Testing the Pecking Order Theory of Capital Structure in South Africa

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Name: Lydia Sejo Andries

Student Number: 2005589

Supervisor: Professor Odongo Kodongo

Wits Business School

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ABSTRACT

This study was conducted with the aim of testing the pecking order hypothesis as well as examining the variables influencing the capital structure decisions using companies that are listed on the main board of the Johannesburg Stock Exchange over 12 years from 2009 to 2020. It has been noted that several listed companies in South Africa are facing the challenge of survival in the current economic climate. The companies are constantly found to be in risky situations in relation to their finances, which makes it difficult for them to meet their responsibilities to creditors and other stakeholders. Making the correct decisions regarding capital structure enhances the financial well-being of any organization. When companies fail to make the right capital decisions, the result can be financial distress, bankruptcy, and liquidation. The research will also inform both potential and existing investors in South Africa on the general approach to funding of the JSE listed companies and therefore give investors some basis for their investment decisions. A total of 197 companies excluding financial companies were selected to be used in the study using stratified random sampling. Pooled ordinary least squares, fixed effects and random effects models with heteroscedasticity robust standard errors were used. The results from the model employed to test the pecking order hypothesis do not show strong evidence of company management going in line with the pecking order theory when making decisions regarding the financing of the company. The conventional leverage regressions run to determine the factors that influence the capital structure were found to be consistent with theoretical predictions except for firm size which had the correct sign as predicted by theory but statistically insignificant. Asset tangibility and firm size were both positive while Market to Book and profitability were both negative in line with theoretical predictions. All the conventional predictors of leverage were statistically significant at the 1% and 5% significance levels except for firm size which was not statistically significant at any of the conventional levels of significance. Thus, for the sample of companies used in this study and the sample period selected, there is no strong support for the pecking order theory while leverage is determined by growth options as proxied by MTB, asset tangibility as well as profitability. A limitation of the model used in this study is that it only considered firm-specific factors in determining the predictors of leverage. Future research could include macroeconomic variables as additional predictors of the financing decisions of listed firms in South Africa as empirical evidence shows that these macroeconomic are important in the leverage-financing deficit nexus.

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LIST OF ACRONYMS

BESA	Bond Exchange of South Africa
CFOs	Chief Finance Officers
GDP	Gross Domestic Product
GMM	Generalised Method of Moments
JSE	Johannesburg Stock Exchange
US	United States

DEFINITIONS OF KEY TERMS

Capital Structure: The study of capital structure attempts to the mix of financing sources that companies use to fund their operations. To fund its operations, a company can utilise internal finances or finance from outside (Gangeni, 2006).

Debt: Debt financing occurs when a company borrows money from an outside source to finance its projects and promises to pay back at an agreed rate of interest and at a set date in the future (Alzomaia, 2014).

Equity: With equity, an organisation allocates a representation of its ownership to other firms or individuals in order to raise capital. The two main categories of equity are common shares are preference shares (Bartoloni, 2013).

Retained earnings: Retained earnings refer to the accumulated portion of profits from the business that are not distributed as shareholder dividends but are instead reserved so that they are reinvested into the business (Alzomaia, 2014).

CHAPTER ONE: INTRODUCTION

1.1 Context of the study

Company management is consistently searching for a combination of debt and equity that is optimal or financing arrangement that results in maximum worth for the company and reduce the company's risk profile. The decision-making process regarding a firm's financing choice is crucial for financial stability and going concern matters (Mokuoane, 2016). Making the correct decisions regarding capital structure enhances the financial well-being of any organisation (Anand, 2002). When companies fail to make the right capital decisions, the result can be financial distress, bankruptcy, and liquidation. According to Marimhutu (2019), one of the factors that influence company failure is poor decisions by management regarding the choice of alternative sources of funding. The importance of choices that relate to capital structure on the assessment of a firm has been a subject for debate since the presentation of Modigliani and Miller's (1958) work, who suggested the capital structure irrelevance theory (Moyo et al., 2012). Through further research, several theories explaining the financing behaviour of firms have been proposed. Some of the theories are the trade-off theory, the pecking order theory, the information asymmetry theories, and the agency cost theory.

Meyers (1984) regarded the trade-off theory and the pecking order theory as the two most common conditional theories of capital structure, judging from the volume of research work conducted globally to draw comparisons between the two theories. The trade-off theory, according to the research done by Modigliani and Miller (1963) and Warner (1977) on taxes and bankruptcy shows financial distress costs and some understanding from Jensen and Meckling (1976) based on their agency literature, indicates that companies have an optimal capital structure that is largely driven by balancing tax benefits derived from debt financing, that is debt tax shields and the costs of financial distress. In support of this theory, Marsh (1982) and Taggart (1977) proved that companies change towards a desired debt-to-value ratio to attain an ideal structure of capital financing.

Studies by Quan (2002) and Mazur (2007) have documented results suggestive of a shift by companies from the trade-off theory to Pecking Order Theory. Donaldson (1961) coined the pecking order theory. The theory describes the hierarchy of financing choices that are made by a firm due to information asymmetry. The pecking order theory states that firms prefer funds generated from internal operations to debt as the first source of funding. Myers and

Majluf (1984) augmenting the work by Donaldson's (1961), Majluf (1984) posited that companies should make use of debt when raising funding from outside and capital from equity should only be taken as the last resort. Therefore, the sequence of funding sources used is internal funds from retained earnings, short-term securities, debt, preferred stock, and common stock last.

Therefore, given the prevalence of the Pecking order Theory of Capital Structure as supported by a number of researches mostly in advanced economies, this research is conducted with the aim of examining the extent to which the corporate finance patterns of companies listed on the JSE during the of 2009 to 2019 align to the pecking order theory. It should be noted that the period of the research started closer the Mazar (2007) research findings about the companies' funding shifting patterns towards the pecking order theory of capital structure and ends in the immediate current year.

Although the pecking order theory is a practical theory that offers a structure for firm financing, it is based on a number of assumptions that need to be scrutinised in relation to their applicability to the capital structure of listed companies in South Africa. The first assumption of the theory is that there are fixed or strict structures that firms first resort to internal financing and then consider external financing when internal financial resources are not adequate (Eldomiaty et al., 2016). There is an implicit assumption in this hierarchy that internal financing costs less than external financing at all times, which may not be true. The second assumption of the POT is that internal and external financing are always available. The third assumption is that the pecking order theory assumes that internal financing is subject to an organisation's control, which may not be true as long as the firm is committed to a certain pay-out policy. Thus, the stability of dividend pay-out does not necessarily equate to stability in internal financing. Internal financing is subject to changes in the revenues and profitability of the company. In addition, there is no guarantee of the availability of external financing at all times.

The question that arises is whether the pecking order theory can be applied in explaining firm financing behaviour of companies in emerging markets, particularly South Africa. Gwatidzo and Ojah (2009) and Singh (1999) pointed out that the capital markets in Sub-Saharan Africa (SSA) are small, less developed, thinly traded, inefficient, and illiquid. There is a virtually non-existent corporate bond market as administrations constantly crowd out private

companies in public debt markets. These countries are also characterised by lower credit ratings, which indicate that there are bad macro-economic prospects and fundamentals, social unrest risks, and less developed legal and tax systems. Lastly, companies in emerging markets are less diversified, smaller, and are highly vulnerable to external shocks.

1.2 Problem statement

Several listed companies in South Africa are facing the challenge of survival in the current economic climate (Marimhutu, 2019). The companies are constantly found to be in risky financial situations in which they fail to fulfil their financial commitments (Marimhutu, 2019). It has also been established from literature that decisions relating to capital structure bear a substantial influence on the performance of an organisation. Making the correct decisions regarding capital structure enhances the financial well-being of any organization (Anand, 2002). When companies fail to make the right capital decisions, the result can be financial distress, bankruptcy, and liquidation. According to Marimhutu (2019), one of the factors that influence company failure is poor decisions by management regarding the choice of alternative sources of funding. Capital structure decisions may therefore be playing a role in the current financial struggles of South African listed companies.

Most of the previous capital structure studies that have been conducted have focused on developed markets (Shyam-Saunder & Myers, 1999; Graham & Harvey, 2001; Frank & Goyal, 2003; Beattie et al., 2006; Cohen & Yagil, 2007) and the findings cannot be generalised to emerging markets because of the differences in market and economic conditions. Firms in Africa operate under a different environment from those in developed economies mainly because of differences in institutional infrastructures. In Africa, capital markets are small and thinly traded (Gwatidzo & Ojah, 2009). In addition, there are high incidents of government intervention in markets in African nations. Conversely, capital markets in developed nations are characterized by properly functioning stock markets and large and efficient credit markets (Kasozi, 2009). It is therefore likely that some of the factors influencing capital structure in developed nations may not apply to companies in developing countries.

It has been noted from some empirical studies that the financing practices of certain firms are not aligned with theory (Graham & Harvey 2001; Ryan & Ryan, 2002). There are several explanations for this anomaly. At one extreme, in cases where finance practice lags behind

theory, the reasons provided include a gap in communication between finance practitioners and academics (Beaumont-Smith, 1991). As a result, finance officials choose to adopt the age-old, tried and trusted, but simpler techniques for managing finances as opposed to the recent techniques that are viewed as more administratively complex but are regarded as enhancing accuracy of financial management practice. The other extreme may see theory lagging behind practice and in such cases, companies adapt existing finance theory to match their exceptional circumstances and needs (Ağca et al., 2010). There is also a possibility that a lack of alignment between finance practice and theory could partly result from the absence of knowledge about application, lack of resources, and several other challenges within the environment of a particular firm that make it impossible to achieve such alignment.

Any nonconformity with agreed norms should be a cause for concern if empirical research does not validate or justify such nonconformity (Alti & Sulaeman, 2012). When companies make shareholder value their main objective, the key drivers of value creation are skilful financial management and optimal finance policy and these have to be confined within a disciplined financial foundation. Thus, there should be a fairly close alignment between financing theory and practices for companies to add value (Alti & Sulaeman, 2012). This study therefore seeks to determine whether the financing practices of firms listed on JSE are aligned with the perking order theory.

Some research has focused on developing countries (Green & Mutenheri, 2002; Ezeoha, 2008; Gwatidzo & Ojah, 2009; Mukherjee & