profitability is negative, but relatively weak. As for the large firms, all debt has negative effects on profitability, with much stronger effects on ROA. This is rather surprising for large firms, given their favourable positions to borrow at lower costs and possible enjoy debt tax shields on their earnings when they have debts. This suggests that large firms probably benefit from non-debt tax shields like depreciation from their large capital investments. Therefore, debt might not be attractive for them if the debt tax shields are less than non-debt tax shields. The results for the small firms suggest that debt (especially long-term debt) affects ROA and EPS, while on NPR and ROE the effects are insignificant. The findings corroborate previous studies where it was noted that lenders charge more on debt when they are extending to small firms, mainly because they have a high risk of defaulting and have little collateral. High debt costs therefore reduce the small firms' profitability, resulting in a negative relationship.

The results are generally robust to alternative estimation methods (pooled OLS regressions), estimation in different sub-sectors, consideration of lagged values of capital structure and inclusion of a dummy to control for the effects of global financial crisis in 2007-2008. The results from the pooled OLS model concur with the results from the FE model where a negative relationship is reported between debt and profitability. Between different sub-sectors, the results indicate that the effects of debt vary. In most of the sub-sectors, debt has a negative effect on profitability, but in construction and materials, short-term debt exhibits a strong and significant positive effect on ROA and NPR. The same conclusion that debt negatively affects profitability is reached when lagged values of capital structure are used. The dummy variable for financial crisis is significant especially for regressions with NPR and ROA as dependant variables.

For control variables, the study finds a positive and significant relationship between growth and profitability for the firms in the whole sample. As the growth is measured by the change in sales, it shows that the improvement in company sales improves the firm profitability through an increase in revenues. This suggests that the companies should find the most effective way to finance growth, as it improves the company profits.

The findings of this study suggest that industrial firms should follow the pecking order theory which advocates that profitable firms use internally generated funds to finance their growth options. This is due to the fact that internally generated funds are the cheapest and safest source of financing. Leary and Roberts (2010:351) argue that good quality firms signal their quality by relying on internally generated funds to finance their growth options. By doing so, firm managers will be able maintain or maximise their financial slack and flexibility without exposing their firms to financial distress costs which impact negatively on profits if they issue debt.

The results also suggest that managers could consider the use of equity which is less risky because there is no commitment to pay interest and principal payment which are paid in the case of debt. The South African capital markets are fairly developed, which can enable industrial firms to raise capital investment which they need by issuing shares. According to the market timing theory, firms issue less debt when interest rates are high because high interest rates reduce the value of the loan amount and firms end up paying huge costs for small loan amounts.

For investors, the results suggest that low debt compared to equity could guide their choice of firms with a higher profitability potential. Also, the fact that both long-term debt to asset and short-term debt to asset have a negative effect on profitability suggests that investors should be indifferent to the term structure of debt since they have both have negative effects on profitability.

5.3 CONTRIBUTION OF THE STUDY

This study has analysed the impact of capital structure on profitability using the fixed effects panel regression technique. The study contributes to literature in a number of ways. Firstly, most of the existing studies on capital structure in South Africa have mainly focused on the determinants of capital structure considering a diverse set of firms in one sample. This study however focused on industrial firms only and analysed the impact of different capital structure mixes on profitability. It therefore fills a void in literature by focusing on a set of similar firms which are likely to use both debt and equity. Secondly, this study has considered a number of profit (NPR, ROE, ROA and EPS) and capital structure indicators (TDA, LTDA and STDA) to test the hypotheses, while most previous studies considered only a limited set of indicators. This made it possible to study the

question more comprehensively. Thirdly the study is novel in that the sample was divided into large and small firms, and also different sub-sectors of industrial firms, to ensure comprehension of analysis and minimisation of bias in the estimations.

5.4 LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

This study was limited to a sample of industrial companies listed on the JSE. It excludes the service, retailing and financial sectors, and the non-listed industrial firms. The results therefore cannot be generalised to all South African firms. However, in future studies it would be interesting to incorporate the other related sectors which are likely to rely on both debt and equity for their financing, as well as other unlisted firms to understand how their financial structures influence their profitability.

This study is limited to 52 industrial companies and covers a period of 10 years (2006-2015). The analysis could be extended to consider longer periods and larger sample sizes. Future studies could also compare similar firms with those of other countries within the same framework. This could provide comprehension in the analysis and reduce possible sample selection bias associated with considering companies listed on only one stock exchange.

Besides relying on the results from the regression models, it is recommended that a survey be done to complement the results. The survey could help in the sense that the managers of the companies in the sample could give their views on how capital structure influences the profitability and how their companies are financed. Also, managers can provide some critical information about their firms which could have had an implication on how debt providers view them and could have probably influenced on the cost of debt.

The results of this study have shown that an increase in the debt to asset ratio generally reduces profitability, but some theories like the trade-off theory argue that an increase in debt should increase profitability up to a certain level, beyond which profits may start to decline. Therefore, the results of this study could reflect that the negative effect of high debt levels could outweigh the positive effects of debt on profitability. Further studies on this subject could disentangle the effects of different levels of debt and analyse the possible threshold effects of debt to equity ratios on profitability.

Since the results indicate that debt proves to be costly to the South African industrial firms, managers could consider using retained earnings (internal financing) which are a cheaper source of financing. Firms can increase the retained earnings by employing a conservative dividend policy. High dividend pay-out reduces levels of retained earnings whereas a conservative dividend policy could help the firms to accumulate more retained earnings. Future studies on capital structure and profitability could assess the implications of dividends pay-out for company profitability.

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APPENDIX

Table 26: List of industrial companies listed on JSE in the sample

Company	Business Activities
AECI Limited	Manufacture of chemicals, explosives, yarns and fibres etc.
African Oxygen	Manufacturing of gas
Afrimat	Manufacture of construction equipment and Concrete Products
Allied Electronics	Information and technology industries
Arcelormittal	Manufacture of steel
Argent Industrial Limited	Manufacture of steel and other heavy industry materials
Aspen Pharmacare	Manufacture health care products
Astral foods	Poultry producer and manufacture of animal feeds
Astrapak Limited	Manufacture of plastic packaging, agriculture, and industrial goods
Aveng Limited	Construction, steel, equipment, engineering; heavy construction: dams, mining, civil engineering
AVI Ltd	Manufacture and distribute consumable products and personal clothing (selected brands)
Barloworld	Manufacture of industrial goods; motor vehicles and other equipment.
Basil Read Holdings	Civil engineering, building, road construction
Bell Equipment Limited	Agricultural equipment:
Bowler Metcalf	Manufacture of containers and packaging
Cargo carriers	Transportation
Consolidated Infrastructure Group	Power manufacturing, mining, logistics and waste management
Distell Group	Distillers, Wineries
DRD Gold	Gold producers and surface gold tailings treatment
ENX Group	Manufacture industrial equipment
Esor Ltd	Civil engineering and construction
Exxaro	Diversified mineral resources producers
Gold fields	Gold mining

Grindrod	Freight movement – cargo
Group Five	Engineering, construction and manufacture of construction material, infrastructure.
Howden Africa	Production of diverse range of industrial equipment
Hudaco Industries	Importation and distribution of high quality branded automotive, industrial and electrical consumable products.
Hulamin Ltd	Aluminium suppliers
Illovo Sugar Ltd	Sugar Producer
Impala Platinum Holdings	Mining platinum
Invicta Holdings	Engineering, capital equipment and building materials
Kap Industrial	Manufacture of leather material, automotive, resin plastic, etc.
Kumba Iron Ore	Supplier of high quality iron ore to global steel industry
Metair Investments	Manufacture and distributes products in the automotive industry
Mondi Ltd	Forestry plantation, pulp, paper and plastic production for packaging.
Murray and Roberts	Construction
Mustek Limited	Assembling and distribution of computers and complimentary ICT products.
Nampak	Manufacture of packaging materials
NU-World Holdings	Manufacture and distribution of highly branded consumable goods
Omnia	Manufacture of chemicals, specialty chemicals, fertilizer, bulk mining, explosives
Pioneer Food Group	Manufacture and distribute food brands
PPC	Manufacture of cement
Raubex Group Ltd	Road construction and infrastructure
Reunert Limited	Manufacture of electrical equipment
SABMiller Plc	Beer, soft drinks (global leader)
Sappi Ltd	Pulp and paper industry
Sasol Ltd	Energy, chemicals, fuels, gas
Bidvest Group	Industrial goods.
Tiger Brands	Produce and distribute food brands
Tongaat Hullet Sugar	Sugar, agriculture
Wilson Bayly Holmes Ovcon	Property Development and construction
York Timber Organisation Ltd	Saw milling

Table 27: Average values for the variables of the sample over the period

Period	NPR%	ROA%	ROE%	EPS/c	DA	LTDA	STDA	Growth %	Size
2006	11.63	19.41	27.26	636.61	0.15	0.09	0.08	14.68	6.65
2007	9.90	18.00	12.51	430.29	0.17	0.09	0.08	18.90	6.69
2008	11.82	18.18	24.53	581.52	0.20	0.12	0.08	33.62	6.81
2009	5.98	13.02	17.68	430.33	0.22	0.15	0.08	13.27	6.84
2010	7.96	14.14	18.06	492.71	0.18	0.11	0.06	5.10	6.86
2011	7.09	12.83	14.82	574.62	0.16	0.10	0.06	8.77	6.89
2012	6.83	11.15	13.50	548.94	0.17	0.11	0.06	11.62	6.95
2013	5.64	9.61	13.19	596.78	0.18	0.11	0.07	10.13	7.00
2014	4.52	8.61	10.95	608.82	0.19	0.11	0.08	11.44	7.03
2015	3.82	8.33	9.81	560.65	0.19	0.11	0.08	0.50	7.07
Obs	510	510	510	510	510	510	510	510	510

Table 28: Hausman specification test – Small firms sample

Coefficients			
	(b) fixed	**(B) random**	**(b-B) sqrt(diag(V_b-V_B)) Difference S.E.**
da	-12.25138	-7.064921	-5.186459 2.913257
growth	.0482079	.0461262	.0020817
size	-12.01002	-7.594093	-4.415928 1.232395

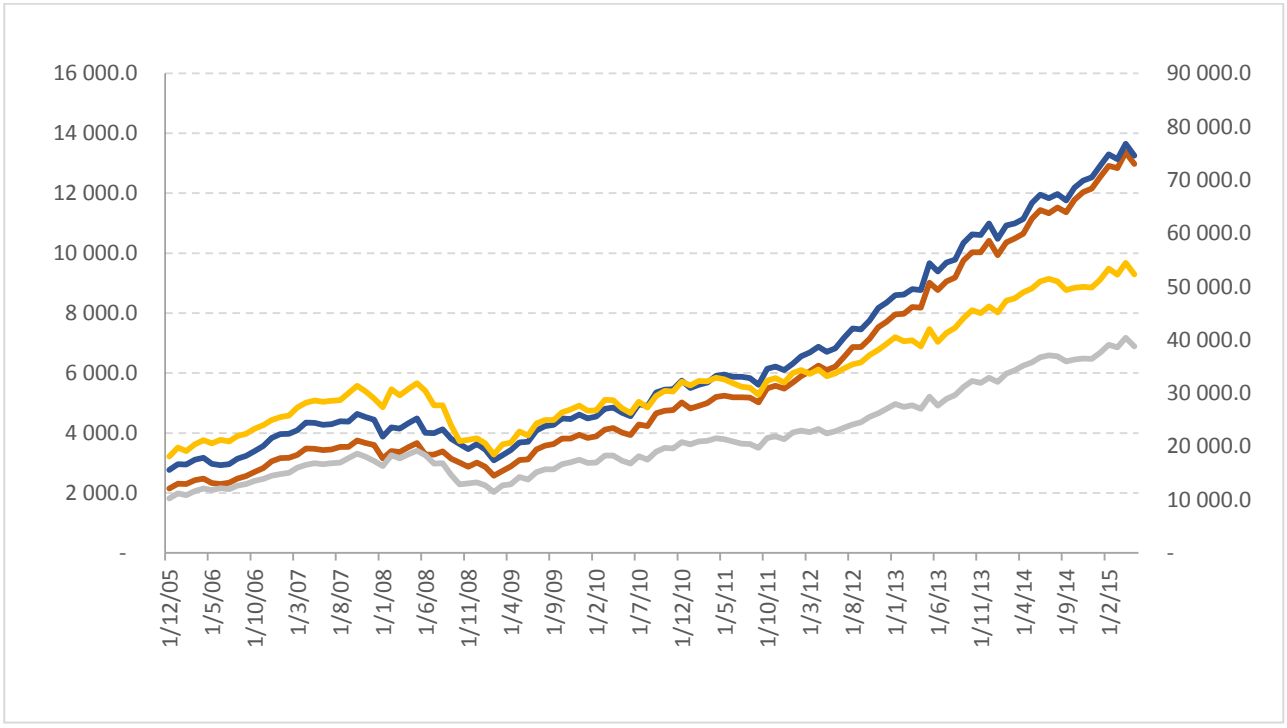
b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)= 13.24
Prob>chi2 = 0.0041
(V_b-V_B is not positive definite

Table 29: Hausman tests - Large companies sample

Coefficients				
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B) S.E.
da	-45.05509	-31.77118	-13.28391	5.855939
growth	.1475932	.1531562	-.0055629	
size	-10.66346	-5.561942	-5.101522	2.29044

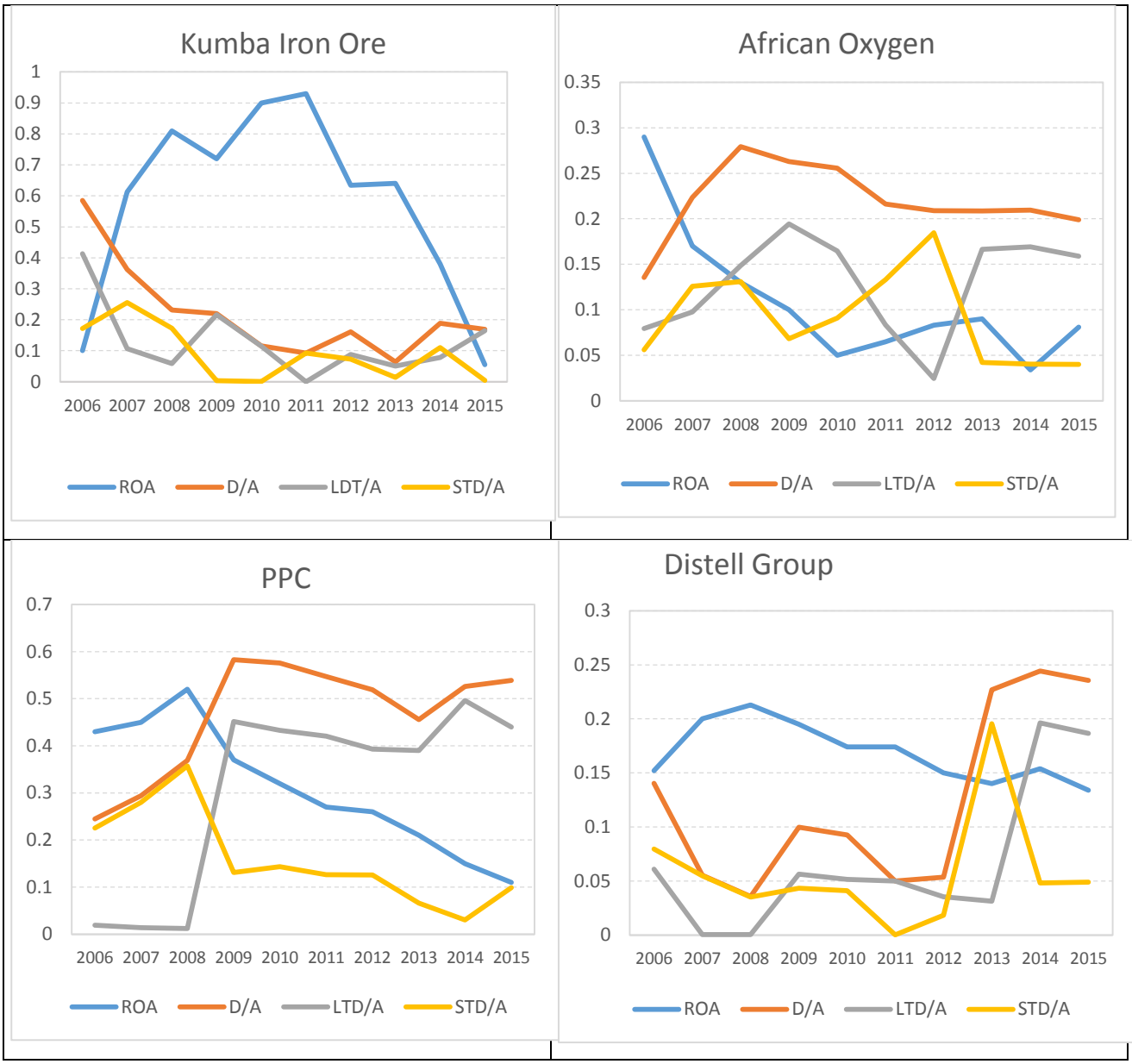
b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)= 9.81
Prob>chi2 = 0.0203
(V_b-V_B is not positive definite)

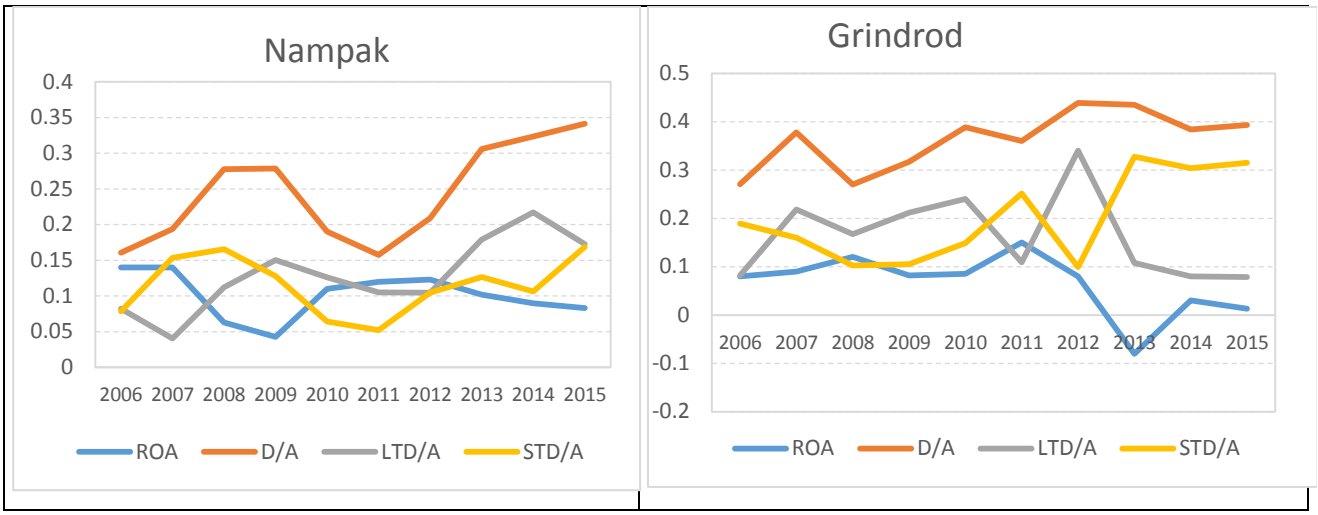
Figure 16: JSE Industrial Index, All Share Index & Capital Indices



Source: JSE

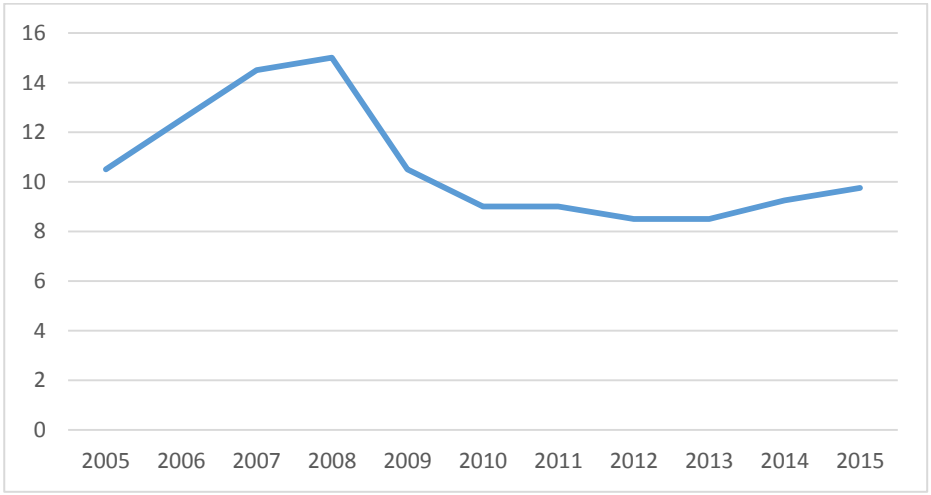
Figure 17: Debt to asset ratios and ROA for selected companies





Source: INET BFA

Figure 18: South Africa Prime lending rates



Source: SARB