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Determinants of Capital Structure of listed firms in the South African Manufacturing Industry

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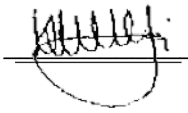
DECLARATION

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

Date signed: 

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ABSTRACT

This study sought to investigate the impact of firm specific variables and corporate governance variables on capital structure of manufacturing firms listed in Johannesburg Stock Exchange (JSE) for the period 2004-2017. This resulted in a panel of 74 out of 108. Return on asset (ROA), size, asset tangibility, growth, tax and business risk, board size, non-executive and Chief Executive Officer (CEO)'s tenure effects on capital structure decisions were analysed. Correlation analysis reveal no strong co-movement among the regressors, while Unit root tests using Augmented Dickey-Fuller and Fisher-type test showed the errors have non-zero mean and non-persistent over time. Dynamic GMM applied provide significant coefficients using lagged values of the dependent variable as instrument. Results reveal that firms follow both pecking order and trade-off capital structure theories. There is positive relationship between lagged leverage and ROA, size, and tax. Asset tangibility and growth have a negative relationship and positive relationship respectively with the lagged leverage of the firms. Growth rate of the sector was slow and less risky, indicating freedom to choose whatever financing method. However, these variables only became significant with the introduction of the lagged leverage variable. This means that any debt-equity decision critically relies on the previous debt equity levels.

Table of Contents

List of Tables

CHAPTER 1: Introduction

A firm's capital structure plays an imperative role on the firm's success, performance and value. Capital structure involves ways in which the firm obtains and manages the long-term financing it needs to support its long term investments. Several studies have revealed that the capital structure of a firm has some degree of impact on its performance and in maximizing shareholders' wealth (Tifow and Sayilir, 2015), (Ahmad, Abdullah and Roslan, 2012), (Goyal, 2013) and (Mojapelo, Mashayanyika, Hefer and Bailey, 2013).

The objective of all firms is to maximize the shareholders' wealth. However to do this, management ought to choose and employ the optimal combination of debt and equity which will result in low cost of capital. This implies that managers need to be aware of factors that can influence their financing decisions. These factors may vary from one industry to another due to the environmental nature in which they operate.

There exist crucial problems when a company fails to strike the balance between debt and equity to finance its assets. One, a high ratio is unfavourable to the firm as it results in greater claims from creditors when it is supposed to be increasing value to the shareholders. This also affects the operational stability of the firm due to high pressure especially during recession, as the firm may struggle to pay the interest to creditors and suffer bankruptcy instantly. Two, a low ratio is unfavourable to the shareholders in a season where firm's economic activities are at its peak, resulting in forfeited opportunities to add value to their stock. Even though these two problems are well known, there are still companies that employ less debt when they have high debt capacity and vice versa. The question is: Why would a company opt to underutilize/over utilize its debt capacity? It would be interesting to establish the reasons and causes for this anomaly and the extent to which they affect financing decisions.

There are two conventionally well-known capital structure theories that tries to explain the reasons behind capital structure decisions, namely the; trade off theory and pecking order theory. In the trade-off theory, Myers (1984) claims that an optimal capital structure does exist because management can select an optimal combination of debt and equity that will in the end maximise the value of the firm. In an attempt to make this financing decision, management will trade off the benefits of using debt with the associated costs thereof.
The pecking order theory states that management will first consider all the financing sources available to them and then opt for the least expensive source; this implies that an optimal

capital structure does not exist (Myers, 1984). Firms prefer to utilize a specific order in the financing decision. Initially they will utilize retained earnings. If they find this not to be sufficient, they will make use of debt instruments because debt is a cheaper form of financing than equity (Myers, 1984). Therefore, the issuing of new equity in a firm is left as last resort (Myers, 1984).

Based on previous studies conducted on South African industries or firms, it was found that South African firms lean towards the pecking order theory (de wet, 2006), (Gwatidzo and Ojah, 2009), (de Vries, 2010) and (Nel, 2014). Kasozi (2009) was the only study that could not find an absolute and resolved it to be highly firm specific. By highly firm specific, they meant firm characteristics. This shows that attention still has to be given to firm characteristics, especially across other sectors/industries.

Available research done on S.A listed firms has concentrated on the effects of firm characteristics and economic factors on capital structures (Nel, 2014), (de Vries, 2010) and (Kasozi, 2009); however, there is still lack of evidence on other industries left out in the studies done thus far. Furthermore, limited research is found on capital structure effect by intra-characteristics embedded in the corporate governance of listed firms.

There is no study that has been done devoted to corporate governance effect on capital structure decisions of S.A firms or industries. Such studies have only been conducted in countries like China (Wen, Rwegasira and Bilderbeek, 2002), India (Kumar, 2015) and Pakistan (Hasan and Butt, 2009). Varying relationship was found between leverage and some characteristics of corporate board. For instance, Wen, Rwegasira and Bilderbeek (2002) afford some preliminary empirical indication which suggests that managers tend to pursue lower financial leverage when they are subjected to stronger corporate governance from the board.

This boils down to the agency theory; under asymmetry of information managers may pursue their own interest (to avoid loss of profit opportunities) at the expense of firm's stockholders but under stringent corporate governance there's reduced management flexibility, as outside shareholders monitor and control management behavior through the use of budget control, audits and incentives systems designed to align managers and their interests (Chow and Fung 1998). Their empirical results show a statistically significant relationship to board composition (non-executive) and CEO tenure. Board size was found not to have statistically significant relationship with Chinese firm's financial leverage. It would be worth noting how

South African industries under manufacturing sector make capital structure decision and how this relates to corporate board characteristics.

Manufacturing industries' characteristics are particularly interesting because the manufacturing sector is a representative of a vast majority of firms operating in South Africa. They are also key drivers of the economy as they contribute to Gross Domestic Product (GDP). Manufacturing sector is the fourth highest sector contributing to the GDP of South Africa. The sector has traditionally played a key role in the economic growth of developing countries. As a result it is imperative to know the firm's capital structure decisions and put more effort towards optimizing their financing method to enable them to expand and be major job creator in our developing economy.

Besides the fact that manufacturing firms contribute largely to the economy of South Africa, the financing choices of these firms is unique as their access to capital and their financing decisions are affected by different factors. For instance the industries' production timeline and consumer base differ. Some firms takes long to produce while others manufacture products under a short space of time and therefore this will obviously speak to how they need or utilize capital. Small firms may not be affected by limited means of external financing the same way large firms would be affected because they are better managed and efficient to produce large cash flows that allow them to finance their fixed investments (Chow and Fung, 1998). It is also believed that industries which fall under this sector vary from capital intensive, labour intensive as well as technology intensive, and would thus be adequate to capture industry specific effects (Yeh and Roca, 2010).

This study makes contribution to literature by studying the financing behaviour of JSE listed manufacturing industries in South Africa and further investigates what instigate their capital structure decisions. The chapter is structured as follows. Section 1.2 presents the background of the study. Section 1.3 and section 1.4 provide the research problem and objective respectively. Section 1.5 presents the significance of the study. This is followed by section 1.6 which discusses the study limitations. The chapter closes of with section 1.7 which offers an outline of the study.

1.1 Background

The pioneers of capital structure research are Modigliani and Miller (1958). They made certain propositions which are based on the assumption of a perfect market. Proposition I

state that "*in a world of no tax, the firm's value is independent of its capital structure*", meaning the proportion of equity to debt in financing a firm's activities does not influence or affect its value. Proposition II went on to show that if proposition I holds, then the firm's cost of equity is linearly related to the company's leverage, meaning that the cost of equity rises with leverage, because the risk to equity rises with leverage. When tax is introduced, proposition I and II show the positive effect of debt financing provided by tax shield through interest payment. Since these propositions were made, a lot of research has been done to prove and disprove the propositions.

Since these propositions emerged, there have been two main theories that have attempted to explain how managers make capital structure decisions, namely the trade-off theory and the pecking order theory. The static trade-off theory posits that capital structure is a trade-off between the tax benefit of debt and cost of bankruptcy. Miller (1977) was the first study to find a balance between demand and supply of debt under corporate and private taxes and found a drawback to be bankruptcy costs. However, the bankruptcy costs effect can be negated by the tax benefit, if one finds a balance. From this, Myers (1984) made a claim that firm value is dependent on debt ratio and that firms will balance their debts ratio against bankruptcy and tax savings. The findings from his study suggest the trade-off theory as one of the explanations of variation in capital structure of firms.

Another theory of capital structure that may explain the capital structure decision of firms is the pecking order theory. There exist a hierarchy that firms follow when they are in capital need for investment. The firm will first use retained earnings before considering debt and then equity issuing due to transaction and issue costs involved in the latter options. The theory is also explained using information asymmetry argumentation which is explained by Myer and Majluf (1984), Ross (1977) and Harris and Raviv (1990). The decision to use last option on the hierarchy will send signal to the investors, which connect it to company capital structure.

From the above theories it is apparent that the factors influencing capital structure of firms are more complex as they are not uniform and thus need to be studied and their influence quantified across firms. An optimal capital structure can be obtained at which the value of the firm is maximized and the cost of capital is minimized, but this may not be the same across industries and managers need to beware of factors significantly challenging their specific industry.

