

# **A Cross Sectional study of the capital structures of firms listed on the JSE**

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of the requirements for the  
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by

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## **ABSTRACT**

This study examines the capital structures' differences across industry classification for 221 firms listed on the Johannesburg Stock Exchange, from 2007 to 2016. A panel multiple regression model which takes into account the determinants of capital structure was used to identify the effect of firm level characteristics on the capital structure across the industrial sectors. The findings indicate that firms in the health care services, utilities and industrial sectors employ a higher percentage of leverage in the mix of capital, compared to the others. From the panel regression analysis, asset tangibility, profitability and firm size were found to have a significant effect on total debt, with varying effects observed for long-term and short-term debt. On the industrial determinants of capital structure, firms in the basic material industry, total debt ratio is mainly determined by the fixed-asset ratio, indicating that firms in this sector rely on tangibility of assets to secure debt financing. Profitability has a negative relationship with total debt, indicating possibly the presence of the pecking order theory. The consumer goods and consumer service industry firms' leverage ratios are mainly determined by the firms' profitability. The health care industry shows signs of the Trade-off Theory being present as the main determinant, being the effective tax rate which has an inverse relationship with the total debt ratio. The industrial industry has an inverse relationship with profitability, also indicating a possible pecking order theory at play. The main determinants for the technology industry are asset tangibility, profit and the effective tax rate. The telecommunication industry determinant of total debt is profit.

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## ACRONYMS

ASSET-Asset Ratio  
BM- Basic Materials Industry  
CG- Consumer Goods Industry  
CS – Consumer Services Industry  
DWH-Durban -Wu- Hausman Test  
FO- Further Offers  
GMM- generalized method of moments  
GRWTH- Growth Rate  
HC- Health Care Industry  
ICB- Industry Classification Benchmarking  
IFRS -International Financial Reporting Standards  
IND- Industrial Industry  
IPO- Initial Public Offering  
JSE – Johannesburg Stock Exchange  
LTR-Long Term Debt Ratio  
POT -Pecking Order Theory  
PROF- Profitability Ratio  
SME -Small and Medium Enterprises  
STR- Short Term Debt Ratio  
TAX- Effective Tax Rate  
TD- Total Debt  
TECH- Technology Industry  
TEL- Telecommunications Industry  
UTIL- Utilities Industry  
WEF- World Economic Forum

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

The Modigliani and Miller (1958) paper entitled “*The Cost of Capital, Corporate Finance and Theory of Investment*” was the genesis of research into the capital structures of firms through an examination of the factors that influence the behaviour of firms when making financing decisions. This theory, in academic circles known as the *Irrelevance Theory*, proposed that given a set of cash flows to the firms, the capital structure is generally a distribution between investors, i.e. the bond holders and the equity holders. Therefore the amount of debt and equity held is irrelevant to the value of the firm. The theory resulted from several very strict assumptions which assumed perfect capital markets, no taxes, absence of transaction costs, symmetric information and homogenous expectations.

Modigliani and Miller later revised their earlier proposition in 1963 through the inclusion of the debt interest tax shield, indicating that a firm’s value will increase proportionally to the amount of debt a firm takes on, relying on the tax shield leverage debt provides. Such situation implies that the more debt obtained, the higher the value of the firm.

The main theories since 1958, developed in the same fashion as the 1963 revision of the irrelevance theory, results from the relaxation of the assumptions made during the 1958 paper. As Harrison and Raviv (1991) indicate: “*MM pointed the direction theories must take by showing what market conditions capital structure are irrelevant.*” The main theories that have been developed since then are the: Trade-Off Theory, Pecking Order Theory and more recently, the Market Timing Theory and the Market Signalling Theory.

These theories to some extent do explain capital decisions made by firms; however, there is no compelling universal theory on how firms make financing decisions (Meyers, 2001). The

variation in practice are attributable regional differences, size of firms, regulation, cultural differences and industry of the population of study and environment (Kumar et al, 2017).

## **1.2 Problem definition**

Kumar et al (2017), in a review on the research that has been conducted on Capital Structure Theory since 1958, indicate that the amount of research on capital structure in developing economies has been increasing in recent years, but still lags in the number of studies that have been conducted in developed markets. Moreover, the review indicates the need to focus more research on the effect of industry classification in the capital structure of firms. Most recent contributions in this respect have been by Abor (2007), where the effect of industry classification was studied on the capital structure of Ghanaian SME's (meaning of SME).

In addition to a lack of research in the developing countries and the majority of the research on South African firms being dated in comparison to international counterparts, there is a need to focus more on specificities relating to South African firms in relation to the environment they operate in. South African firms and industries are uniquely related to its socio, economic history. Furthermore, the country's political history through the priorities and support of the Apartheid era government further distinguishes the firms and impact on the financing decisions firms make. This was illustrated by Mashavane and Tsarai (2015) who indicated that the relationship between profit and leverage fluctuate haphazardly. They conclude that no relationship exists between capital structure and profitability and that the capital structures are determined by other environmental factors, which in contrast to the Modigliani and Miller propositions creates a South African phenomenon.

The majority of studies on South African firms were conducted prior to 1994 according to De Vries and Erasmus (2010). To the authors knowledge, these studies since 1994 focused mainly on the determinants at a firm level and country specific level rather than industry characteristic

determinants, and where industry effects have been studied, it focused mainly on a single industry or a few firms. Notable contributions after 1994 have been made by Abor and Biekpe (2009), Nagesh (2001), De Vries and Erasmus (2010), Gwaditso and Ojah (2014) and Ramjee and Gwaditso (2012).

There is a need to add focus on the current research on the JSE and its industry classifications given the South African social, economic and political history of the country and more specifically the related industries. This study aims to add to the existing research and aims to perform cross sectional analysis of firms listed on the Johannesburg Stock Exchange (JSE) according to their Industry Classification Benchmarking (ICB).

### **1.3 Statement of research objectives and hypotheses**

The research objectives for this study are primarily to focus on the JSE and the industry classification according to the Industry Classification Benchmark (ICB), and to:

- examine inter-industry differences in the capital structures of firms listed on the JSE;
- examine the inter-industry differences in the determinants of capital structure decisions among firms listed on the JSE

1. In considering the above research objectives we hypothesise the following: that *Capital structures does not vary significantly across ICB classification of the industry.*

2. *Capital structures determinant does not vary significantly across ICB classification of the industry.*

The alternative hypothesis:

1. *Capital structures vary significantly across ICB classification of industry.*

2. *Capital structures determinant vary significantly across ICB classification of the industry.*

### **1.4 Justification for selecting the Study**

According to Kumar et al (2017), research on the industry specific determinants is much needed in the developing economies, specifically in Asia and Africa. In South Africa post 1994, current research on the JSE is much needed, as indicated by De Vries and Erasmus (2010). Franck and Goyal (2009) found the most important empirical predictor for capital structure is industry leverage. Given the limited research in this area and the need to study the effect of the JSE, industry classification on capital structure could have important implications.

This research could potentially be of interest to a variety of stakeholders, namely financial managers, academicians, policy makers, tax authorities and credit providers, to understand the effects of industry classification on financing decisions.

Specifically, the results of this study could be used by other firms in the same industry to set benchmark targets relative to their peers in the same industries or establish financing strategies. Banks and credit providers could use the research to understand the industries' financing behavior, better and improve the risk assessments to solution clients. Policy makers and tax authorities can use the results to set policies more geared towards the needs of the firms. The JSE (regulator) and auditors can also use the results to monitor and review the capital structures of the firms, to ensure sustainability and to protect the shareholders' interests. Finally, academics can understand the different theories at play and gain a better understanding of the application of traditional theories in the different industry classifications.

### **1.5 Organization of the Study**

This study is organised into five chapters, as follows: Chapter One: Introduction and Background, introduces the study through a discussion of a brief background, sets out the research problem, the research objectives and hypothesis, as well as the justification of this study.

Chapter Two: Literature Review, discusses both the theoretical and empirical literature for the study and provides an overview of studies that have focused on industry effects on capital structure.

Chapter Three: Data and Methodology, discusses the data for the study, the methodology and the variables to be used in the study, as well as empirical evidence that justifies the selection and impact of the variables.

Chapter Four: Empirical Results, provides an overview of the results of study and compares the findings of contributions made by previous studies.

Chapter Five: Analyses of results and Conclusions, discusses the main implications of the results and analyses the significance of the findings.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter provides an overview of the history, performance and characteristics the Johannesburg Stock Exchange plays in providing access to equity funding. Furthermore, the theories on capital structure are discussed and an overview provided on the main contributors to capital structure theory. Although most of the theories have been developed in the western context, we introduce the original theory and then discuss the relevance of the theories to the African and South African contexts, thereby establishing a starting point on which we seek to build with this study. This chapter will also examine the empirical literature on the determinants and establish a relationship between the theory and the determinants. Moreover, we review the specific studies that have been done on industry specific determinants of capital structure.

#### **2.2 Overview of the JSE**

The Johannesburg Stock Exchange is the oldest stock exchange in Africa, and was originally started to support the gold rush in 1887. The exchange is often referred to as the “gateway to Africa,” which received numerous accolades, the most recent being ranked by the WEF (meaning global competitive index) for 2016/17. The index rated the JSE number 1 out of 138 countries for raising equity funding through the local market<sup>1</sup>. The JSE also ranked third for regulation of the exchange and first for protecting the interest of minority interests’ shareholders. The JSE, according to the 2017 Credit Suisse Yearbook, is the best performing exchange between 2016 and 1900, returning 7.2 percent per year over the period and 8.2 percent since the year 2000.

The current market capitalisation is estimated at over 11 trillion rand, and currently hosts over 400 firms<sup>2</sup>. The JSE was traditionally a basic material mining heavy exchange; however, since the fall in commodity prices, the importance of mining has decreased due to a decline in the commodity prices and political and regulatory uncertainty. Since around 2013, the financial services and media and telecommunications have been playing an increasing role in the composition of the JSE. The financial services’ industry amounted to 27 percent, and media and telecommunications industry to 28 percent. The basic material industry only amounts to

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<sup>1</sup> <http://publications.credit-suisse.com/tasks/render/file/index.cfm?fileid=B8FDD84D-A4CD-D983-12840F52F61BA0B4>

<sup>2</sup> [www.jse.co.za](http://www.jse.co.za)

13 percent of the composition of market industry, with the balance being consumer goods and other industries. The top 20 shares account for 71 percent of the market capitalization; 50 shares account for 86 percent<sup>3</sup> of the JSE. The JSE therefore remains top-heavy in terms of market capitalisation. The largest firms by market capitalisation on the JSE are alcoholic beverage firm Anheuser Busch InBev (17.8 percent), British American Tobacco (12.3 percent) and Naspers (6.9 percent).

The exchange has undergone numerous changes in the past 20 years, which includes moving from a manual trading system in 1996 to an automated Johannesburg Exchange Trading platform (JET). This system was later upgraded to the millennium exchange trading platform, and simultaneously moved the trading system to Johannesburg; this resulted in increased executing times. Another important change was the adoption of the Industry Classification Benchmark (ICB), which provides a standardized framework for categorizing firms according to the composition of the firms' revenue streams. This promotes comparability across exchanges, and facilitates the top down and bottom up approach to stock selection. The JSE currently lists firms across eight of the 10 industries of the ICB framework.

The JSE has also seen an upward trend in the amount of capital raised through Initial Public Offering (IPO's) over the past ten years. For the first six months of 2017, three listings have taken place, with the total capital raised amounting to 250 million dollars. This is the highest it has been since the 2012 comparative period. In 2016, a report by the accounting firm PWC (Price Waterhouse Coopers)<sup>4</sup> indicated that the amount of capital raised on the JSE through IPO amounted to 823 million dollars, through four IPOs. There was an increase of 25 percent from the previous year, where 630 million dollars were raised from 9 IPOs. This is a significant increase from 2013, considering 261 million dollars were raised from four IPOs and comparatively, during 2016 350 million dollars were raised from one listing by the pharmaceutical company Dis Chem.

In terms of offering new listings opportunity to raise more capital, the JSE has clearly provided adequate capital for firms to finance investment decisions. Despite the amount of IPOs, the amount of further offers (FOs) by existing listees has decreased in two years from 9757 (Rm) and 71 FOs in 2015 to 6 202 (Rm) and 45 FOs in 2016. This trend could be due to the political

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<sup>3</sup> Growth and Strategies of Large and Leading Firms - Top 50 firms on the Johannesburg Stock Exchange (JSE)1 Center for Competition, Regulation and Economic Development, University of Johannesburg

<sup>4</sup> <https://www.pwc.co.za/en/assets/pdf/africa-capital-markets-watch-2016.pdf>

Table 2.1 and <https://www.ceicdata.com/en/indicator/south-africa/data/market-capitalization-jse-annual>



uncertainty in the country, as the majority of the FOs during 2016 was intended to raise funds for divestures by South African or foreign companies looking to sell off assets, as opposed to expansion or acquisitions of other entities. Most notable FOs include PPC, a cement company which raised equity funding to provide liquidity following the credit downgrade of the South Africa sovereign debt. Despite the uncertainties, there was some positive sentiment in other FOs, most notably Steinhoff International, raising 627 (R'm) for their European acquisitions and Remgro 662 (R'm) for future acquisition, indicating some optimism by South African firms. The majority of the FOs took place in the health care and the consumer goods industries.

Table 2.1 below indicates that the number of firms on the JSE has been steadily decreasing since 2007. This is partly due to delistings attributable to tough trading conditions, as well as the introduction of a new alternative exchange (Alt-x) that has less stringent listing requirements than the main board of the JSE. The same explanation can be provided for the decline in the number of new listings from 2007 to 2013. However, the number of listings has increased from 2013 to 2016. The market capitalisation has almost doubled from 2007 to 2016. The index return has been double digit in most years, except for, most notably, the effects of the financial crises in 2008 and in the last two years (2015-2016) due to the political instability in the country.

**Table 2.1: Stylized facts on the JSE from 2007- 2016**

	Number of listed firms	New Listings	Market Capitalization	Index Return
2007	410	25	5696829	19.2%
2008	348	18	4541900	-23.20%
2009	334	6	5929062	32.10%
2010	339	13	6698000	19.00%
2011	340	13	6908500	2.60%
2012	339	10	8383600	26.7%
2013	329	8	10626200	21.40%
2014	333	18	11505000	10.90%
2015	331	15	11727600	5.10%
2016	338	18	13580600	2.60%

Source: [www.pwc.com](http://www.pwc.com) and [www.ceicdata.com](http://www.ceicdata.com)

### **2.3.1 Theories of Capital Sstructure**

In recent times, various studies have aimed to consolidate the research on capital theory, namely Harris and Raviv (1991); Luigi and Sorin (2009); Miglo (2010) and Kumar et al (2017). These authors identify five main theories. The fundamental paper by Modigliani and Miller (1958), known as the Irrelevance Theory, and the subsequent research stemming from the MM paper, namely the Trade Off Theory, Agency Cost Theory, Pecking Order Theory and Signalling Theory. The following sections provide a comprehensive overview of the theories and the related empirical evidence in South Africa and abroad.

### **2.3.2 Irrelevance Theory**

This theory in academic circles known as the “irrelevance theory” proposed that given a set of cash flows to the firms, the capital structure is generally a distribution between investors, i.e. the bond holders and the equity holders. Therefore, the amount of debt and equity held is irrelevant to the value of the firm. The theory resulted from several very strict assumptions which assumed perfect capital markets, no taxes, absence of transaction costs, symmetric information and homogenous expectations.

Modigliani and Miller later revised their earlier proposition in 1963 through the inclusion of the debt interest tax shield, indicating that a firm’s value will increase proportionally to the amount of debt a firm takes on, relying on the tax shield leverage debt provides. Hence, it implies that the more debt a firm obtains, the higher the value of the firm.

### **2.3.2 Trade off Theory**

It is a combination of theories resulting from the relaxation of the strict assumptions made in the MM propositions: perfect market, no taxes and no transaction costs. Underpinning the theory is the existence of an optimal capital structure, i.e. a trade-off between the benefits and different costs associated with debt. The classical trade off theory was first presented by Kraus and Litzenburger (1973), who theorized that a firm’s value is maximised if an optimal capital structure is obtained. The optimal capital structure is a trade-off between the benefits of debt tax and the costs of financial distress. This theory opposes the MM (1963) view that a firm’s value increases when more debt is taken on, a view that is not supported empirically; firms generally have a combination of debt and equity.

There are two main themes in the research that have been conducted. Firstly, the existence of an optimal capital structure, and secondly, how firms determine the optimal capital structure.

Another branch of the trade-off theory as explained by Luigi and Sorin (2009) is the dynamic trade off theory which provides that “firms will determine the optimal capital structure based on what is expected in the next period,” due to the existence of transaction costs firms and considering time factor: firms take time to adjust. These studies therefore consider the adjustment time firms take to adapt to a target optimal capital structure. In contrast, static trade-off theory does not take into account the time taken to adjust to the optimal structure. As Myers (1984) indicates that adjustment costs are costly if these are not observable, firm capital structure would be its optimal structure. When this is not the case, a possible reason he indicates is that firms adopt an optimal capital structure and attempt to move towards such capital structure.

Harris and Raviv (1991), based on a review of the literature, find several studies suggesting the idea that the optimal capital structure is determined by industry specific factors. The review indicates that that each firm has more in common with firms in their own industry, and persistent inter industry differences exist across the studies reviewed, indicating a relationship between target ratios and industry classification. Myer and Majluf (1984) argue that industry classification does not directly influence firm capital structure, but could indirectly influence capital structure due to the asset intangibility that the industry requires.

Moreover, proponents of the POT argue that the firm capital structure is merely a summation of the financing decisions a firm takes. As Stiglitz (1973) puts it, “leverage ratio is the fortuitous outcome of the profit and investment history of a firm” - they therefore dispute the existence of the optimal target capital structure. The agency cost and the trade-off theorists, however, agree on the optimal capital structure, but nonetheless disagree on the costs that firms trade off against, as we will discuss in more detail below.

In South Africa, empirical analysis indicates the existence of an optimal capital structure. Ramjee and Gwaditso (2012) studied the adjustment of firms towards a target ratio for 178 firms listed on the JSE from 1998 to 2008. This study found evidence of both the POT and the dynamic static trade off theory. The study indicates that South African firms do have an optimal capital structure - firms do consider the optimal capital structure as a trade-off between costs and benefits of debt. How they tend to behave when reaching the target ratio indicates that they follow the POT, as firms prefer to use internal funding to finance investment decisions.

The results of this study are supported by a survey conducted by Correia and Cramer (2008) from CFOs of JSE listed firms. The survey results indicate that only 21 percent of respondents

do not use target debt ratios, 29 percent use strict target ratios, 14 percent somewhat tight ratios and 36 percent use a flexible target ratio. This indicates that South African firms use target ratios; however, we do not have empirical evidence to the writer's knowledge on how firms establish those target ratios, whether due to industry or firm specific determinants. These studies did not study the effect of inter industry relationships on the financing decisions. Therefore, industry specific factors could have an influence on how firms arrive at optimal capital structure or target ratio. This is the main enquiry of this study.

### **2.3.3 Agency Cost Theory**

The research on agency cost was initiated by Jensen and Meckling (1976) and Fama and Miller (1972), as indicated by Harris and Raviv (1991). Agency cost proponents agree on the optimal capital structure of firms, however, but disagree on the costs involved in determining the capital structure of a firm. They argue that the trade-off is not necessarily between the tax benefit of debt and cost of debt, but also between the agency costs involved with the issue of debt.

Jensen and Meckling (1976) combine the theory of property rights, the theory of agency and finance to develop the agency cost theory for share ownership. They enumerated two types of agency costs, which are: agency cost between the equity holders and managers, and the agency costs which are a result of conflict between the financiers, namely equity holders and debt holders. Jensen and Meckling argue that an optimal capital structure can be obtained by trading off the agency cost of debt against the benefit of debt, as previously described.

The conflict between managers and shareholders exists when the managers do not own 100 percent of the firm, and the incentives are not aligned with that of the shareholders. Managers will choose the course of action that best furthers their own interests, thereby increasing their span of control, and prefer to pursue actions that will not likely result in the optimal capital structure.

Managers of a firm will always want to continue operations, even with the possibility of bankruptcy, to pursue personal interests. They will prefer to take on more risks, despite their actions reducing the value of the firm, and in so doing enhancing their own span of control. (Harris and Raviv 1991).

Jensen and Meckling (1976) indicate that debt reduces the "free cash" available which managers have to spend on perks that enhance their lifestyle of "perquisites." As a result, the managers see debt as an obligation to pay which would divert cash from their interests. If

managers are incentivized with share benefits, these influences could be mitigated. They would then see issuing equity as reducing their shareholding, and prefer to issue debt.

Shareholders, on the other hand, carry the costs of ownership and the risk of losses if the firm goes bankrupt, as shareholders have a residual claim on the business. Shareholders want to protect their interest and ensure that they do not lose out on maximizing the value of the firm, thereby increasing the value of their share in the business. (Harris and Raviv, 1991)

The conflict between shareholders and debt managers arises due to the return on investments shareholders must share with debt holders, as explained by Abor and Biekpe (2006). The debt holder receives a fix interest rate based on a risk assessment they regard as adequate. The shareholder is a residual owner of the portion of profits after paying the fixed obligation due to debt holders. This results in shareholders requiring a higher return to service the debt obligation, and then to ensure a return on their investment, discounting cash flows using the weighted average cost of capital (WACC). This results in more risk taking to obtain higher return.

In a study conducted on the existence of agency costs in SME capital structure, Abor and Biekpe (2006) studied 86 firms listed on the JSE between 1998 and 2004. The study found a relationship between block shareholding and agency factors, where one major shareholder was present. The shareholder was better able to monitor the actions of management and exercise more control. However, when more than one block shareholder existed, the monitoring was not as effective in reducing agency costs with regard to shareholder maximization.

#### **2.3.4 The Pecking Order Theory**

This theory highlights the existence the effect that asymmetry of information has on the capital structure decision. Myers and Maljulf (1984) show that because of information asymmetries, outsiders of the firm can potentially undervalue the equity of the firm. As a result the firm would be forced to sell equity cheaper than the value that management or insiders place on equity in the firm. Myers (1984) indicates that a pecking order exists when a firm decides how to finance its investment decisions. When faced with investment opportunities, firms will finance new investments first with internally generated funds, then debt and lastly with equity to minimize the asymmetry costs. As a result, in periods with low growth and few investment opportunities, firms will hoard cash to finance future investment opportunities. In periods of high growth and many investment opportunities, firms will maximize borrowings and increase

leverage as much as possible, till the book value of the firm approaches the market value of the firm, and then resort to equity financing - Luigi and Sorin (2009).

Empirical evidence suggests that South African firms do display evidence of pecking order decision making. Gwaditso and Ojah (2009), in a study on listed firms across five sub Saharan countries between 1995 and 2005, found that firms prefer internal financing and prefer short-term debt to long term debt. Similar findings were found in Ramjee and Gwaditso (2012) on JSE listed firms; however, additionally, the study indicates that firms who are more profitable operate at a lower leverage, and that the pecking order applies to South African listed firms.

### **2.3.5 The Market Timing Theory**

As quoted by Frank and Goyal (2009), Baker and Gurgler indicate that firms' capital structures are more clearly understood by the firms' previous attempts to time the respective bond and equity markets. The firms constantly monitor the debt and equity market. If favourable, they will enter that market and raise funding, irrespective of whether they have new investment opportunities.

## **2.4 Empirical Literature on the Determinants of Capital Structure**

Various determinants have been investigated by researchers to explain the determinants of capital structure of firms. Researchers have also attempted to identify whether the determinants and their respective correlation with the leverage ratios can be explained by the theories on capital structure. The main determinants identified in the reviews of theories on capital structure are profitability, size, tangibility of assets, taxes and growth associated with the firm.

The static trade-off theory predicts that profitable firms are more levered, as they would benefit from the tax benefits of debt. Profitability is a very important measure for debt and equity holders, as it is used in valuation techniques to determine the future recoverability of loans or to determine the current share value in models, such as the Gordon Dividend Growth model. Chipeta and Diressa (2016) indicate that in countries with the least developed markets, the profit factor is a significant determinant of capital structure. The pecking order theory predicts that profitable firms would use less debt, as they would use the firms' retained earnings to fund investment opportunities. As found in the study by Gwaditso and Ojah (2009), similar evidence was found in a study by Chen (2014) on 1418 Chinese-listed firms in 2011. This study will investigate whether the profitability factor is significant for all industries.

The asset structure is a very important indicator that has been studied in numerous papers on capital structure. The asset structure refers to the degree of fixed assets to the total amount of assets, more commonly known as the fixed-asset ratio. Asset structure represents collateral for firms who intend to borrow capital; the empirical evidence suggests that total debt is positively related to tangible assets. This is due to assets carrying a liquidity value that can be easily recovered should the firm default. (Harris and Raviv 1991). In terms of the static trade off theory, this liquidity value decreases the bankruptcy cost and reduces the agency costs between insiders and outsiders of the firm. Therefore, there is a positive relationship between asset tangibility and leverage, indicating that the higher the fixed-asset ratio, the higher the leverage. The tangibility of the asset structure also indicates a degree of information asymmetry - the higher the asset structure, the less information asymmetry. The POT, therefore, theorizes a negative relationship between asset structure and leverage as it becomes cheaper to issue equity. A firm would, therefore, be more inclined to issue debt; however, as Franck and Goyal (2009) point out, the existence of adverse selection could result in a positive relationship between debt and equity, due to the existence of no tax related deductions. In Gwaditzo and Ojah (2009), a positive relationship was found between total debt and long-term debt and asset tangibility, indicating the collateral value that assets have in the financing decisions. This study also found a preference for short term debt for South African firms; there appears to be a negative relationship between short-term debt and total debt. Similar results have been found in the Ghanaian context: Abor and Biekpe (2009) found that for SMEs, the empirical evidence suggests that total debt is positively related to tangible assets. However, this study found a negative relationship between asset structure and short-term debt, indicating that SMEs match short term finance with current assets, and prefer to finance long term assets with fixed assets. This is known as the matching principle. However, as Myers (1984) points out, industry classification could be a proxy for industry classification, whereas De Wet (2006) indicates that while it is true that industry and fixed-asset ratios do assimilate each other, it is also true that companies in the same industries use various levels of debt relative to their own capital. Therefore, this study will focus specifically on the differences on the impact that determinants have on the capital structure in the respective industry, so that we can better understand the industry effect.

Another important determinant in the literature is the size of the firm. The size of the firm could proxy for many aspects, such as diversified operations, brand or reputation, economies of scale and transparency. The more diversified firms' operations result in less varying cash flows, and

as a result less risk of default. Furthermore, economies of scale in borrowing may have more bargaining power in the debt market. Larger firms may, therefore, have increased leverage ratios. On the other hand, transparency as indicated by Rajan and Zingales (1995) plays a key role in the access financing, as larger firms provide more information to shareholders. This decreases the amount of information asymmetries, and reduces the agency costs. In applying the pecking order theory, it could be argued that the larger the firm, the older the firm and the more time a firm has had to accumulate retained earnings. Therefore, larger firms tend to have less leverage and prefer to utilise internal sources, as found in a study by 1200 Chinese-listed firms, between 1994 and 2003 by Huang and Song (2006). The study found that size has a negative relationship with leverage in the Chinese environment. A possible explanation offered is that if a firm lists a firm's value, generally it increases, and firms prefer to raise equity in the absence of a well-developed bond market.

The risk associated with a firm as measured by the variability of earnings increases the risk of default and bankruptcy costs. Applying the static trade-off theory firms with greater risk should have lower leverage ratio, as the bankruptcy costs are high. Applying the pecking order theory, high risk firms are faced with higher asymmetric information, and as a result face the problem of adverse selection, and choose to issue debt rather than equity to prevent the firm issuing cheap equity that would dilute the firm's value (Frank and Goyal, 2009). However, as cited by Kumar (2017), it indicates that business risk is positively and significantly correlated with a high leverage ratio, but notes that this is not the case for all regions.

The 1963 paper from MM included taxes as the main motivation for firms to increase leverage, and in doing so maximize firm value. The trade-off theory predicts that firms will increase the amount of debt to benefit from the deductibility of tax benefits related to interest payments. Therefore, leverage and tax are negatively correlated. However, some would argue that the tax rate is merely a proxy for none debt related tax deductions. The tax rates for South African firms are fixed; however certain industries enjoy favourable deductions from none debt related tax shields. Huang and Song (2006) found a positive relationship between long term and total debt and the effective tax rate.

## **2.5 Empirical Literature on Industry as a Determinant Capital Structure**

In the research reviewed, there are clear indications that industry classification does influence the capital structure of firms. Industry classification can affect the capital structure in two ways: first, firms could use the average industry leverage as a bench mark, and second, firms in the



industry could face common industry factors that result in different determinants playing an influencing factor in the determination of capital structure (Frank and Goyal 2009). The main studies that have been reviewed for this study include Bradley (1984) Hatfield et al (1994); Hall et al (2000) and Abor (2007).

The existence of an inter-industry capital structures has been empirically verified by Bradley (1984) in a study that involved 821 firms from 25 industries, over the period from 1962 to 1981. The study found that inter-industry variances do exist in capital structure, and that the low intra-industry variation in leverage could indicate that firms in the industry have optimal leverage gravitate towards one another with their financing behaviour. This study indicated that hotel, restaurant and education industry have higher debt ratios than other industries.

Hall et al (2000) attempted to investigate “*whether the industry is really only a proxy for asset structure (i.e. the effect of asset structure is the same across industries) and other determinants or whether the effect asset structure and other determinants exert on financial leverage varies across industries.*” This study attempts to address Myers’ (1984) concerns regarding the proxy of asset tangibility for industry effects. Hall et al studied 3500 firms across 10 industries in the United Kingdom. This study found that asset structure is a significant determinant; however, other variables play a differing significant role as determinants of capital structure. They also found that growth is positively related to short-term debt, whereas size and asset structure is positively related to long term debt, but negatively related to short-term debt.

Hatfield et al (1994) found surprising results in a cross-industry examination of 183 firms across 55 industries, between 1982 and 1986. The study aimed to understand the relationship between industry leverage and firm capital structure. The study found no relationship between the industry leverage and firm leverage. Furthermore, the study found that the market does not consider the relationship between industry and firm leverage as important, indicating that the firm leverage has no implication on the value of the firm. This study surprisingly supports Modigliani and Miller’s (1953) “*irrelevance theory*”.

In the African context, Abor (2007) studied a total of 150 Ghanaian SMEs over a six-year period from 1998 to 2003 across 6 industries, and found significant variations between industry capital structures, and concluded that industry effects play an important role in determining capital structure. This study found that industries with higher collateral have more debt - the agricultural industry had the highest amount of fixed assets and the highest amount of debt. Firms with low value collateral tend to rely more on short term financing - the wholesale and

retail industry had the highest current assets, indicating these industries rely more on short-term financing. Similar industry variation was found by Smart et al (2004) as referenced by De Wet (2006), who indicates that capital structures tend to display definite industry patterns, and that South African firms have similar industry debt patterns to that of US-based firms.