An investigation into inter-and intra-industry variations of capital structure and intra-industry causes of these variations focusing on the Czech manufacturing industry is performed by Pinkova and Riederova (2013). They found no existence of capital structure variances among the studied industries. Their study also showed that the effect of capital structure determinants is identical across the studied industries and is highly dependent on choice of leverage measure.

In their studies, de Wet (2006), Gwatidzo and Ojah (2009), de Vries (2010), and Nel (2014) reveal that South African firms' capital structures tend to follow the pecking order theory. We wish to extend their work around South Africa by focusing on manufacturing industries.

1.2 Research Problem

From the preceding sections, it is clear that managers need to be aware of different aspects that impact their capital structure decision. This will help them choose the optimal debt to equity structure for financing their net positive business opportunities. It will also be beneficial for managers to be aware of their use of leverage and those of their counterparts, this will enable them to correct if they under or over leveraged and thus set optimal debt targets.

There is limited research on capital structure of firms in South Africa; this means that we know little about how these firms make their capital structure decisions. Various studies on this topic have already been conducted in different countries. Few similar studies in South Africa have attempted to solve this mystery; de Vries (2010) and Nel (2014); however the studies have not covered all key sectors or industries. To the best of our knowledge, no study has been devoted to capital structure of manufacturing industries in South Africa. Yet this sector traditionally plays a key role in the economic growth of our developing country.

It is imperative to know the manufacturing firm's capital structure decisions and put more effort towards optimizing their financing method to enable them to expand and be major job creator in our economy. The study attempts to fill this gap with an independent sample to increase tests on capital structure of South African firms and contribute towards the understanding of the behaviour of manufacturing firms in South Africa; in order to provide better insight on how best they can decide on their capital mix in the different and challenging environment they operate in. Ultimately this will enable firms to discriminate among financing choices and determine theories that work in manufacturing industry context.

1.3 Research Objectives

The intention of this research was to investigate the capital structure decisions of manufacturing sector of listed firms from the following industries; apparel & textile products, automobiles & parts, chemicals, commercial services, construction & materials, electronic & electrical equipment, fixed line telecommunications, general industries, forestry & paper, industrial metal & mining, household goods & home construction, industrial engineering, industrials & transportation, technology hardware & equipment, mining and support services.

The objectives of the study included the following:

- To determine the capital structure patterns of manufacturing Industry
- To identify how firm characteristics (empirically identified) affects capital structure of manufacturing Industry
- To analyze how corporate governance affects capital structure decisions of manufacturing industries

1.4 Significance of the Study

This study is important to managers, investors and academia. Capital structure of a business is one complex subject of financing decision due to its interrelationship with other financial decision variables. Thus, in order to understand this interrelationship, the underlying effects need to be studied and understood.

It is important to examine the Industry's characteristics 'influence to its capital structure decisions. It is widely believed that industry factors are important determinants to firm's capital structure. Empirical evidence outside South Africa has shown that there's wide disparity in financial structure even after an attempt to control for industries through the use of dummy variables. In their attempt to fill this gap, MacKay and Phillips (2005) examined the importance of industry to firm level financial and real capital structure decision and found that financial structure and risk are jointly determined in within industries. This study finds that there is lack of evidence on industry effect on capital structure of South African firms. Thus we attempt to fill this gap by investigating industry variations and contribute towards quantifying the term Industry.

While many studies in South Africa tackle the study of capital structure decisions, they mostly don't compare industries and sub sectors based on inter and intra- industry characteristics and environment challenges. Industry analysis is important because it helps

managers to estimate how much debt they can use and how much profit they can generate from business operations. Analysis and outcome of such results could be valuable to peer industry managers when making financing decisions and assist them to move towards an optimal capital structure.

The need to understand the connection between capital structure and industry is of paramount importance if there exist an optimal capital structure. The study will fill the gap by determining whether there are variations in corporate finance decision making among manufacturing companies listed on the JSE and identify the causes of these variations, this will contribute to the industry analysis done by managers as an effective way of improving financial management decisions and better inform managers to make better financing decisions. Consequently the study will contribute to identifying the optimum capital structure which management of firms in this sector and its industries ought to employ in order to maximize firm's value.

Understanding South Africa's industries capital structure variations and its causes will enable CEO's to make better decisions by understanding their counterpart's decision patterns, to move towards an optimal structure. It will also enlighten the characteristics that industries in certain environmental challenges acquire or possess in order to survive in that industry.

1.5 Limitations

The main limitation of this study was the small sample size after trimming and excluding outliers. The number of firms in each industry was small as the JSE has a set size, and after splitting up the JSE into each industry, the grouping of the firms was too small. An attempt to counter this was to lengthen the study time period to 14 years.

This specific limitation resulted in one of the research objective not being met. Inter-industry variation across different industries could not be conducted due to inadequate observations and data points. The small sample per industry could not provide a concluding observation. What is more, is few entries might have resulted in a biased inference (a sample should normally have n=30). Consequently the study missed the possibility to compare the inter-industry analysis of debt equity management which could have made a difference by advising on which industry is well managed in terms of capital structure and which industry need to shift from their target ratio.

Another limitation is that the study might have not exhaustively utilised all the relevant variables important in determining the debt equity decisions in the manufacturing industry in South Africa, we also recognise that, as a constraint, the sample period employed in this study might have not brought out the desired results.

1.6 Outline of the Study

Chapter 1 gives an introduction and background to the study of capital structure; it states the research problem, questions posed by the study and the research objectives. Chapter 2 gives a review of the related studies on capital structure across industries and set out clearly the gap to which the research need to fill. Chapter 3 provides the research approach and the methodology which states the industries chosen, the size of data to be tested, the model and analysis tools used to evaluate the proposed questions and hypothesis. Chapter 4 presents the empirical results obtained from the statistical test conducted; this is presented and interpreted in this chapter. The results are presented in the order of data analysis employed for the study as stated in chapter 3. In chapter 5 the results are discussed, contrasted and their implications presented. A conclusion is drawn from the discussed results, stating limitations and possible areas to improve the study.

CHAPTER 2: Literature Review

2.1 Introduction

A firm's capital structure shows how a firm finances its identified value adding business activities and its growth by utilizing various funding sources. The sources of funding is made up of proportions of debt and equity; which is referred to as the debt to equity ratio of the firm and gives an indication of the level of risk a firm is associated with. Equity may be classified as retained earnings, common stock and preferred stock while debt may be in the form of long term debt or short term debt. For most definitions of capital structure, the debt part is considered to be the long-term debt since it speaks to the long term financing of the firm, thus it excludes the short term sources of capital financing.

The balance between debt and equity when financing a firm's operational need and investment is one of the most crucial elements in the growth of a firm. However, for any management within any company and industry, identifying the balance between the two is a challenging task. Myers (2001) stated that albeit different capital structure theories exist and are well known such as Modigliani-Miller theory, trade off theory and pecking order theory, there is still no universal theory of debt-equity choice that can be used as a benchmark. Thus, it becomes the management's responsibilities to find a suitable choice for their firm. Several studies have, however, been conducted in pursuit of identifying the optimal capital structure (Brennan & Schwartz, 1984), (Ratshikuni, 2009) and (de Vries, 2010).

2.2 Underpinning Capital Structure Theories

2.2.1 Modigliani and Miller (MM) Theory

The Modigliani and Miller (1958) theory of business finance posits that in a perfect capital market, the market value of a firms is independent of the leverage it takes on but rather by the income it generates from its activities as well as the risk from its underlying real assets. In other words, the average cost of capital to any firm (i.e. the ratio of expected return to the market value of all of the firm's securities) is entirely independent of its capital structure and is equivalent to the capitalization rate of a pure equity stream of its class (Modigliani and Miller, 1958). MM further shows that if this equality does not hold for a pair of firms of similar business risk, that is, there is a discrepancy between the market value of firms due to manipulation of the capital structure, there would be arbitrage that would ultimately drive the firms to a common equilibrium total value. Having discrepancies in the price of shares would

mean investors could buy and sell stocks and bonds, such that they could exchange one stream of income for another stream, sharing the same class but selling at a lower price. Ultimately, the price of the overpriced shares will fall while the under-priced shares will rise in such a way that equilibrium is restored.

Consequently, the expected yield on equity, in an all equity firm, should tend to increase linearly with debt to equity ratio of a highly leverage firm to an extent that the lower-cost advantage of high leverage in the capital structure would drive up and ultimately cancel out with a linear increase in the cost of equity (Modigliani and Miller, 1958).

In their corrected paper, Modigliani and Miller (1963) noted the impact of corporate taxes on the cost of capital. With the presence of corporate tax, the firm needs to borrow as much debt as possible since more debt lowers tax payment due to the interest payment that is deducted. The tax-deductibility of debt interest will mean more remaining cash flow and ultimately an increase in the value of the firm. This leads them to conclude that firms with more debt have higher value. Following the seminal contribution of MM, many theories have evolved but the two most prominent among these are the trade-off theory and the pecking order theory. The ensuing sections provide brief descriptions of these two theories.