**Table 2.2: List of Research and Empirical Studies Cited:**

Author/s	Sample Period	Country/ies	Main Findings
Modigliani and Miller (1958)	Theoretical development-1958	USA	A firm's value will increase proportionally to the amount of debt a firm takes on relying on the tax shield leverage debt provides
Harris and Raviv (1991);	Review up until 1991	Global Review	Based on a review of the literature several studies suggest the idea that the optimal capital structure is determined by industry.
Miglo (2010)	Review of main theories up until 2010	Global review	A review of capital structure theories
Luigi and Sorin (2009)	Review of capital structure theory - 2009	2009	"firms will determine the optimal capital structure based on what is expected in the next period"
Stiglitz (1973)	Theoretical Development - 1973	USA	POT-leverage ratio is the fortuitous outcome of the profit and investment history of a firm.
Correia and Cramer (2008)	2008	South Africa	The survey results indicate that only 21 percent of respondents do not use target debt ratios, 29 percent use strict target ratios; 14 percent Somewhat tight ratios and 36 percent use a flexible target ratio.
Ramjee and Gwaditzo (2012)	1998-2008	South Africa	The study indicates that firms which are more profitable operate at a lower leverage and that the pecking order applies to South African listed firms
Jensen and Meckling (1976)	Theoretical Development-1976	USA	Presented an additional layer to the trade-off theory, by applying the principles of property ownership to that of the relationship between a shareholder and management, suggesting that additionally a trade-off exists between the agency costs of debt and the agency costs of equity (Agency Cost Theory).
Kraus and Litzenburger (1973)	Theoretical Development-1973	USA	The optimal capital structure is a trade-off between the benefits of debt tax and the costs of financial distress
Bradley (1984)	1962-1981	USA	The study found that inter industry variances do exist in capital structure, and that the low intra industry variation in leverage could indicate that firms in the industry have optimal leverage gravitate towards each other with their financing behaviour.
Hall et al (2000)	1995	UK	This study found that asset structure is a significant determinant; however, other variables play a varying significant role as determinants of capital structure.
Abor and Biekpe (2009)	1998-2003	Ghana	The study found that for SMEs, the empirical evidence suggests that total debt is positively related to tangible assets, however this study found a negative relationship between asset structure and short-term debt, indicating that SMEs match short term finance with current assets and prefer to finance long term assets with fixed assets; this is known as the matching principle
Chen (2014)	2011	China	The study found evidence that pecking order theory is present in the Chinese environment, which predicts that profitable firms would use less debt, as they would use the firm's retained earnings to fund investment opportunities.
Rajan and Zingales (1995)	1987-1991	G7 Countries-	Study found that transparency plays a key role in the access financing, as larger firms provide more information to

			shareholders. This decreases the amount of information asymmetries and reduces the agency costs
Chepeta and Deressa (2016)	2004-2013	Botswana, Ghana, Kenya, Malawi, Mauritius, Namibia, Nigeria, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.	The study indicated that countries with least developed markets the profit factor is a significant determinant of capital structure.
De Wet (2006)	2006	South Africa	Indicates that capital structures tend to display definite industry pattern, and that South African firms have similar industry debt patterns to that of US based firms.
Abor (2007)	1998-2003	Ghana	This study found significant variation between industry capital structures and concluded that industry effects play an important role in determining capital structure. This study found industries with higher collateral have more debt, the agricultural industry had the highest amount of fixed assets and the highest amount of debt.
Gwaditso and Ojah (2009)	1991-2004	Kenya (2000-2004); Ghana (1998-2004); Nigeria (1999-2003); South Africa (1990-2004); Zimbabwe (1991-1995)	Studies found that South African firms prefer internal financing and prefer short term debt to long term debt. Also found a positive relationship between total and long debt and Asset tangibility and the effective tax rate
Huang and Song (2006)	1994-2003	China	This study found that size has a negative relationship with leverage in the Chinese environment. Also found a positive relationship between long term and total debt and the effective tax rate
Myers (1983)	1995	United Kingdom	Firms adopt an optimal capital structure and attempt to move towards such capital structure
Frank and Goyal (2009)	1950 -2003	USA	Applying the pecking order theory, high risk firms are faced with higher asymmetric information, and as a result face the problem of adverse selection and choose to issue debt rather than equity to prevent the firm issuing cheap equity that would dilute the firm value.
Hatfield (1994)	1982 -1986.	USA	The study found no relationship between the industry leverage and firm leverage. Furthermore, the study found that the market does not consider the relationship between industry and firm leverage as important, indicating that the firm leverage has no implication on the value of the firm.

## 2.6 Conclusion

In this chapter, we will discuss several theories of capital structure. We also discuss how the theories relate to determinants at a firm level. What is certain from the review is that the research varies from region to region, and seems to suggest no consensus on the theories, the determinants or the effect that industry has on the capital structure of firms. In the South

African context, more research is needed on the industry effects and the determinants at a firm level, on whether differences do exist in how firms determine capital structures.

## **CHAPTER THREE**

### **RESEARCH DATA AND METHODOLOGY**

#### **3. Introduction**

This section outlines the source of the data, provides an overview of the industries and firms included in the sample and explains the variables used in the study. The methodology and the related analysis will also be discussed in detail to provide the basis for follow-up research. Finally, we will discuss possible limitations to the study and discuss statistical techniques to prevent biased interpretation of the results.

#### **3.1 Research Data**

This study investigated a sample of selected firms across the eight industries according to the Industry Classification Benchmark (ICB). The total number of firms included in the sample amounts to 221 firms, after excluding financial services firms due to the liquidity and other regulatory requirements that govern the capital structure of the financial industry. The period covered by the study is from 2007 to 2016, which covers the period immediately after the 2007/2008 financial crises, was mainly limited by data availability. The sample includes all firms who have available data as at the end of December 2016. The data was obtained using the IRESS excel add in functions to extract the data from the financial statements. The data therefore represents an unbalanced panel, as we do not have the all the data points available for all firms under review, due to new listings in the intermediary period since 2007 and up to 2016.

#### **3.2 Overview of the Industry and Firms**

The ICB allocates each firm into a sub-sector that represents the nature of its business; this classification is used globally by stock exchanges and improves the comparability of stock exchanges across the world. This study investigates the industry classifications of the ICB; the sample firms are spread across seven industries: (1000) Basic Materials, (2000) Industrials, (3000) Consumer Goods, (4000) Health Care, (5000) Consumer Services, (6000) Telecommunications, (7000) Utilities and (9000) Technology. The composition of sample according to Industry as follows are outlined in Table 3.1

**Table 3.1: Firms Distribution Across Industry Classification**

Industry	Number of Firms	Percentage
Basic Materials	60	27%
Consumer Goods	23	10%
Consumer Services	42	19%
Health Care	9	4%
Industrials	68	31%
Technology	12	5%
Telecommunications	6	3%
Utilities	1	0%
<b>Total</b>	<b>221</b>	<b>100</b>

The firms and industries have been indexed for our analysis. The unit of analysis of the firms has been indexed, and allocated a unique number between 1 and 221; the industries have also been allocated a unique index between 0 and 7.

### 3.3 Empirical Model

In the examination of the research hypotheses, this study adopts the empirical model of Abor (2007). The regression equation is:

$$debt_{i,t} = \beta_0 + \beta_1 IND_t + \beta_2 controls_{i,t} + \mu_{it} \quad (1)$$

where  $i$  denotes firm and  $t$  denote years;  $debt$  denotes the debt ratio, decomposed into total debt ratio (TDR), short term debt ratio (STR) and long-term debt ratio (LTR);  $IND$  represents the industry classification defined as basic materials, consumer goods, consumer services, health care, industrials, technology, telecommunications and utilities. The  $IND$  dummy variable is constructed as a categorical variable form 0-7 (0 if Basic Materials, 1- if consumer goods, 2 if consumer services, 3- if health care, 4- if industrials, 5- if technology, 6- if technology and 7 if utilities. Controls represent in asset structure (ast), profitability (prof), firm size (size), taxation (tax), firm risk (risk) and firm growth (growth).  $\mu_{it} = \mu_{it} + \nu_{it}$  where  $\mu_{it}$  represents unobservable firm specific components and  $\nu_{it}$  represents the remaining variation over time  $t$ .

The regression models are stated as follows:

$$TDR_{i,t} = \beta_0 + \beta_1 ast_{i,t} + \beta_2 prof_{i,t} + \beta_3 size_{i,t} + \beta_4 tax_{i,t} + \beta_5 growth_{i,t} + \beta_6 IND_t + \mu_{it} \quad (2)$$

$$LTR_{i,t} = \beta_0 + \beta_1 ast_{i,t} + \beta_2 prof_{i,t} + \beta_3 size_{i,t} + \beta_4 tax_{i,t} + \beta_5 growth_{i,t} + \beta_6 IND_t + \mu_{it} \quad (3)$$

$$STR_{i,t} = \beta_0 + \beta_1 ast_{i,t} + \beta_2 prof_{i,t} + \beta_3 size_{i,t} + \beta_4 tax_{i,t} + \beta_5 growth_{i,t} + \beta_6 IND_t + \mu_{it} \quad (4)$$

### 3.3 Description of Variables

The variables used for this study are similar to those discussed in Frank and Goyal (2006) and Abor (2007) and Abor and Biekpe. The main dependent variables for this study are: Total debt ratio (TDR) also known as the leverage ratio, Long term debt ratio (LTR) and short-term debt ratio (STR). These variables define the capital structure for a firm. The definition of these variables follows the accounting framework as required by the JSE, and as prescribed by the International Financial Reporting Standards (IFRS). Long term debt or none current liabilities includes all obligations that the firms have that are due after a 12-month period from the year end date. Short-term debt or current liabilities includes all obligations that are due within 12 months. The total debt is the sum of the long and short-term debt. The debt ratios are the proportion of the total, short and long debt to the total liabilities and the total equity.

The independent variables are measured as follows: the asset tangibility (ASSET) will be measured by the fixed-asset ratio. The fixed assets are all the assets that are tangible in nature in proportion to the total assets of the firm. The profitability (PROF) of the firm will be measured as profit before interest and tax to assets. The size (SIZE) of the organization will be measured by using the log of assets. The tax variable (TAX) will be defined by the effective tax ratio which is the percentage of tax to the profit before earnings and tax. The risks (RISK) for this study will be defined as the variability of earnings before interest and tax over the period studied. The growth (GRWTH) of the firm will be measured by the percentage increase in the turnover of the firm. We will also include an industry dummy variable to examine industry effects on capital structure.

### 3.4 Estimation Techniques

The usage of panel data over a period allowed us to obtain a better understanding of the role the variables play in the capital structure over a period of time. However, the variables selected were based on the most prominent variables the literature review has revealed. The South African environment is unique, and as a result there might be unobserved variables which we have not included in the model and will result in an unobserved effect. If these variables are in any way correlated with the explanatory variables, the model will result in omitted variable bias. In any case, the model will be ineffective; the result yields ineffective conclusion on the effect in the differences in capital structure across industries. The two approaches to fitting a model used the panel data to minimize the influence of unobserved effects. These are the fixed effects and random effects regression. The fixed effect regression assists us to unobserved effect and allows us to analyze the net effect of the independent variables on the capital structure. The fixed effect regression assumes that the error is within the firm, and could have an impact on the variables; the fixed effects model controls for this. The random effects model assumes that the errors are random and not because of the firm independence. To ascertain the appropriateness of the model we will use the Durban-Wu-Hausman test (DWH). The null hypothesis is that the error term is distributed independently from the independent variables. If the null hypothesis is true, then the random effects and the fixed effects will be consistent. If the null hypothesis is false, then the random effects model will differ significantly from the fixed effects estimates, as it will be influenced by heterogeneity bias.

If the DWH test determines that we use the random effects model, we can then write the unobservable effects as:

$$\mu_{it} = \sigma + \varepsilon_{it}$$

Where the observable effect  $\sigma$  is zero and the unobservable effect consists totally of  $\varepsilon$ . For both the fixed effect and the random effect regression, we will have to estimate the unobserved effects. As robustness analysis, the OLS panel-corrected standard errors (OLS-PCSE) of Beck and Katz (1995) was employed to correct for sphericity of the error term.



## CHAPTER FOUR

### FINDINGS AND DISCUSSIONS

#### 4 Introduction

This chapter describes the overall descriptive statistics for the sample under review and discussion, and the main results linking the findings to previous research that have been conducted as outlined in Chapter 2 the literature review.

#### 4.1 Descriptive Statistics

A summary of the descriptive statistics is provided below in table 4.1. Starting at the top of the table results, the mean and standard deviation for total debt ratio is given as 0.496 and 0.3639. The average long-term debt ratio is 0.3663, with standard deviation of 0.2529. The short-term debt average for the sample is 0.6469, with a standard deviation of 0.2564. The asset tangibility ratio is on average 0.7588, with a standard deviation of 0.1995. The profitability on average is 0.0663, with a standard deviation of 0.3569. The average size of the companies in the sample is 14.412, with a standard deviation of 2.34. The average tax rate is 0.2451, with a standard deviation of 2.1046. The average growth is 0.0017, with a standard deviation of 0.0547.

The sample infers that South African firms have an equal propensity for debt and equity. The firms on the JSE also, on average, prefer short-term debt to long term debt. The asset tangibility is very high, at 0.7588. This is understandable as traditionally, the JSE has many mining and basic resource firms listed compared to other industries. The profitability on average has been low on average, given the tough trading environment and given the political uncertainty and slow growth rates firms have had during the period under review. The average tax rates are lower than the corporate tax rates, indicating that firms do take advantage of taxable deductions as indicated by Gwaditso and Ojah (2009).

**Table 4.1: Descriptive Statistics**

	Mean	Median	Std. Dev	Min	Max	N
<b>TDR</b>	0.4961	0.467	0.3639	0	8.0641	1966
<b>LTR</b>	0.3663	0.3348	0.2529	0	1	1894
<b>STR</b>	0.6469	0.6837	0.2564	0.0017	1	1964
<b>AST</b>	0.7588	0.1995	8.6954	0	200.7404	1966
<b>PROF</b>	0.0663	0.086	0.3569	-9.8864	1.8506	1966
<b>SIZE</b>	14.4162	14.477	2.3422	6.6529	29.5398	1966
<b>TAX</b>	0.2451	0.2765	2.1046	-69.7582	54.9111	1967
<b>GROWTH</b>	0.0017	0	0.0547	-0.1332	2.0657	1642

Note: TDR=Total debt Ratio; LTR= Long Term Debt; STR=Short Term Debt; AST= Asset Tangibility; PROF=Profitability; SIZE= Firm Size; Tax= Taxation; Growth=Firm Growth;

The table 4.2 below presents the average of the variables for each industry. The highest total debt ratio observed was in the health care industry at (1.05). The lowest total debt ratio was observed in the basic materials industries (0.4136). The health care industry also prefers long term debt and has the highest recorded long-term debt ratio for the period under review. The lowest long-term debt ratio recorded was for the technology sector (0.1904). The other industries prefer short-term debt to long term debt, with the technology industry having the highest short-term debt ratio (0.83). This is consistent with existing research asset intangibility of the industry, and the basic materials industry, the least reliant on short-term debt, seemingly indifferent to short-term debt to long term debt. The health care industry has the highest asset ratio for them at (15.9) and the technology firms, not surprisingly, have the lowest asset ratio on average (0.07). The highest average tax rates are in the consumer services industry (0.3190), with healthcare recording the lowest average tax rate (0.0720) indicates that the industry enjoys preferential tax policies.

The healthcare industry has significantly higher debt levels, relies on long term debt and has a significant amount of fixed assets. The firms in this industry provide state of the art health care service to individuals who choose not to rely on the public health care system. The private health care providers must acquire specific and very sophisticated equipment to provide world class health services. These machineries are very expensive. The properties that house the equipment are tailor-made for such purpose and therefore purchased or self-constructed for this purpose. The hospitals cater for middle to high income earners in the South African economy, and as a result the hospitals are also located in more affluent areas in South African major cities. The financing of the land, buildings and equipment based on table 4.2 is mostly by debt of a long-term nature. The tax deductions in the health care industry is significantly higher than the other industries, given the none debt related tax deductions and preferential tax treatment given to the health care industry, specifically in the research and development of new technologies. One example of innovation, for example, is Net Care's investment in green energy due to power shortages that could potentially affect the operations of the hospital. The industry therefore relies more on long term debt for the significant capital outlay. The consumables that the hospital industries use is financed by short-term debt.

**Table 4.2 Average Determinant Values**

	<b>TDR</b>	<b>LTR</b>	<b>STR</b>	<b>AST</b>	<b>PROF</b>	<b>SIZE</b>	<b>TAX</b>	<b>GROWTH</b>
<b>Basic Materials</b>	0.4136	0.5154	0.5111	0.2345	-0.0452	14.3539	0.2795	0.0024
<b>Consumer Goods</b>	0.4888	0.3611	0.6407	0.3005	0.1003	14.7581	0.2436	0.0001
<b>Consumer Services</b>	0.4965	0.2887	0.7192	0.2949	0.1399	14.7199	0.3190	0.0000
<b>Health Care</b>	1.0551	0.5724	0.4531	15.9221	0.2551	14.7997	0.0720	-0.0056
<b>Industrials</b>	0.5138	0.3059	0.6978	0.2638	0.0786	14.3783	0.1828	0.0000
<b>Technology</b>	0.4999	0.1904	0.8323	0.0754	0.1113	12.8218	0.2739	0.0000
<b>Telecommunications</b>	0.4726	0.2419	0.7581	0.3290	0.1462	15.6125	0.3055	0.0000
<b>Utilities<sup>5</sup></b>	0.6056	0.0000	1.0000	0.3536	-0.1138	10.0132	0.0000	0.2592
<b>Anova: F test</b>	28.08***	61.22***	55.82***	31.34***	14.31***	16.52***	0.25	28.59***
<b>Bartlett's: chi2</b>	1.40E+03***	24.2948***	42.8858***	1.40E+04***	1.90E+03***	185.7282***	2.20E+03***	1.60E+04***
<b>Kruskal-Wallis: ch2</b>	105.698***	334.743***	312.806***	146.986***	259.754***	107.191***	139.08***	100.88***

Notes: Note: TDR=Total debt Ratio; LTR= Long Term Debt; STR=Short Term Debt; AST= Asset Tangibility; PROF=Profitability; SIZE= Firm Size; Tax= Taxation; Growth=Firm Growth; \*\*\* denotes significance at 1%,

<sup>5</sup> The utilities industry in South Africa only has one listed entity.

The basic materials industry has significantly less debt than other industries, with the total debt ratio being 42.36 percent. The basic material industry has traditionally been driver in the establishment of the JSE and a driver of the South African economy, which majorly assisted the basic material industry in raising equity for significant investment in the industry. The mining firms of South Africa therefore have a long history and established infrastructure. The figures in table 4.2 are viewed in the context of the history of South Africa's socio-economic environment. The statistic sheds light on the current environment in the mining sector. The sector surprisingly has the lowest fixed-asset base and an effective tax rate that is not significantly different from the company tax rate of 28 percent, meaning the industry on average does not claim deductible expenditure for tax purposes. The lower asset ratio and high tax rate could be because of significantly cheaper labour available in South Africa, opposed to other countries. South African firms are therefore more inclined to stick with more traditional methods of mining rather than investment in newer, less labour-intensive technologies, to extract minerals from the ground. Investment in newer technologies would also result in job losses that are not favourably viewed by the labour unions and the South African government. The relationship with the South African government and the workers has been fickle, due to uncertainty regarding the mining regulations, and high political uncertainty has contributed to a lower growth environment. Given the systemic local risks, the mining industry growth has also been further exasperated due to tough trading conditions in the international markets, resulting from a decrease in commodity prices during the last decade. The firms in the basic materials industry therefore rely more on equity to fund projects due to possibly asymmetric information regarding prospects in the mining industry. This could be due to firms seeing debt as "reduction of free cash," as indicated by Jensen and Meckling (1976) and possibly the existence of agency costs. This could also be due to closer monitoring by block shareholders, as indicated by Abor and Biekpe (2006). The industry prefers equity to debt to finance investment opportunities, which consists mostly from offshore expansion. The industry on average has equal preference for short and long-term debt. At an industry level this contrasts existing studies that indicate preference for short term debt in South African firms.

The consumer goods and consumer services industry have a similar preference for equity over debt - on average the leverage ratios for firms are 48.8 and 49.6 percent for the consumer goods and consumer services respectively. The structure of the debt for both industries leans towards a preference for short term debt, again confirming the matching principle with regard to the

industry demands for networking capital. Consumer goods firms on average have a short-term debt ratio of 64.07 percent, as opposed to consumer service with 71.92 percent. The long-term average debt ratios are 36.11 percent and 28.87 percent for consumer goods and consumer services respectively. The consumer goods industry includes the retail sector, which according to a recent study by accounting firm PWC, is the largest in Africa and 20<sup>th</sup> largest in the world. The firms deliver final consumable goods to the consumer of the product as the end user. The industry has been plagued by a low growth inflationary environment with South Africa, only recently moving out of a recession during 2017. The focus of most of these firms has been on competitive operational efficiency and cross border expansion. These firms rely on efficient distribution networks that minimize the holding costs of goods to prevent passing of extra costs on to the consumer, as a result relying more on short term debt to finance the working capital to match the duration of the debt and to minimize the working capital cycle. The larger long-term debt ratio for the industry possibly translates from the need to maintain and expand the distribution networks and physical locations of the business operations. The consumer services industry provides service to the final consumer goods. These firms provide services mainly on a contractual basis, and rely more on short term debt and less long-term debt, matching the term nature of operations with that of the finance needs.

The largest industry on the JSE, the industrial industry on average prefers debt to equity with a leverage ratio of 51.38 percent. The firms in this industry rely more on short-term debt, with an average short-term debt ratio of 69.78 percent and a long-term debt ratio 30.59 percent. This is surprising, given the machinery requirements of the industry. This could mean that machinery is financed through short-term debt and leased rather than owned directly by the company, in accordance with the International Financial Reporting Standards (IFRS). This view is supported by the relatively low fixed-asset ratio, as leased assets not owned by the entity are not recorded by the firm, which only records the lease expenditure in the financial statements, with subsequent reduced liabilities (as opposed to buying the asset) disclosed. The industry enjoys favourable government support through favourable tax deductions compared to other industries, with an effective tax rate of 18.28 percent. This is part of government initiatives to diversify the economy away from the basic material and mining sectors and to produce goods locally, through which the high unemployment rates in South Africa can be reduced.

The technology industry is still in its infancy and on the average, seems to have no preference for debt or equity with the leverage ratio being 49.9 percent. In terms of the structure of the

debt profile, the technology industry places heavy reliance on short-term debt to finance operations, with the short-term debt ratio at 83.25 percent, and very little long-term debt is used in financing operations, with the long-term debt ratio at 19.04 percent. The industry, as expected, has the lowest average fixed asset ratio at 7.5 percent. This is consistent with the existing studies, particularly relating to the asymmetry of information regarding the valuation of assets, as Gwaditzo and Ojah (2009) indicate that no collateral is needed for short-term debt as opposed to long term debt.

The telecommunication industry has on average a leverage ratio of 47.26 percent, thereby preferring equity to debt; the industry also prefers short term debt to long term debt with short term debt on average being 78.81 percent and the long-term debt ratio 24.19 percent. The industry has the highest fixed-asset ratio after health care industry, as the industry relies on telecommunication infrastructure to provide service to its customers.

## 4.2 Correlation Analysis

The illustration table 4.3 presents the correlation between different variables; of importance for this study is the sign, i.e. positive or negative correlation and the strength of the correlation.

**Table 4.3: Correlation Matrix**

	<b>TDR</b>	<b>LTR</b>	<b>STR</b>	<b>AST</b>	<b>PROF</b>	<b>SIZE</b>	<b>TAX</b>	<b>GROWTH</b>
<b>TDR</b>	1.0000							
<b>LTD</b>	0.1302***	1.0000						
<b>STD</b>	-0.1393***	-0.9996***	1.0000					
<b>AST</b>	0.5364***	0.1544***	-0.1311***	1.0000				
<b>PROF</b>	0.0488**	0.0158	-0.0274	0.1963***	1.0000			
<b>SIZE</b>	-0.0399*	0.1947***	-0.2577***	-0.1171***	0.2211***	1.0000		
<b>TAX</b>	0.0043	0.0311	-0.0465**	-0.0213	0.0112	0.0511**	1.0000	
<b>GROWTH</b>	-0.0201	-0.0370	0.0465*	-0.0058	-0.0486**	-0.0617**	0.0000	1.0000

*Note: TDR=Total debt Ratio; LTR= Long Term Debt; STR=Short Term Debt; AST= Asset Tangibility; PROF=Profitability; SIZE= Firm Size; Tax= Taxation; Growth=Firm Growth; \*\*\*, \*\* and \* denotes significance at 1%, 5% and 10%. Source: Researchers estimates from research data*

The first column represents the correlation with the first dependent variable total debt ratio (TDR). A weak but positive relationship exists between the total debt ratio and the long-term debt ratio (0.1302) and a weak but negative relationship with the short-term debt ratio (-0.1393). The higher the debt levels, the higher the long-term portion of the debt and in contrast when total debt increases, the short-term portion decreases. This could be an indication of poor economic environment during an uncertain period under review, during which firms prefer to utilize short-term debt and pay it off within the short-term. However, when looking at the correlation between the fixed-asset ratio and the total debt ratio, this indicates that as the

tangibility of assets increases across firms, the more debt is taken on by firms. This finding is similar to the results indicated by Abor and Biekpe (2009) in a study involving Ghanaian firm, that debt is positively related to asset tangibility. However, in that study, firms prefer short-term debt as the total debt increases, indicating that the structure of debt is more biased towards short-term debt due to low asset intangibility. In contrast, South African firms' total debt ratio increases along with long term debt, but decreases when short-term debt increases. This is further indicated by the strong negative relationship between long term debt and short-term debt. This supports the findings Gwaditso and Ojah (2009) observations regarding the negative relationship between total debt and short-term debt for South African firms. This indicates that long term debt is preferred to purchase fixed assets, where short-term debt is used to finance net working capital; furthermore, we observe a negative relationship significant at all levels between short-term debt and fixed assets, indicating that long term assets are possibly financed by long term debt. This is referred to by Abor and Biekpe (2009) as the "matching principle." The correlation between asset tangibility and long-term debt is positive at all levels tested (0.1544), and a small but negative correlation with short term debt (-0.1311), further corroborating Abor and Biekpe (2009). To some extent, agreeing with studies that found that the term preference of total debt correlates with asset tangibility.

When looking at profitability, there is a positive correlation with total debt, long term debt and a negative correlation with short-term debt. This indicates that profitable firms prefer to use retained earnings when available, and during times of low profitability to use short term debt; however, the correlation is very weak. We will examine this closer at an industry level. This could highlight the relative developed nature of South Africa's financial system with relative easy access to financing for listed firms, as explained in Gwaditso and Ojah (2009).

Firm size, as indicated by previous studies, has an impact on the capital structure of firm. Size for South African firms is positively correlated with long term debt (0.1947) and significantly, the firm size is negatively correlated with short term debt (-0.2577). This is in contrast with Haung and Song (2006), who found a negative relationship between total debt and size - the reason for this could be due to the relative profitability and environment facing Chinese firms. The negative correlation with short-term debt indicates that larger firms use profits to finance operations and investment decisions; this is consistent with other studies Gwaditso and Ojah (2009). This can be corroborated with the fact that size has a positive correlation with profitability (0.221), which indicates the preference of a pecking order (POT). Furthermore,

tax and growth prospects do not seem to have a strong correlation with capital structure decisions, given the proxies used in the study.

### **4.3 Regression Results**

The regression results on the determinants of debt among JSE listed firms is presented in Table 4.4. The equations are estimated using the Random Effects (RE) and the Panel Corrected Ordinary Least Squares Estimation Techniques (OLS-PCSE). The choice of the RE technique over the fixed effects (FE) was determined by the results of the Hausman (1978) specification test. All model diagnostics suggest that estimated results are statistically significant in explaining leverage usage among the sample. Specifically, the results of the Wald Test are significant at 1% across all model and estimations techniques. This suggests that the independent variables have significant explanatory power on leverage, as defined by Total Debt Ratio (TDR), long term debt ratio (LTR) and short-term debt ratio (STR). The R-squared which explains the variations in leverage usage collectively by the independent variables shows that in respect of the RE model, the independent variables jointly explain the approximately 50% (89.58% in OLS-PCSE) of the changes in total debt (TDR), compared to 23.06% (63.05 in OLS-PCSE) and 24.32% (81.86% in OLS-PCSE) in long term debt (LTR) and short-term debt (STR) respectively.

The coefficient of asset tangibility (AST) is observed to be positive and significant across the Models 1 (TDR) and 2 (LTR) to indicate that increases in tangible assets result in higher leverage usage at a 1% significance level. The reason for total debt increasing with asset tangibility in Model 1 (TDR) is due to collateral value of fixed assets. Through increases in the value of fixed tangible assets, firm are able to increase their capacity in providing collateral to acquire more debt; this is due to the protection offered by courts to the creditors, who can approach the court to place the company under administration and or liquidate the assets. This is consistent with research conducted by Hall et al (2000) and Gwaditzo and Ojah (2009) for firms listed in the JSE, which found that this condition was not applicable to other African countries included in the study. The root cause and explanation offered for the observation was due to the relative established legal infrastructure that South Africa has - the authority of the local courts enforceability of contracts and property rights and also the protection offered to creditors. This gives the lenders the comfort and security that if the firm finds itself in financial difficulty, the lenders/creditors can then step in and apply for a court order to place the firm under liquidation. In the liquidation process, the South African laws are clear in the preference on claims on the firm's assets: the firms first pay the creditors and debt holders, and then



shareholders share in the residual value post settlement of debt. The relevant provision is contained in the new companies' act 71 of 2008 section 37, which deals with finance instrument preferences, rights and obligations<sup>6</sup>. The companies act goes further than just providing for the protection in terms of the preference and process of liquidation, but also provides for the personal liability of directors in section 76(3) of the companies act – “*Director must perform his functions in good faith and for a proper purpose; in the best interest of the company; and with a degree of care, skill and diligence that may be reasonably expected of such a person who carries on the same functions in relation to the company as those carried out by that Director and; having the general knowledge, skill and experience of that Director.*” This provision reduces the agency costs, as indicated by Jensen and Meckling (1976), as the debt providers can now also approach the court to seize the assets of directors if negligence can be proved. The new companies act brought the South African law in line with USA, Canada and the UK, and for this reason the results assimilate the findings of Hall et al (2000) in the UK.

Long term debt providers require specific collateral, and usually the asset being financed is the collateral for debt providers. Long term financing is also cheaper than short term financing, and it becomes very expensive when firms attempt to borrow short to finance long term assets, due to roll over costs and other transaction costs, not to mention the higher interest rates.

Asset tangibility is observed to have a negative and significant effect on short term debt (STR) in Model 3. The observed negative effect of fixed assets on short-term debt in the STR (Model 3) is also consistent with the explanation provided in the preceding paragraph; increased asset intangibility results in the firm having access to longer term and cheaper financing: therefore, the higher the tangibility, the lower the reliance on short term financing. Firms with lower asset intangibility and therefore absence of collateral requirements for long term debt resort to short term debt to finance operating and investment decisions. This is consistent with results obtained by Abor and Biekpe (2009), who indicated that in the Ghanaian environment a negative relationship between asset intangibility and short-term debt was found between total debt and short-term debt, indicating that firms have a preference for short term debt due to the absence of collateral value required to finance activities. In that study it was proved that a statistically negative relationship exists between asset tangibility and long term debt, suggesting that firms choose to match the duration of their liabilities and there assets.

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<sup>6</sup> [http://www.cipc.co.za/files/2413/9452/7679/CompaniesAct71\\_2008.pdf](http://www.cipc.co.za/files/2413/9452/7679/CompaniesAct71_2008.pdf)

The coefficient for profitability (PROF) is negative and significant in Model 1 (TDR) and Model 2 (LTR), but positive for Model 3 (STR). Similar results have been found in Gwaditso and Ojah (2009) and in the Chinese environment as indicated by Chen (2014). As profitability increases, firms use the profits and retained earnings to finance investment and operating activities, and rely less on debt in general, and specifically long-term debt. This indicates that in profitable periods, a pecking order (POT) exists in financing activities. The POT can further be elaborated on through observing the positive relationship between profitability and short-term debt. As profitability increases, firms are more likely to resort to short-term debt if needed. The reasoning for this is as follows: when profitability increases, the firms generally produce and sell more goods and services, thereby increasing the day to day activities, therefore the networking capital requirements increases, and as a result short term debt or current liabilities increases. The pecking order is as follows: firms first choose to finance activities with profits and retained earnings, and then resort to short term debt, which, depending on arrangements between the firm and credit providers, is, often interest free, according to the amount of days the debt is outstanding. The reason for this is possibly due to information asymmetries between managers and financiers about future prospects, due to the relatively higher costs of seeking financing externally Myers and Maljuf (1984), thereby resulting in the cheaper internal and short term interest free credit (if terms are adhered to).

A slightly negative significant negative correlation has been found for model 1 (TDR) with regards to size when considering the random effects, significant at a 10 percent level. A similar relationship was found by Haung and Song (2005), which found a negative relationship between leverage and size, indicating that larger firms have had more time to accumulate retained earnings, and therefore prefer financing using the profits to finance both investments and operations.

The coefficient for size is significantly positive for Model 2(LTR); this result is similar to that of the study by Rajan and Zingales (1995) that indicates that the larger firms have more diversified operations and as a result provide more transparency, decreasing the asymmetries of information and the related costs that exist between the firm and external parties. The firms therefore find it easier to issue long term debt to finance investment and operations, due to reduced “costs” associated with leverage. Similar results have been found locally by Ojah and Gwaditso (2009) in South African environments.

Short term debt has a significant negative relationship with size, according to Model 3 (STR), meaning that as the size of the firm increases, firms tend to use less short term financing, and conversely smaller firms therefore are more leveraged than larger firms. This is similar to findings from Abor and Biekpe (2009), indicating that smaller firms tend to be discriminated against and therefore resort to short term financing. Larger firms are also able to access long term cheaper financing, due to the size and possibly higher asset tangibility. Therefore, larger firms rely less on short term debt and prefer to use internal financing.

The tax rate has an overall positive and insignificant effect on model 1 (TDR), but significantly positive for model 2(LTR). This is unexpected, as Gwaditzo and Ojah (2009) found a negative relationship between debt and effective tax rates, indicating that firms in that study took advantage of the tax benefits. However, this study reveals that on an overall level firms do not take advantage of the tax benefits when making capital structure decisions concerning long term debt. The signal is negative and significant for short term debt (model 3), possibly indicative of the fact that South African firms utilize short term debt more than long-term debt, and incur higher interest costs, which are then claimed as tax deductions. Similar findings were found by Huang and Song (2006) in China.

The growth rate coefficient is insignificant for Model 1 (TDR) and Model 3 (STR). However, for Model 2 (LTR) the growth rate effect is significantly negative; this indicates that when firms are experiencing high growth prospects they tend to borrow less, and during periods of low growth firms tend to borrow more. This is due to high growth periods attracting high profits, and as a result firms tend to use more internal sources of financing, corroborated by similar signs for profitability, as explained above. This result does not conform to Abor and Biekpe (2009) on Ghanaian SMEs, which indicated that growth placed constraints on profits for SMEs, and as a result firms have no choice but to seek external sources of financing; this could be due to the pecking order at play in the relatively larger firms.

In respect of the industry dummies, firms in the consumer goods (CG) consumer services (CS), health care (HC), industrials (IND); technology (TECH); telecommunications (TEL) and utilities (UTIL) are observed to have significant higher levels of debt compared to firms in the basic materials (BM) industry. This is mainly due to the basic material (BM) firms consisting mainly of large mining firms with a long history in the South Africa and having access to international funding through dual listings elsewhere; it can be argued that the firms in this industry could raise equity financing easily, compared to other firms.

However, aside from the health care (HC) industry, firms in the basic materials (BM) industry employ significant higher levels of long term debt (LTR) compared to the other industries, and this is could be due to the matching principle: the mining industry has mostly large investments in infrastructure and, being established firms, they have access to cheaper finance, thereby preferring to finance fixed assets with long term finance; this could also be indicative of the collateral value of the fixed assets. Similarly, in the health care (HC) industry, private health care providers must acquire specific and very sophisticated equipment to provide world class health services. This machinery is very expensive. The properties that house the equipment are tailor made for purpose and therefore purchased or self-constructed for purpose, and as a result firms tend to match longer term projects or fixed assets with longer term finance.

In terms of the Short-Term Debt (STR) component of total leverage, basic materials industry utilizes significantly lower short-term debt than other industries, due to the minimal net working capital requirements compared to other industries, who rely on short-term financing to finance operations. Similar results were found by Abor and Biekpe (2009), referred to as the 'matching principle,' whereby firms match the term of projects with equivalent terms of financing. Similar results were also found by Abor 2007, who indicated that firms with high value collateral tend to rely more on short term financing.

This supports studies from Franck and Goyal (2009), who indicated that industry classification can affect the capital structure in two ways: firstly, firms could use the average industry leverage as a bench mark. Secondly, firms in the industry could face common industry factors that result in different determinants playing an influencing factor in the determination of capital structure. Industry therefore influences capital structure decisions.

**Table 4.4: Determinants of Capital Structure**

Dep. variable	Model 1		Model 2		Model 3	
	TDR		LTR		STR	
	RE	OLS-PCSE	RE	OLS-PCSE	RE	OLS-PCSE
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
<b>Constant</b>	0.5102*** (0.063)	0.4052*** (0.103)	-0.0987 (0.062)	0.0623 (0.054)	1.171*** (0.063)	0.9491*** (0.058)
<b>AST</b>	0.0189*** (0.001)	0.0227*** (0.002)	0.0019*** (0.001)	0.0048*** (0.001)	-0.0017** (0.001)	-0.0040*** (0.001)
<b>PROF</b>	-0.2504*** (0.024)	-0.2061*** (0.038)	-0.0885*** (0.025)	-0.0801*** (0.025)	0.1004*** (0.026)	0.0929*** (0.025)
<b>SIZE</b>	-0.0064* (0.004)	0.0010 (0.006)	0.0436*** (0.004)	0.0314*** (0.003)	-0.0476*** (0.004)	-0.0317*** (0.003)
<b>TAX</b>	0.0019 (0.001)	0.0006 (0.0010)	0.0046** (0.002)	0.0048** (0.002)	-0.0026* (0.001)	-0.0025** (0.001)
<b>GROWTH</b>	-0.0185 (0.058)	-0.1141 (0.084)	-0.1379 (0.171)	-0.4309** (0.193)	0.0342 (0.063)	0.0465 (0.036)
<b>INDUSTRY DUMMY (Basic Materials as reference point)</b>						
<b>CG</b>	0.1200** (0.051)	0.0936*** (0.019)	-0.1540*** (0.048)	-0.1896*** (0.027)	0.1450*** (0.046)	0.1681*** (0.029)
<b>CS</b>	0.1164*** (0.042)	0.0694*** (0.025)	-0.2381*** (0.040)	-0.1961*** (0.027)	0.2285*** (0.038)	0.1929*** (0.028)
<b>HC</b>	0.2406*** (0.083)	0.3020*** (0.105)	-0.0083 (0.078)	-0.0322 (0.040)	0.0019** (0.076)	0.0305 (0.040)
<b>IND</b>	0.1037*** (0.037)	0.1008*** (0.022)	-0.2202*** (0.035)	-0.1964*** (0.022)	0.2061*** (0.033)	0.1894*** (0.022)
<b>TECH</b>	0.1212* (0.064)	0.0565 (0.047)	-0.2500*** (0.061)	-0.2379*** (0.040)	0.2384*** (0.059)	0.2456*** (0.039)
<b>TEL</b>	0.0911 (0.086)	0.0803*** (0.028)	-0.3303*** (0.081)	-0.2877*** (0.036)	0.3187*** (0.078)	0.2829*** (0.031)
<b>UTIL</b>	0.1307 (0.204)	0.1996** (0.085)	-0.2616 (0.222)	-0.3226*** (0.030)	0.2997 (0.187)	0.3643*** (0.031)
R-squared	0.5008	0.8958	0.2306	0.6305	0.2432	0.8186
Wald $\chi^2(12)$	841.27	310.31	221.81	2723.28	241.81	1314.89
Prob > $\chi^2$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Firms	210	210	210	210	210	210
Observations	1639	1639	1598	1598	1639	1639

Note: AST= Asset Tangibility; PROF=Profitability; SIZE= Firm Size; Tax= Taxation; Growth=Firm Growth; CG= Consumer Goods; CS= Consumer Services; HC= Health Care; INDS=Industrials; TECH= TECHNOLOGY; TEL= Telecommunications; UTIL= Utilities; robust standard error in parentheses; \*\*\*, \*\* and \* denotes significance at 1%, 5% and 10%. Source: Researchers estimates from research data

#### 4.4 Industry Level determinants of Total Debt Ratio

The determinants of debt indicated by the independent variables in the study vary significantly from industry to industry in relation to total debt, as shown in table 4.5. This could indicate the existence of inter industry capital structures, as empirically verified by Bradley (1984), who found that inter industry variances do exist in capital structures, and that the low intra industry variation in leverage could indicate that firms in the industry have optimal leverage to which

they gravitate with their financing behavior. Similar results were found in Ghana by Abor (2007), who found significant variations between industry capital structures, and concluded that industry effects play an important role. The main determinants for each section are explained below.

The effect of asset tangibility on total debt is observed to be positive and significant for firms in the basic material (BM), Health Care (HC) and Technology (TECH) industries; significant at a 10 and 1 percent level respectively. The effect of asset tangibility is observed to be higher for firms in the TECH industry followed by BM and HC respectively. This study used the ICB classification; this makes the comparability with other studies difficult, as other studies have used mostly local stock exchange industry classifications. This result to some extent validates Hall et al (2000), who indicated that asset structure is a significant determinant. This is due to financiers demanding some form of collateral from these industries to extend financing, and the availability of such collateral therefore improves the firms' chances of obtaining debt financing. However, the results to some extent support Abor (2007), who found industries with higher collateral have more debt; the agricultural industry in Ghana had the highest amount of fixed assets and the highest debt ratios. Similarly in this study the health care (HC) industry has the highest fixed asset ratio according to Table 4.2, and the highest debt levels. The fixed asset ratio is a significant determinant for the Health Care (HC), Basic Materials (BM) and Technology (Tech) industry.

The profitability has a significant effect on total debt for all industries, namely the Basic Materials (BM), Consumer Goods (CG's), Consumer Services (CS), Industrial (IND) and Technology (TECH) firms. This confirms that the pecking order is applicable to these firms in these industries. These firms prefer internal financing to external sources of financing. The result slightly amends the results found by Gwaditso and Ojah (2009), Chepeta and Deressa (2016) and Ramjee and Gwaditso (2012), which indicated that in general South African firms who are more profitable operate at a lower leverage, and that the pecking order applies to South African listed firms. The result indicates that Basic Materials (BM), Consumer Goods (CGs), Consumer Services (CS), Industrial (IND) and Technology (TECH) industry firms display a significant pecking order in the capital structure decision.

However, a significant positive relationship is observed for the telecommunication industry (TEL) between debt and profitability at a 5 percent and 10 percent significant level. This indicates that as a firm's profitability increases, the total debt decreases. This suggests that the

POT is not applicable to this industry. The firms in the telecommunication (TEL) industry firms therefore prefer to pay dividends to shareholders instead of using external sources of finance, as observed by Gwaditzo and Ojah (2009) and as was the case with Nigerian firms included in that study.

The size determinant has a positive significant effect on total debt at a 1,5 and 10 percent for the TECH and CS industries. This indicates that firms in these industries tend to attract more debt as they grow larger in terms of size. Firms in the TECH and CS industry therefore benefit from the effect of more transparency and the reduced costs of information asymmetry Rajan and Zingales (1995), the firms have traditionally smaller fixed asset ratios, and as size increases, the monitoring and other costs associated with issuing debt decreases. However, for the basic material (BM) industry, the coefficient has a significant negative effect on total debt, indicating larger the firms have less debt. This could be indicative of the fact that larger firms have had more time to obtain returned earning from diversified operations and therefore do not have to use external funding Huang and Song (2006)

The tax determinant has a negative significant relationship with the TECH and HC industry at a 1 and 10 percent level respectively. This indicates possible existence of a trade-off between the benefits of debt and the cost of debt, as explained by the trade-off theory. The results in the TECH and HC industry support the results as obtained by Kraus and Litzenburger (1973), who theorized that a firm's value is maximized if an optimal capital structure is obtained. The optimal capital structure is a trade-off between the benefits of debt tax and the costs of financial distress. However, the IND industry has a positive relationship with the effective tax rate, indicating possible differences in the tax and accounting treatment of deductible costs for the industry, resulting in deferred tax liabilities indicating that the tax policy relating to none tax deductibles for the industrial industry being more beneficial to the industry by deferring tax liabilities to future periods.

The different industries total debt appears to be unaffected to growth prospect of firms.

**Table 4.5: Industry Level determinants of Total Debt Ratio**

Dependent variable: Total Debt Ratio (TDR)							
	BM	CG	CS	HC	IND	TECH	TEL
	<i>Coef.</i>	<i>Coef.</i>	<i>Coef.</i>	<i>Coef.</i>	<i>Coef.</i>	<i>Coef.</i>	<i>Coef.</i>
Constant	0.7508*** (0.098)	0.7553*** (0.168)	0.2423** (0.111)	-0.1594 (0.559)	0.4710*** (0.115)	-0.7801** (0.302)	0.2367* (0.126)
AST	0.1503* (0.079)	0.0054 (0.099)	0.0768 (0.072)	0.0202*** (0.003)	0.0306 (0.048)	1.2006*** (0.385)	0.0706 (0.074)
PROF	-0.1979*** (0.036)	-0.7010*** (0.071)	-0.3127*** (0.062)	0.3558 (0.380)	-0.2564*** (0.040)	-0.5833*** (0.146)	0.2122** (0.086)
SIZE	-0.0250*** (0.007)	-0.0124 (0.011)	0.0193*** (0.007)	0.0432 (0.034)	0.0033 (0.008)	0.0987*** (0.021)	0.0111 (0.008)
TAX	0.0008 (0.002)	0.0255 (0.026)	-0.0125 (0.009)	-0.1628* (0.088)	0.0028** (0.001)	-0.2675*** (0.096)	0.0428 (0.044)
GROWTH	-0.0202 (0.193)	5.1516 (7.459)	-80.2099 (79.404)	-2.4868* (1.418)	71.4327 (87.775)	6385.2730 (4054.033)	3860.7470 (6931.207)
R-squared	0.1285	0.2944	0.313	0.9446	0.0887	0.5126	0.4208
Wald $\chi^2$ (5)	49.02	106.32	44.76	648.51	48.03	72.73	31.97
Prob > $\chi^2$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Firms	56	22	40	7	66	12	6
Observation	409	172	318	44	542	97	50

Note: AST= Asset Tangibility; PROF=Profitability; SIZE= Firm Size; Tax= Taxation; Growth=Firm Growth; BM=Basic Materials; CG= Consumer Goods; CS= Consumer Services; HC= Health Care; INDS=Industrials; TECH= TECHNOLOGY; TEL= Telecommunications; robust standard error in parentheses; \*\*\*, \*\* and \* denotes significance at 1%, 5% and 10%. Source: Researchers estimates from research data



## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1.Introduction

This study examined the capital structures differences across industry classification for 221 firms listed on the JSE between the 2007 and 2016. A panel multiple regression model was used to identify the effect of firm level characteristics on the capital structure across the industrial sectors.

#### 5.2 Summary of the study

This study to some extent confirms the results of other studies that have been conducted on the JSE by Gwaditso and Ojah (2009), which indicate that firms in the South African firms on an overall context prefer internal financing and prefer short term debt to long term debt. The results on an overall level is consistent with this study and agree that when looking at the South African listed firms, the results indicate that South African firms follow the pecking order. This study also confirms that a positive relationship between total debt and long-term debt and asset tangibility. On an overall level, the study confirms that profitability is a significant factor in determining the capital structure of firms in developing countries as found by Chepeta and Deressa (2016). Furthermore, it also provides evidence that supports Ramjee and Gwaditso (2012), indicating that more profitable firms operate at a lower leverage and that the pecking order applies to South African listed firms.

The study supports results from Abor and Biekpe (2009), and found evidence that in South Africa, more specifically, total debt is positively related to tangible assets, but asset structure is negatively related to short-term debt, indicating that SMEs match short term finance with current assets, and prefer to finance long term assets with fixed assets – this is known as the ‘matching principle.’ The aim of this study was to investigate whether findings from elsewhere on the continent apply to JSE listed entities specifically. Abor (2007), who found in Ghana significant variation between industry capital structures, concluded that industry plays an important role in determining capital structure. This study also found that industries with higher collateral have more debt; the agricultural industry had the highest amount of fixed assets and the highest amount of debt. Similar industry variation was found by Smart et al (2004) as

referenced by De Wet (2006), who indicate that capital structures tend to display definite industry patterns, and that South African firms have similar industry debt patterns to that of US based firms. The study therefore contradicts the findings by Hatfield et al (1994), who found no relationship between the industry leverage and firm leverage in a cross-industry examination of 183 firms across 55 industries between 1982 and 1986 in the USA.

### **5.3 Summary of findings**

On an overall level Asset tangibility, profitability and firm size were found to have a significant effect on total debt, with varying effects observed for long-term and short-term debt. Firms in the basic material industry total debt ratio are mainly determined by the fixed asset ratio indicating that firms in this sector rely on tangibility of assets to secure debt financing. Profitability has a negative relationship with total debt, possibly indicating the presence of the pecking order theory.

The consumer goods and consumer service industry firms leverage ratios, mainly determined by the firm profitability, following the pecking order theory. The health care industry shows signs of trade off theory being present as the main determinant being the effective tax rate which has an inverse relationship with the total debt ratio. The industrial industry has an inverse relationship with profitability, also indicating possible pecking order theory at play. The main determinants for the technology industry are asset tangibility, profit and the effective tax rate. The telecommunication industry determinant of total debt is profit. However, the relationship was found to be positive with firms most likely preferring to pay dividends during profitable periods, therefore incurring more debt as profitability increases.

### **5.4 Conclusions and policy implications**

Despite comparability issues with Abor (2007) due to the classification for this study being according to the ICB classification, and Abor (2007) being according to the local industry classification for Ghana, we can conclude that this study confirms that industry variation exists in firm determinants of capital structures. More specifically, the hypothesis for this study was that Capital structures do not vary significantly across the ICB classification of the industry. Capital structures determinant does not vary significantly across ICB classification of the industry. We hereby reject the null hypothesis in favour of the alternative hypothesis and conclude this study by stating that:

*Capital structures vary significantly across ICB classification of industry.*

*Capital structures determinant vary significantly across ICB classification of the industry.*

The study has important implications for policy makers. South Africa being a developmental state, it is important to understand the determinants of capital structure to effectively support the industries through policy to address funding challenges that firms face. Through this understanding, it will be easier to support growth in the different industries, thereby hopefully reducing the unemployment rates and spurring economic growth. Industries that enjoy tax benefits take on more debt, as shown by the health care industry in this study. In industries where asset tangibility is a significant determinant, i.e. the basic material, health care and industrial industries, government can offer support in financing assets or subsidise purchases to ensure that firms' access to more debt for other investment activities. Where profitability is a major determinant, ie the basic materials, consumer goods, consumer services, industrials and technology firms, government could look at providing direct financing through public finance institutions to reduce the burden; in particular start-up firms, and in supporting small businesses. The same is true for firms where size an important determinant.

### **5.3 Avenues for future research**

The need for current research on the capital structure has been emphasised by various authors, specifically in the African context. This study focused on the determinants of capital structure at a firm level. However, the study ignored the macro economic environment. It is also noted that this study relied on other studies to identify determinants of capital structure, specifically Abor (2007). There could be other variables that influence the financing decision, and therefore more work could be done in that regard.

This study considered the highest level of the ICB as the classification on the JSE, namely the industrial level; however, the ICB has four lower levels that could be investigated by future studies. This would also allow for better comparability to other studies which did not classify the firms according to the ICB, but used the local classification system, for example Abor (2007).

Furthermore, the need to understand capital structure decisions could influence policy for private listed entities; however, little research has been conducted on the capital structures of

SOEs. As a future research, the applicability of the findings found here could be tested against the decision-making processes of State Owned Enterprises (SOEs) particularly in the South African context.

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