2.2.2 Trade-off theory

The trade-off theory argues that firms find an optimal capital structure based on the cost and benefits of borrowing debt. The classic version of the trade-off hypothesis, the 'State-Preference Model of Optimal Financial Leverage', commonly known as the static trade-off theory, is attributed to Kraus and Litzenberg (1973). Kraus and Litzenberg's model assumes that firms have an obligation to pay taxes on their profits and firms that are not profitable could go bankrupt, which may result in losses on capital provided by the firm's financers. Hence, one way to increase the firm value would be to reduce the chances and costs of bankruptcy by bringing down the taxes the firm has to pay. Their conclusion was that firms set a target level of debt finance and equity finance to use and move towards it in a gradual manner by striking a balance between the marginal costs and marginal benefits of the leverage plan.

This well-defined target debt to value ratio, as implied by the theory, is usually the industry average (Lev, 1969). In other words, corporate capital structure follows industry standards, instead of being dependent on the financing needs of the firm. As a result, relating firms within the same industry may well improve firm financial decision-making. Myers (1984),

Harris and Raviv (1991), Michaelas, Chittenden and Poutziouris (1999), MacKay and Philips (2005) and Varadi (2011) are among the studies that support the perspective of the static trade-off theory. Yet, there are a number of studies (Brennan and Schwartz, 1984; Kane, Marcus, and McDonald, 1985; Hovakimian, Kayhan, and Titman, 2011) that argue that a firm's leverage ratio is not static but dynamic.

2.2.3 Pecking order theory

The pecking order theory, mentioned by Donaldson (1961) and popularized by Myers and Majluf (1984) argues that the cost of financing increases with asymmetric information – current firm insiders (managers) being well-informed than potential investors. The theory posits that firms prioritise their sources of financing, giving much preference to internal over external financing (debt and equity). Accordingly, firms would typically first rely on internal financing, such as retained earnings, and when that is insufficient then they rely on debt, since it is considered safest among the external financing options. When debt issuance becomes infeasible, then it resorts to hybrid securities like convertible bonds and then equity as a last resort. In other words, retained earnings are superior to debt and debt is superior to equity.

Under this theory managers are assumed to be well-informed on the real condition of the firm than potential investors. From the perspective of the rational investors, manager's decision to issue new equity could be because managers think the firm is overvalued and are thus taking advantage of this over-valuation. Hence, investors will under-value the new equity issuance, which would ultimately lead to a drop in share price.

If firms are required to finance new projects by issuing equity, rational investors might think manager's decision to issue new equity is because managers think the firm is overvalued and are, thus, taking advantage of this over-valuation. Hence, new investors will under-value the new equity issuance so severe that they capture more than the net present value of the new project, which would ultimately lead to a drop in share price and net loss to existing shareholders. Contrary to the negative signalling associated with issuing equity, the issuance of debt gives a positive signal of managers' confidence that an investment is profitable and that current stock price is undervalued. This explains the preference for debt over equity as a means of raising capital and also explains the inverse relationship between profitability and debt ratios.

Acceptance of the pecking order theory would imply that industry averages are not so relevant in the corporate capital structure decision-making, in contrast to the trade-off framework. Studies that support this theory include Cassar and Holmes (2003), Degryse, Goeij and Kappert (2012) among others.

2.3 Empirical Evidence

2.3.1 Factors influencing capital structure

The extant literature examines the capital structure of firms in general and the factors that determine it. A significant body of research (Demirgüç-Kunt and Maksimovic, 1999; Booth, Aivazian, Demirgüç-Kunt and Maksimovic, 2001; Claessens, Djankov and Nenova, 2001; Bancel and Mittoo, 2004; and De Jong, Kabir and Nguyen, 2008) document that capital structure is influenced by firm-specific factors as well as the country and industry within which firms operate.

For instance, Feidakis and Rovolis (2007) find evidence in support of a unified corporate finance decision making among construction firms in the European Union. They document several determinants that analogously affect the capital structure of listed European construction firms, including size, profitability, liquidity, tangibility, asset utilization, growth opportunities, risk, share price performance, and growth in real GDP.

There is abundant literature on the direct impact of country characteristics on leverage. Booth et al. (2001) argue that the firm-specific factors that affect capital structure decisions are same for firms in both developed and developing countries, although there are differences in the impact from country-specific factors such as capital market development and growth in GDP effect. Similarly, Fan, Titman, and Twite (2012) document additional country-specific factors including the degree of development in the banking sector, and equity and bond markets. While this evidence is based on listed firms, further evidence on the direct impact of country-specific factors can be found in Giannetti (2003) who examines a sample of unlisted firms from eight European countries. Among the factors, she documents as having an impact on leverage are stock market development, creditor protection and legal enforcement. Other studies in this line of research include Song and Philippatos (2004) and Hall, Hutchinson and Michaelas (2004). A notable feature of these studies is the implicit assumption of a homogenous impact of firm-specific factors on capital structure (De Jong, Kabir and Nguyen, 2008)

In contrast, a few others also focus on the indirect impact of country characteristics on capital structure. Using nearly 12,000 firm data from 42 countries over the period 1997-2001, De Jong, Kabir and Nguyen (2008) evaluates the importance of both firm-specific and country-specific factors in the capital structure decision-making. Their country-specific variables included shareholder/creditor right protection, market/bank-based financial system, legal enforcement, growth rate of GDP and stock/bond market development. They argue that firm-specific factors do not have homogenous impact across the various countries examined and most importantly, that country-specific factors have both direct and indirect impact on corporate leverage.

Another strand of the literature focuses on the inter- and intra-industry differences in capital structure. Specifically, this line of research seeks to examine whether different industries share similar factors and whether there are mutual factors that characterize capital structure of firms within same industry. In an analysis of capital structure decisions of small Dutch firms, using proprietary data, Degryse, Goeij and Kappert (2012) find that growing firms tend to increase their debt position as they require more funds, and Small Medium Enterprises (SMEs) cut down on debt levels using profits, in line with the pecking-order theory. In addition, they find that short-term debts could be reduced by profits, while long-term debt is increased by asset growth. Most importantly, their results suggest that inter- and intra-industry heterogeneity plays a significant role in explaining the capital structure. Their results suggest the level of competition, level of agency conflicts, and variations in the technology employed as important drivers of capital structure.

An investigation into inter-and intra-industry variations of capital structure and intra-industry causes of these variations focusing on the Czech manufacturing industry is performed by Pinkova and Riederova (2013). They found no existence of capital structure variances among the studied industries. Their study also showed that the effect of capital structure determinants is identical across the studied industries and is highly dependent on choice of leverage measure.

Talberg, Winge, Frydenberg and Westgaard (2008) found in their study for companies quoted on the New York Stock exchange that there exists a significant difference in capital structure of firms depending on the industry in which the firm operate. There are some studies (e.g. Hatfield, Cheng and Davidson, 1994; Cassar and Holmes, 2003) that support the viewpoint of Meyers (1984) which argues that firm's capital structure rest on the financing need of the

firm and does not necessarily follow industry standard. Yet, there are also some studies that argue that industry affects the capital structure choice (Harris and Raviv, 1991; Michaelas *et al.*, 1999; MacKay and Phillips, 2005; Varadi, 2011).

2.3.1.1 Capital Structure and Corporate Governance

In their paper, Wen, Rwegasira and Bilderbeek (2002) study the relationship between capital structure of a firm and selected characteristics of corporate board for Chinese listed firms. Their study provides some preliminary empirical evidence suggesting that managers have a tendency to pursue lower financial leverage when they are subjected to stronger corporate governance from the board. Their empirical results show a statistically significant relationship to board composition and CEO tenure. No significant relationship was found between firm's financial leverage and board size.

In a study that utilizes selected non-financial listed companies from Karachi Stock Exchange for the period 2002 to 2005, Hasan and Butt (2009) studies the relationship between capital structure and corporate governance by using a multivariate regression analysis under fixed effect model approach. They employ board size, board composition, and CEO duality (individual holding both CEO and chairperson position) as a measure of corporate governance. The study reveals that board size relate negatively with debt to equity ratio. However capital structure behavior is found not to be significantly influenced by board composition and CEO duality. They further conclude in their study that corporate governance variables like board size, ownership structure and managerial shareholding are key determinant of a firm's capital structure.

Kumar (2015) employed firm-level time series data of listed companies of India for the period 1994 to 2000 and analyzed the firm's corporate financing behavior in connection with its corporate governance arrangements, particularly its shareholding pattern. His study shows that the structure of debt is inversely proportional to corporate governance and that firms with weaker corporate governance setup, dispersed shareholding pattern tend to have a higher debt level. No significant relationship between firm's capital structure and ownership of directors is found in his study.

It is apparent that corporate governance has some extend of effect on firms' capital structure choice, and the effects tend to vary across different countries. Corporate governance practices can have significant influence on the company's debt to equity strategic decision (Hasan and Butt, 2009). It therefore important to take into consideration corporate governance variables

like size of board, composition of board, skill set at board and CEO tenure as key factors that influence capital structure decisions (Berger, Ofek, Yermack, 1997; Friend & Lang, 1988; Wen et al., 2002 & Abor, 2007).

2.4 Literature related to studies on South African firms

The debate on capital structure decision-making is not only restricted to advanced markets. A smattering of papers has appeared in recent years examining the issue within a South African context.

2.4.1 Optimal Capital Structure/ Speed of Adjustment to Optimal Structure

A few studies focus on optimal structure and suggest a conservative usage of debt among South African firms. For instance, using data over the period 1987 to 2009, Ratshikuni (2009) investigates the optimal capital structure for 97 listed companies on the Johannesburg Stock Exchange (JSE), with the aim of showing if the firms were underutilizing their debt capacity and what the base case scenario would've contributed to firm's value. The study concludes that most companies could have increased shareholder value by using more debt than they actually did. Similarly, Harrison (2003) document that the financial leverage of South African firms is substantially lower than those in G7 countries. This is corroborated by Wimberley (2001) who studies the top 25 JSE listed companies and concludes that increased use of debt could have led to 3% to 14% increase in value.

2.4.2 Capital Structure Determinants and Speed of Adjustment

The results offered by Gwatidzo and Ojah (2009) suggest that South African firms, along with other African firms, have a tendency of relying on internal finance to a great extent, and in cases where the rely on external finance, they choice is heavily tilted to short-term debt, which provides support for the pecking order theory. They also document that firm-specific factors such as leverage, asset tangibility, size and age have significant impact on firm capital structure.

Ramjee and Gwatidzo (2012) studied the cost of adjustment and the speed of adjustment towards an optimal debt ratio, using a GMM estimation technique for a panel of 178 firms, and conclude that a target capital structure does not exist for South African firms. In addition, they find that firms adjust to their target total debt ratio quickly. They also examine the determinants of target capital structure and argue that firms that have larger amount of tangible assets have higher debt ratios, firms that are more profitable operate at lower levels of leverage, the larger the firm the higher levels of leverage, and that firms that grow prefer

debt than equity when raising funds" (p. 62). In line with the pecking order theory, they find that South African firms prefer internal over external sources of finance. Again, in line with the trade-off theory, they note that firms' capital structure decision-making usually takes the trade-off between the costs and benefit of debt finance into account.

In a related study, Chipeta and Mbululu (2013) examined the dynamics of the pace of adjustment towards optimal capital structure for a panel of 91 non-financial firms listed on the JSE, using a fractional dependent variable (DPF estimator) and found that firm-specific factors such as size, asset tangibility, liquidity, profitability and interest cover significantly affect transaction cost and hence the speed of adjustment. Specifically, an increase in these variables directly translates into further capital for firms, hence increasing their chances for adjustment to their target capital structure. Besides the firm-specific factors, macroeconomic factors such as real GDP growth rate, term spread market dividend yields and interest rate we found to have differing impact on the speed of adjustment.

Recently, Kwenda and Holden (2014) analysed the determinants of working capital investment of firms listed on the JSE over the period 2001-2010, using GMM techniques and found that South African firms pursue target levels of current assets, albeit with a slow adjustment process. Leverage, short-term finance and fixed investment are among the factors that are of significant importance to the level of working capital investment. On the other hand, firm size, macroeconomic condition, operating cash flows and sales growth rate do not have significant impact on working capital investment.

2.4.3 Capital Structure and Firm Performance

Fosu (2013) analyses the leverage-performance relationship among a panel dataset of 257 South African listed firms over the period 1998-2009 and the extent to which the relationship depends on the degree of industry competition. The results suggest a positive relationship between financial leverage and firm performance and that product market competition enhances the performance of leverage; that is, the benefits of debt-finance would be better realized if a competitive environment is created. Given the relatively little of use of debt finance among South African firms (Ratshikuni, 2009; Harrison, 2003), this finding implies that financial leverage mitigates the agency costs of outside equity, in line with the argument by Jensen and Mackling (1976). They also note that excessive expansion of firms could create moral hazards, since firm size is nonlinearly related to performance.

2.4.4 Capital Structure across Different Industries

de Vries (2010) studied the effect of firm characteristics and economic factors on the capital structures of listed industrial firms in South Africa. He used all JSE listed and delisted industrial sectors and found firm growth and interest rate to be the most important firm characteristic and economic factor, respectively, to influence financing decision of a firm. His study also concludes that JSE firms included in their study follow mostly the pecking order theory.

An analysis of the capital structure variations across industries over different business cycles is provided by Nel (2014). Panel data analysis involving random and fixed effect techniques was employed to analyse data over the period 1995-2012 for firms sampled from different industries namely, farming and fisheries, heavy construction and computer services. The study also considered firm-specific factors such as asset tangibility, tax, profitability, age and size. In this work it was observed that capital structure varies across different industries in South Africa in boom and bust periods. Notably, all industries showed a preference for short debt finance, and the author concludes that South African firms follow the pecking order theory.

de Wet and Gossel (2016) show a survey result conducted about capital structure decisions on 33 JSE listed companies' Chief Financial Officers (CFOs). Results from their survey show that CFO's in South African likely to follow both the pecking order and static trade-off theories equally. Though, small companies lean more towards the pecking order theory while large companies are more likely to follow the static trade-off theory. In comparison with other emerging countries, the study shows that South African companies are more likely to follow the static trade-off theory than companies in other emerging countries.

Chapter Summary

It is clear from the extant literature done, that little attention has been paid to industry capital structure heterogeneity in South Africa. Most of the evidence is based largely on United State (US) firms. As a result we know little about how South African sectors and their industries make capital structure decisions. It must be emphasized that firms' financial decisions are likely to be affected by the sector in which they operate (Ramjee and Gwatidzo, 2012) thus ignoring industry differences could mask very vital potential outcomes.

To the best of our knowledge, Nel (2014) and de Vries (2014) are the only the empirical studies that separates firms into sectors or industries. However, a key limitation of Nel's

research is that firms are selected from few industries namely, farming and fisheries, heavy construction and computer services neglecting important sectors like manufacturing, communications, transport and retail. de Vries (2009) 'study is also limited to the role of internal firm and country characteristics; however, the question of industry is not addressed.

The attempt to find any study done on corporate governance effects on capital structure decisions of South African firms or industries yielded no results. It would be valuable to concentrate on these determinants for emerging economies like South Africa and see how they compare with emerging markets like India, China and Pakistan.

From the above literature survey, the following hypotheses are developed:

> **H_0:** Capital structure of manufacturing industry in South Africa is not significantly affected by firm characteristics and corporate governance
>
> **H_A:** Capital structure of manufacturing industry in South Africa is affected by firm characteristics and corporate governance

CHAPTER 3: Research Methodology

3.1 Introduction

This chapter outlines the research methodology as well as the model utilized to investigate the capital structure decisions and determinants across manufacturing firms listed on the JSE.

The methodology will be aligned to provide answers to the research problem and quantify the objectives by looking at Section 3.2 which describes the data used. Section 3.3 discusses the theoretical model specification, Section 3.4 discusses the motivation for variables selected and section 3.5 discusses the method of the study. Chapter ends with a summary that conclude the chapter.

3.2 Data and Data Sources

To investigate the capital structure choice among manufacturing firms listed on the JSE, the study uses JSE listed industries under manufacturing sector. The research is done for a period of 14 years from 2004 to 2017. The term sector and industries are commonly used interchangeably when in fact they have a slight difference in their meaning. A sector refers to a large fragment of the economy, while industry refers to a much more specific group of companies or businesses. Thus, sectors are categorised into industries which are homogenous in terms of products and services offered and their regulatory and operating environments. The study uses the terms as defined above throughout the study.

Data for this study was sourced from Bloomberg terminal. As a result the Bloomberg classification was used and selected industries were based exclusively on data availability. According to Bloomberg classification, there are 108 manufacturing firms listed in the JSE within the period of the study. However only limited firms were included in the study for analysis due to several instances where data was missing from the Bloomberg terminal. For instance some firms started reporting late thereby having only few years of results. Others were delisted within the period of the study resulting in incomplete reporting to commit including them in the sample.

This resulted in exclusion of 34 firms, leaving a total census of 74 firms to be used for the analysis of the effects of financial performance indicators and corporate governance on capital structure of manufacturing industry in South Africa. Table 1 presents classification of JSE sectors from Bloomberg as well as summary of the study sample.

Table 1: Bloomberg Classification and summary of sample used in the study

Sector	Number of firms	Percentage
Communications	0	0
Consumer Discretionary	8	10.8
Consumer Staples	2	2.7
Energy	0	0
Financials	0	0
Health Care	0	0
Industrials	33	44.6
Materials	31	41.9
Technology	0	0
Utilities	0	0
Total	**74**	**100**

3.3 Research Design

The multivariate regression model that was used to analyze the data and the model is specified as follows:

$$D_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 SIZE_{it} + \beta_3 AST_{it} + \beta_4 Growth_{it} + \beta_5 Tax_{it} + \beta_6 BusRisk_{it} + \beta_7 BODSize_{it} + \beta_8 NoEXEC_{it} + \beta_9 CEOTEN_{it} + \varepsilon_{it}$$

Where

D_{it}= leverage of firm i in time t, computed as total debt divided by equity (D/E) ratio.

ROA_{it} = return on assets for firm i in time t.

$Size_{it}$ = size of firm i in time t.

AST_{it} = asset tangibility for firm i in time t.

$Growth_{it}$ = firm growth (Market to Book Value for firm i in time t).

Tax_{it} = tax (average corporate tax rate of firm i in time t.)

$BusRsk_{it}$ = tax (business risk of firm i in time t.)

$BODSize_{it}$ = log (number of board of directors)

NoExec= % of outside directors of board of firm i in time t

$CEOTEN_{it}$ = log (year in CEO position) of firm i in time t

ε_{it} = error term

3.3.1 Variables Description and measurement

With the support of previous theoretical and empirical research, six firm specific characteristics and three corporate governance characteristics were identified to better explain the financing decisions of firms. From existing studies, evidence suggest that predominant firm characteristics; return on assets or profitability, size, asset tangibility, tax, growth, asset structure, business risk and corporate governance (board size, board composition and CEO tenure) are some of the determinants of capital structure. These selected variables are described below in more detail as well as the effect they might have on capital structure of a firm.

3.3.1.1 Leverage

As mentioned in the previous chapter, for most definitions of capital structure, the debt part is considered to be the long-term debt since it speaks to the long term financing of the firm, thus it excludes the short term sources of capital financing. For this study, leverage was extracted for each firm on Bloomberg, reported as total debt divide by equity.

The data analysed herein made use of a combination of both long term and short term debt to equity variables, this was directly sourced from the Bloomberg data base, as some of the companies included in the sample did not report the two components of debt separately. Capital structure as the dependent variable for this study is defined as the debt-equity ratio

3.3.1.2 ROA

The purpose of financial management is to maximize the shareholder's wealth. Hence it is imperative to include profitability in the model as it is a determinant of performance. Profitability is the ability of a business to generate income as compared to its assets. According to Hifza (2011), profitability is one of the most essential objectives of financial management. Without profit, a business cannot survive or pursue investment opportunities.

On the other hand, a business that is exceedingly making money has the capacity to compensate its shareholders with a large return on their investment.

It can also be argued that profitable firms employ more debt due to the fact that they are less likely to suffer bankruptcy and financial distress; they have the capability to fulfill their debt obligations. This also provides an incentive as it allows firms to exploit debt tax shield (Hutchinson & Hunter, 1995). Another possible reason for a positive relationship between leverage and profitability is to minimise agency costs in a firm; using more debt tend to limit the actions taken by management when it comes to free cash flow, since debt is associated with compulsory interest payments (Jensen, 1986). The positive relationship between leverage and profitability supports the trade-off theory of capital structure.

Evidence from theoretical and empirical results has shown the relationship between leverage and profitability to be controversial; there is support for both the trade-off theory (positive relationship) and the pecking order theory (negative relationship). For instance, Nel (2014), Gwatidzo and Ojah (2009), Ramjee and Ojah (2012) all found a negative relationship between profitability and leverage; which postulates that profitable firms prefer internal sources of financing rather than external funding.

ROA which is also referred to as profitability is employed as a variable in various studies (Talburg et al., 2008; and Ramjee & Gwatidzo, 2012). Although Gwatidzo & Ojah (2009) and Nel (2014) have argued the unneccessity of having both ROA (profitability) and Growth in a study, they feel that ROA (profitability) is a suitable proxy for growth. Our study employs both variables, just as the aforementioned studies and de Vries (2010) did; we believe both characteristics play a critical role in firm's access to capital and financial status. The variable is measures by dividing earnings before interest and tax (EBIT) by total assets.

3.3.1.3 Size

The trade-off theory envisages that bigger firms have a propensity to be more diversified, they are less risk and prone to bankruptcy than minor firms. Thus, larger firms should be more leveraged as they have a lower risk of bankruptcy. This low risk offers them an advantage of low lending rate and financial distress cost thus allowing them easier access to capital markets. Empirical literature suggest that the leverage ratio is positively related to firm size (Rajan & Zingales, 1995), (Frank and Goyal, 2004), (Gwatidzo & Ojah, 2009) and (Nel, 2014)). There are also controversial results on the relationship between the size of a firm and its capital structure.

A negative relationship exists with regard to information asymmetry. Larger firms tend to have low information asymmetry, thus their equity attract investors easily allowing the frims to have enough capita available to them (de Vries, 2010). Also, this low asymmetry implies that there's minimal chances of a new equity issue being undervalued and thus encourage the use of equity financing by larger firms. This negative relationship was found by Titman and Wessels (1988).

Different measurements of size can be found in both literature and previous studied. It can be measured as average value of total assets, the natural logarithm of net sales or total assets, total assets (book value and the market value). The two most regular used measurements for firm size are centered on annual sales and total asset values. For the purpose of the study, this variable is measured by the natural logarithm of total assets.

3.3.1.4 Asset tangibility

Capital structure theories maintain that the capital structure choice of a firm is affected by the type of assets that it possesses. This is because tangible assets (mostly non-current assets) are seen as collateral backup when securing loans compared to intangible assets. Consequently, one would expected asset tangibility to be positively related to leverage of a firm due to the collateral advantage it provides; firms with a strong asset base are able to use these assets as surety when securing loans. This also affords firms the privilege of securing loans at lower interest rate because they are able to back these loans. We find studies that found a positive relationship supporting the trade-off theory; these studies are Titman & Wessels, 1988; Rajan & Zingales, 1995; and Frank & Goyal, 2004. Nel (2014) found a positive relationship only with long-term debt for South African firms.

According to the pecking order theory, there should be a negative relationship between asset tangibility and leverage. Gwatidzo and Ojah (2014) found this to be the case for most African firms (Ghana, Zimbabwe and Kenya), meaning that African firms underutilize their collateral advantage. Asset tangibility is measures by dividing sales by physical assets (fixed assets).

3.3.1.5 Growth

It is believed that growing firms are still relatively young and thus have limited internal finance available for investment opportunities (Talburg et al 2008). We therefore expect growing firms to utilize more debt for this purpose because growing firms have an appetite for new investment opportunities than larger firms and would most likely opt for external

financing for funding these investments. On the other hand, Titman and Wessels (1988) and Prasad, Green and Murinde (2001) reason that firms with substantial growth opportunities should issue equity rather than debt as equity has the potential to decrease agency costs. In this case, one would expect growth to be negatively related to leverage.

Controversial results have been found concerning relationship between growth and leverage. de Vries (2010) mentions that from theoretical and empirical studies, it is evident that the relationship depends on which capital structure theory is being followed. A positive relationship is envisaged for a pecking order theory due to reasons stated previously; growing firms use more debt because their internal funds are not adequate to finance their investment opportunities. A negative relationship results under the trade off theory due to the lowering of agency conflicts between shareholders and bondholders and the free cash flow theory; more debts should be used in firms with limited growth opportunities to prevent managers from using the money for investments that are not beneficial to the firm.

Different measures have been used to capture the growth potential of a firm. Hall et al. (2004) use a growth variable given by the 'percentage increase of sales turnover in the previous 3 years. For this study, growth is measured by the ratio of market value of equity to book value of equity; following studies by Talburg et al. (2008), Ramjee and Gwatidzo (2012) and de Vries (2010).

3.3.1.6 Tax

A tax is a government charged fee on a product, income, or activity on individuals or corporate companies. The role of this charge by the government is to finance government expenditure. Taxes play a central role in standard tradeoff models of capital structure; this shock provides a particularly useful experimental setting for examining the role that taxes play in financing decisions. Tax also impacts the amount of debt held by a firm. Firm with high effective tax rates ought to use more debt than equity to take advantage of interest tax shields (Cheng and Shiu, 2007). For the above reason, a positive relationship between tax and leverage was expected.

3.3.1.7 Business risk

Risk of a firm refers to any uncertainty in its earning abilities. Firms with high risk are expected to utilize less debt due to less access to funding; they struggle to get capital from lenders. They also tend to avoid the use of debt in order to reduce the risk of high distress costs or business failure. A negative relationship between a firm's risk and leverage is

expected because a highly risky firm gives an indication of the volatility of its earnings and possible bankruptcy. Business risk is measured by adjusted return on assets; this is because return on assets is affected by uncertainties in the business environment. Adjusted ROA is calculated by dividing the sum of net operating profit and investment income by total assets.

3.3.1.8 Corporate governance variables

Corporate governance is the system of rules, practices and processes by which a company is directed and controlled (Kumar, 2015). Corporate governance essentially involves balancing the interests of a company's stakeholders, management, customers, suppliers, financiers, government and the community. The board of directors plays a key role in the company's strategic planning relating to financial mix. They ensure the success of the company by directing its affairs and at the same time meeting the interest of both managers and stockholders. The three corporate governance variables to be included in the model are, board size, board composition and CEO tenure. Board size is defined as a total number of the members of the board. Board composition is a number of all non-executive directors. CEO tenure refers to the number of years the CEO has been at that particular firm. A negative relationship was expected for corporate governance characteristics because a stronger board imposes rigorous conducts which limit reckless lending and sometimes the loss of net positive investment. Table 2 presents the summary of the variables and how they are measured.

Table 2: Summary of the Variable Measures

	Variable	**Measure**
Dependent	Leverage (LEV)	Debt/Equity
Independent	ROA	EBIT/Total Assets
	Size (SIZE)	Natural Log of Total Assets
	Asset Tangibility (AST)	Sales/Total Assets
	Growth (GROWTH)	Market to Book Value
	Tax (TAX)	Average Corporate tax rate
	Business Risk (BUS-RISK)	(Net operating profit + investment income)/Total assets
	Board Size (BSIZE)	Log (Number of board of Directors)
	Board Composition (NOEXEC_)	% of outside directors of Board
	CEO tenure (CEO_TEN)	Log (year in CEO position)

3.4 Data Analysis

A statistical analysis software suite, namely EVIEWS was utilised to analyse the data. Three statistical tools; descriptive statistics, inferential and panel data analysis were used for empirical analysis to provide insight into the data. The tools are discussed in more details below.

3.4.1 Descriptive Statistics

Descriptive statistics such as means and standard deviations for leverage, return on assets (ROA) or profitability, size, asset tangibility, tax, growth, business risk, board size, board composition and tenure of CEO were calculated to comprehend the nature and behaviour of the data. Bless and Kathuria (1993) defines mean as the sum of the observations divided by the total number of observations. Mean identifies the central location of the data while a standard deviation measures the spread of the data set and the relationship of the mean to the rest of the data. Calculating the mean and standard deviations of all the variables is for the researcher to gain an understanding of the industry position on different variables. The observations range includes minimum and maximum values of each type of observation.

3.4.2 Inferential Analysis

Correlation statistics between return on assets (ROA) or profitability, size, asset tangibility, tax, growth, business risk, board size, board composition and CEO tenure were also calculated. Correlation is a statistical process used to "measure the strength of the association between two variables" (Keller, 2012: 634). In addition, the authors, Leedy and Ormrod (2014) highlighted that the strength of the relationship is presented by the size of the correlation. If a correlation is "+1" or "-1", then a perfect or strong positive and negative correlations are experienced, meaning the two variables have close relations. On the other hand, a correlation close to "0" indicates a weak correlation. However, correlations in the middle range such as the positive or negative presents a moderate correlation (Leedy & Ormrod, 2014). The correlation calculation is performed to describe if there is a degree of meaningful relationship between the variables.

The results here help to understand the quantum relations among the variables included in this study, as the relationship proves vital to model analysis. Correlations analysis measures linear relationship among two variables. If two variables have a correlation coefficient of more than 0.8 in absolute terms, the two variables cannot be included in the same statistical model since they carry the same data generating process, or manifest the same innovations

(Ouma & Muriu, 2014). In this case, only one of the two could be used in the analysis. Should they be included, then it results to Multicollinearity which has serious econometric ramifications.

3.4.3 Unit root test

The requirement of classical regression demands that, stationary conditions within the data series be known. Since most of the variable used in this study are ratios, the deviations from the classical regression assumptions may not be as severe (Choi, 2001). Variable in their rates of change tend to be linear as opposed to variables in other specified units of measurements like prices. Collin-Dufresne and Goldstein (2001) show that most financial ratios have a mean reverting behaviour hence the threat of non-stationarity is not as pronounced as other financial variables. Ioannidis, Peel, and Peel (2003) provide evidence that financial ratios can actually be characterized as non-linear mean-reverting processes. Due to this controversy, panel unit root test is carried out following (Choi, 2001; Levin, Lin, & Chu, 2002; Pesaran, 2007) procedures.

The unit root test is based on the following hypothesis;

$$H_0 = Unit\ Root$$

$$H_1 = No\ Unit\ Root$$

ADF-Fisher panel data unit root test combines the P-values of the test statistics for a unit root in each of the cross-sectional units, giving room to test each time series independently. The test according to Maddala and Wu (1999) and Hoang and McNown (2006) is favourable over competing methods because it can be performed with any unit in a single or multiple time series. It can also perform different tests with different tests in each of the cross-sections and time series, making it a competing method for economic panel data series.

3.4.4 Generalised Method of Moments (GMM) Estimation Technique

The study uses GMM estimation technique to analyse the data. The technique is employed due to its robustness to many of the data related problems which were encountered in the analysis process. It is worth noting that initially the study aimed to analyse the data following both the fixed effect and random effect model but the models did not yield optimum output for this study. Though the data was found to fit the random effects model via Hausman test, the model could not yield optimum output as majority of the coefficients were found to be inefficient. To address the shortcomings of these well-known models; Ordinary Least Square

(OLS), Fixed Effect Model (FEM) and Random Effect Model (REM), instrument variable estimators or dynamic panel GMM was used.

3.4.4.1 GMM

GMM is statistical procedure that makes use of instrumental variables in the process of minimizing the distance between the distributions of the disturbances. Instrumental variables or moment conditions employed in the GMM are mostly the lagged values of the independent variables. GMM solves the problem of endogeneity which is common in situations where part of the independent variables is correlated with the dependent variables and the error term. In this study, just like the studies of this type, lagged variables are used as the instruments to mimic the moment conditions (Kyereboah-Coleman, 2008; Schultz, Tan, & Walsh, 2010; Sheikh, Shah, & Akbar, 2018). Critical to GMM is the right number of instrumental variables used in the estimation; therefore, J-statistics is used to assess the instrumental rank in order to validate the significance of the results. This takes place through instrumental rank analysis through the Sargan statistic test of the value of the GMM objective function at estimated parameters (Blundell, Bond, & Windmeijer, 2001; Kiviet, Pleus, & Poldermans, 2017). The Instrument rank is simply the rank of the instrument matrix, and is equal to identification which helps to reveal the right and optimum number of instruments identified.

GMM assumes that there are a set of moment conditions, say L with a $K-$dimensional parameter that can be satisfied by β. The moment condition can be general and the most difficult part in the GMM parameter estimation is to find the appropriate number of instrument to mimic the optimal moment conditions. A general setting of GMM can be presented as;

$$E(m(y_t, \beta) = 0$$

Where y_t represent the dependent linear variable to be estimated, β are the parameters setting the moment conditions m. To make the model conditional for the objective function of y_t to be estimated, a sample analog can be used in the form of;

$$m_T(\beta) = \frac{1}{T}\sum_t Z_t\, u_t(\beta) = \frac{1}{T} Z'u(\beta) = 0$$

In this objective function, finding the t number of β solves the moment conditions in the set of L equations set earlier. It is not straightforward to determine the exact solution for an over identified GMM system, however, a reformulation of parameters β with appropriate sample

moment$m_T(\beta)$ can provide the solution when it is close to zero as possible. This is done through the Sargan (1958) test of over-identification of under-identification of instruments.

3.4.4.2 Dynamic GMM

In situation where sequential GMM does not give reliable estimates or moment conditions, Dynamic Generalized Method of Moments GMM is called upon. Dynamic GMM is a superior model than the ordinary GMM. It uses lagged values of the dependent variable and investigates if the past information of the dependent variable has any bearing on the present and future performance of that variable. The use of dynamic GMM is a step towards a right direction in estimating panel data regressions. The traditional models such as panel OLS, Fixed Effects and Random Effects models have become less productive in producing reliable parameter estimates (Greene, 2004). For this study, the lagged value of leverage is used as one of the instrumental variables.

Dynamic GMM can be specified as;

$$y_t = y_{t-1} + \varphi_t + \frac{1}{T}\sum_{\beta=1}^{K} Z_t u_t(\beta) = 0$$

Where, the lagged value of the dependent variable is used as one of the instruments in the objective function.

Chapter Summary

The aim of this chapter was to present the data and methods that are employed in this study. The study applied three statistical tools which are descriptive statistics, inferential and panel data analysis to analyse the data. The chapter presented the data encompassed and the description of the models, and the variables as well as the sample period. In addition, this chapter also included the motivation for the choice of variables. The central role of this chapter was to provide the information needed for interpreting the results from the econometric analysis.

CHAPTER 4: Presentation and Analysis of Results

4.1 Introduction

This chapter presents the analysis and results of this study using the proposed models in the previous chapter. The chapter is organised as follows: section 4.2 provides a basic analysis of the variables, commonly known as descriptive statistics followed by section 4.3 which presents correlation results to give the interrelationship in between the variables. Section 4.4 present unit root test results to give an insight into the series used; to ensure they do not have time dependence where variance is not constant and the mean is not zero. Section 4.5 presents the GMM and Dynamic GMM estimation results for factors influencing leverage of a firm. The chapter ends with a summary of the results.

4.2 Descriptive Statistics

Table 3: Descriptive Statistics

	Mean	Median	Max	Min	Std. Dev.	Observations
LEV	195.1	32.6	61031.1	-10.5	2477.1	1032
ROA	4.9	5.5	108.6	-598.3	27.3	1032
SIZE	8567.8	2289.9	89999.0	-3601.0	14742.2	1032
AST	1.2	1.1	8.3	-1.4	0.8	1032
TAX	46.9	29.3	5491.1	-287.5	197.4	1032
GROWTH	2.8	1.5	864.3	-442.8	32	1032
BUS_RISK	0.1	0.1	17.0	-4.4	0.8	1032
BSIZE	11.5	12	133.0	5.0	4.3	1032
NOEXEC_	0.7	0.7	1.1	0.0	0.1	1032
CEO_TEN	4.6	4	18.0	0.1	3.3	1032

Table 3 presents the descriptive analysis of the variables of interest. The table shows that, the dependent variable leverage or debt to equity variable on average from 2004 to 2017 is 195.1 with a median value of 32.6. Interesting to this basic statistics, the standard deviation value is too indicating that majority of these figures are spread out from the mean. However, given the maximum value and the minimum values at 61031.1 and -10.5 respectively, the high level of dispersion in the variable is not very surprising. The same behaviour is manifested by the debt equity variable is also revealed by the size variable.

ROA, a measure of efficiency of the management on using the available resources to generate income for the organization has a mean value of 4.9 and median value of 5.5. The standard deviation of 27 measures the deviation from the mean, indicating the extent of risk encountered by the firms the manufacturing sector in South Africa when generating income

from the available assets. Asset Tangibility output in Table 3 report that the maximum value of asset tangibility in the industry is 8.3, while the minimum value of -1.4, this indicate that firms in this industry keep quality assets. This information is also presented by the lower standard deviation of 0.8, indicating a lower risk involved with asset tangibility.

The average tax for the firms included in this study over the period is 46.9 with a median value of 29.3. This indicates that tax is a component of a company's financial decisions which involve debt and equity decisions. Corporate governance theories like trade-off hypothesis advocate for tax deductibility advantage in the process of capital structure decisions. It means that, at some point organizations prefer to have debt in their capital structure in order to reduce the amount that they pay as debt. In that case, firms will therefore increase their use debt in acquiring assets in order to pay less tax, making tax a critical component of capital structure decisions.

Table 3 shows average growth of 2.8 and median growth of 1.5 indicating a slow growth in the industry. This has a bearing on the amount of debt taken to equity since growth connotes a potential for better income generation using the company's assets. If risk of growth is high as presented in table, then creditors would be shy of advancing credit facility to such an organization.

Business risk represents variability of income generated by a firm to total assets. If this variability is large then the organization is facing volatility in its income generation, and a potential of losing out in generating income from the available resource. In Table 3, the manufacturing industry in South Africa for the period of 2004 to 2017 had an average risk of 0.1. The volatility as presented by standard deviation is 0.8 indicating that the industry did not face much variability in income. This also indicates stability. This variable is of great impact on capital structure decision by a firm since stability indicate predictability of income, hence allowing the organization the freedom to choose on the form of financing they prefer.

The CEO tenure variable reveal that, on average between 2004 and 2017, the CEOs in the manufacturing sector in South Africa continued at their job for 4.5 years, with majority of them staying for 4 years, as the median number reveals. The low standard deviation of 3.2 reveals that there is not so much CEO turnover in the industry. The shortest tenure was around 18 days (0.05 years) with longest serving CEO at 18 years. On average, non-executive members of the board is 70%. This is because, on average, the number of non-executive members of the management was higher. If an organization has few executive decisions

makers, their final management output may deviate from the standard norm. Other corporate governance theories have explanations as to why it is preferred to have directors with no executive roles; these are mostly about the independence among others.

4.3 Correlation Statistics

Table 4: Correlation Analysis

Correlation									
Probability	LEV	ROA	SIZE	AST	GROWTH	BUS_RISK	BSIZE	NOEXEC_	CEO_TEN
LEV	1.000								

ROA	0.029	1.000							
	(0.349)	-----							
SIZE	-0.031	0.014	1.000						
	(0.322)	(0.661)	-----						
AST	-0.016	0.097	-0.250	1.000					
	(0.617)	(0.002)	(0.000)	-----					
GROWTH	0.193	0.197	-0.013	-0.022	1.000				
	(0.000)	(0.000)	(0.673)	(0.490)	-----				
BUS_RISK	0.021	-0.446	-0.044	0.089	-0.288	1.000			
	(0.506)	(0.000)	((0.154)	(0.004)	(0.000)	-----			
BSIZE	-0.002	-0.010	0.049	0.015	-0.003	-0.031	1.000		
	(0.954)	(0.738)	(0.116)	(0.641)	(0.911)	(0.327)	-----		
NOEXEC_	0.011	-0.006	0.083	-0.039	0.056	-0.080	-0.104	1.000	
	(0.714)	(0.841)	(0.007)	(0.206)	(0.070)	(0.011)	(0.001)	-----	
CEO_TEN	-0.020	0.073	0.106	-0.121	-0.006	-0.032	-0.067	(-0.107)	1.000
	(0.528)	(0.020)	(0.001)	(0.000)	(0.853)	(0.311)	(0.031)	0.001	-----

Table 4 moves further the ladder to interrogate relationship among any two of the independent variables. The table shows that the relation of all variables to one another have a correlation coefficient of less than 0.8 in absolute terms. This shows that the problem of Multicollinearity is not a concern for this study as all the independent variables manifest correlation coefficient lower than the threshold value; if any of the two variables had a correlation coefficient of more than 0.8 in absolute terms, the two variables could not be included in the same statistical model since they carry the same data generating process, or manifest the same innovations.

The results also show that some of the coefficients are not significant, but that is of less concern to this study at this stage. Of interest to note is the correlations coefficient between the independent variables with the dependent variable. Majority of them manifest non-significant correlation. The three corporate governance variables have a non-significant

relation with the debt-equity variable. This is interesting as the debt equity decisions or the leverage of a firm have strong management influence (Abor, 2007; D'Mello, Gruskin, & Kulchania, 2018)

4.4 Unit Root Test

Table 5: Summary results for variables' Unit Root Test

Variable	ADF - Fisher Chi-square	
	t-static	**Probability**
Leverage	4.660	0.000*
ROA	2.289	0.000*
SIZE	3.129	0.000*
AST	3.126	0.000*
GROWTH	2.228	0.000*
TAX	3.101	0.000*
BUS_RISK	2.797	0.000*
BSIZE	2.307	0.000*
NOEXEC_	3.501	0.000*
CEO_TEN	3.683	0.000*

Panel root test was carried out on the sample in order to test if the sample mean is zero and variance is constant; to establish the stationary conditions within the data series. According to the test statistic reported in table 5, all the variable tested have a test statistic of $t > 2$ and $P\ value < 0.05$ indicating that the null hypothesis of the presence of unit root can be rejected. This now supports the use of classical linear regression techniques such as Panel Ordinary Least Squares.

4.5 Factors influencing capital structure of manufacturing firm

Table 6: Summary of Panel two-stage GMM and Dynamic GMM Models Outputs

Variable	1. GMM: Leverage	2. Dyn GMM: Leverage
LEV(-1)		-0.582
		(0.000)***
ROA	-1.065	29.535
	(0.916)	(0.000)***
SIZE	2619.562	73.307
	(0.141)	(0.000)***
AST	-173.097	-1485.813
	(0.428)	(0.000)***

Variable	1. GMM: Leverage	2. Dyn GMM: Leverage
GROWTH	90.305	17.944
	(0.127)	(0.000)***
TAX	0.530	1.372
	(0.874)	(0.000)***
BUS_RISK	659.007	1903.376
	(0.344)	(0.000)***
BSIZE	-4.983	-151.447
	(0.991)	(0.000)***
NOEXEC_	-10.000	159.129
	(0.980)	(0.000)***
CEO_TEN	-213.583	-19.258
	(0.537)	(0.000)***
Observations	941	941
J-stat	0.026	0.027
AR(1)	0.260	0.321
AR(2)	0.225	0.185
Instrumental Rank	74.000	74.000

*Notes: In this table, both the system GMM and Dynamic GMM are reported with their Probability values. It can be seen that in the system GMM, all the variables are not significant, while the entire sample estimates in the dynamic GMM report significant coefficients. The values with asterisks ("***") indicate that the coefficients are significant at 1% level. The J-statistics and Probabilities of J-stat report the identification criteria of the instrumental ranks.*

Results in Table 6 indicate that using ordinary system GMM, all the variables used in this study do not have any influence on the debt-equity decisions in the manufacturing industry of South Africa; all variable have a non–significant relationship with firm leverage. Though non-significant, ROA, asset tangibility and all corporate governance characteristics are seen to have a negative relationship with leverage. Size, growth and tax had a non-significant but positive relation to leverage.

The Sargan test of probability of J-statistics, that measures the validity of instruments, was found to be (0.68), indicating that the right number of instruments were chosen. Therefore a further investigation should reveal why there is no significant relationship between the variables, which critically contravenes the theory. Possible remedy to this kind of results is usually by investigating if the past information of the dependent variable has any bearing on the present and future performance of that variable, hence the inclusion of the lagged dependent variable; LEV(1). In this study therefore, one lag of leverage is used to determine the effects of financial performance indicators and corporate governance performance indicators on the debt-equity decisions (or firm leverage). By including this variable it means that only dynamic GMM can be used to investigate this relationship.

Results of the dynamic GMM indicate that all the variables are significant at 1% level of significance. This means that the investigated variables are all significant determinant of the level of debt-equity ratios in the manufacturing industry in South Africa. The fact the coefficients of all the variables indicated more than 1% level of significance could be questionable in many econometric analyses, but the instrument validity tests, both reveal that the right instruments were used. This therefore validates the results as the output shows. The J-statistic tests the number of instruments used in estimation. The Instrument rank is simply the rank of the instrument matrix, and is equal to identification which helps to reveal the right and optimum number of instruments identified. In the model therefore, there is no over identification or under identification of the instruments.

From the Sargan statistic test, Dynamic GMM outputs are accurate as per the probability of J-Stat (0.8122). ROA, size, growth, tax, business risk, and non-executive, all reported a significantly positive relationship with lagged leverage of the firm. Asset tangibility, board size and CEO tenure were found to have a significantly negative relationship with lagged leverage.

CHAPTER 5: CONCLUSION AND RECOMMEDNATION

5.1 Introduction

This chapter presents the conclusion drawn from the analysis of results done in the previous chapter. Section 5.2 provides the discussion of the results where results were contrasted with previous empirical studies and their implications presented. This is followed by section 5.3 which presents the conclusion and recommendations of the study.

5.2 Discussion

The preceding four chapters in this study have presented intriguing evidence about the subject study here. Essentially, the study sought to investigate the effects of financial performance variables and corporate governance practice on debt-equity levels (capital structure decisions) in the manufacturing industry of South Africa. Chapter 4 specifically presents interesting output of this quest. Three important variables are clearly shown right from the basic statistical analysis to be important determinants of leverage in the industry; these are ROA, growth and business risk.

It is important to note that, with the introduction of the past leverage or lagged leverage variable (Dynamic GMM), all the other variables turns to be significant. What this says about the industry is that, any debt-equity decision taken by either management or the board critically relies on the previous debt equity levels before deciding on the new debt-equity levels. It is therefore reported that corporate governance components, tax environment, asset turnover, specific risk environment under which the firm is exposed to, and asset quality are critical to the capital structure decisions in the industry.

From the results obtained it was found that ROA, size, growth, tax, business risk, and non-executive have a significant and positive relationship with the lagged debt-equity decisions taken by managements in the manufacturing sector over the period of investigation. This is as reported in the Dynamic GMM output. Asset tangibility, board size and CEO tenure were found to have a significantly negative relationship with lagged leverage .It is worth noting that different studies have found varying and contradicting relationships between leverage and firm specific variables, our study also find its own relation between firm characteristics and leverage for manufacturing firms in South Africa, some of the findings are not in line with majority of previous studies that have been conducted on South African firms (Gwatidzo

& Ojah (2009), Kasozi (2010), De Vries (2010), Ramjee & Gwatidzo (2012) and Nel (2014)) while others do corroborate the findings from these studies.

Our study finds the following similarities with other studies. Size was found to have a significantly positive relationship with leverage in line with Gwatidzo & Ojah (2009), Ramjee and Gwatidzo (2012) and Nel (2014). This means that large firms tend to have higher levels of leverage. Gwatidzo & Ojah (2009) explains this to be the low asymmetry information problem faced by large firms as well as diversity which reduces risk. For growth, mixed relation to leverage was predicted earlier in the study based on results from other studies as well as literature. Firstly, different measures have been used to capture the growth potential of a firm; for instance; Ramjee and Gwatidzo (2012) defined growth in two ways, as market to book value, and as (book value of asset – book value of equity+ market value of equity)/book value of equity). Hall et al. (2000) measured growth as percentage increase of sales turnover in the previous 3 years. Secondly, both a positive and negative relation relationship between growth and leverage can be explained.

A positive relationship can be expected as we believe growing firms use more debt to pursue investment opportunities; they are still relatively young and thus have limited internal funds thereby relying on external funds. On the other hand, Titman and Wessels (1988) and Prasad et al. (2001) reason that firms that have extensive growth opportunities ought to issue equity rather than debt because equity has the potential to decrease agency costs. For these reasons, growth can be negatively related to leverage. Our study reports a positive relationship between growth and lagged leverage implying that most of the firms under the industries studies are growing slowly and thus don't utilize external financing that much This explanation can be backed by the descriptive statistics which revealed a slow growth in this industry. This positive relationship is in line with findings by Ramjee and Gwatidzo (2012) and de Vries (2010).

A negative relationship between leverage and corporate governance characteristics was projected because a stronger board imposes rigorous conducts which limit reckless lending and sometimes the loss of net positive investment. Our study provides evidence to supports this for board size and COE tenure. This implies that manufacturing firms in South Africa are subjected to a stronger board which imposes rigorous conducts which limits lending by management to pursue their own interests.

The study finds these dissimilarities with other studies. ROA relation to lagged leverage does not corroborate most studies (Gwatidzo & Ojah (2009), Ramjee & Gwatidzo (2012), Nel (2014) and de Vries (2010) that find ROA (profitability) relate negatively to leverage, which is consistent with the suggestions of the pecking order theory, which presumes that profitable firms prefer internal sources of financing rather than external funding. This is not surprising though, since our study has employed a different analysis route (GMM and Dynamic GMM) which is robust to endogeneity. What this means for manufacturing firms in South Africa is that the more profitable they the more they employ more debt due to the fact that they are less likely to suffer bankruptcy and financial distress; they have the capability to fulfill their debt obligations. This also provides them with an incentive to exploit debt tax shield (Hutchinson & Hunter, 1995). Another possible reason for a positive relationship between leverage and profitability is to minimise agency costs in a firm; using more debt tend to limit the actions taken by management when it comes to free cash flow, since debt is associated with compulsory interest payments (Jensen, 1986). The positive relationship between leverage and profitability supports the trade-off theory of capital structure.

Asset tangibility also reported inconsistent results with existing literature and the aforementioned studies. A significantly negative relationship is found between asset tangibility and leverage for South African manufacturing firms. Other studies have previously found a significantly positive relationship between available assets and debt usage of a firm, due to the collateral advantage asset availability offers when securing loans (Gwatidzo & Ojah, 2009; Frank & Goyal, 2004; Ramjee & Gwatidzo 2012; Nel 2014). Theory also presumes a positive relationship between asset tangibility and leverage; that the more collateral a firm can offer, the more debt secured. What our findings imply is that manufacturing firms do not utilize their assets structure to their advantage or full potential; perhaps due to risky nature of the environment in which the firms operate.

Previous studies (Gwatidzo & Ojah (2009) and Nel (2014) have found no significant relationship between tax and leverage. From our result a significant positive relationship is observed as anticipated based on literature. This explains that manufacturing firms with high effective tax rates tend to issue more debt than equity to take advantage of interest tax shields.

Intriguing results were obtained for business risk relation to debt. A significantly positive relationship is found for South African manufacturing industry in this regard. This implies

that highly risky firms tend to use more debt and less risky forms tend to use less debt. The descriptive statics revealed that manufacturing firms in South Africa have less variability in income, which mean they are more stable and able to choose whatever financing method they prefer. This together with the revelation that manufacturing firms underutilize their asset structure's collateral advantage, may be pointing out that they use mainly their asset for financing and thus resort less to external financing. Abor (2007) points out that the researchers have found a positive relationship between firm risk and leverage. Together with Prasad et al. (2001) they suggest that a bi-directional relationship may exist between leverage and firm risk. Empirical and theoretical research cannot reach unanimity on whether leverage is an increasing or decreasing function of business risk; empirical evidence has been found in favour of both.

5.3: Conclusion and recommendation

In concluding this study, a significantly strong relationship between leverage and the identified firm specific characteristics was established by the chosen model (Dynamic GMM). Consequently this suggest that there is weak evidence to support the null hypothesis which state that capital structure of manufacturing industry in South Africa is not significantly affected by firm characteristics and corporate governance. Therefore the study reject the null hypothesis put forward in chapter 3 that capital structure of manufacturing industry in South Africa is not affected by firm characteristics and corporate governance.

A number of interesting outputs is communicated; first the specific business risk in the manufacturing sector in South Africa is important in the debt and equity decisions taken by the management and boards of the organizations. The sales growth is also found to be important consideration in the sector. Another variable of crucial consideration by the managements of these organizations is the value derived from the assets they hold. It is always important that a firm is able to sweat the best out of their assets, hence a decision to acquire more assets depends on how much the assets are able to generate to the shareholders in terms of bottom lines.

We can conclude from the way leverage relate with the identified firm specific characteristics in this study, that manufacturing firms in South Africa follow both the pecking order and trade-off theory. This is shown by the positive relationship observed between lagged leverage and ROA, size, and tax which follow the trade-off theory. Asset tangibility and growth were found to have a negative relationship and positive relationship respectively with the lagged

leverage of the manufacturing industries, indicating some preference to pecking order theory. Growth rate of this sector was found to be slow and less risky, giving them the freedom to choose whatever financing method they prefer.

We recognise as a limit that the study might have not exhaustively utilised all the relevant variables important in determining the debt equity decisions in the manufacturing industry in South Africa, we also recognise that, as a constraint, the sample period employed in this study might have not brought out the desired results. In recommendation therefore, a study of this type should be carried out with longer sample period and broader sample frame that would help harness the critical determinants of debt-equity decisions in the industry.

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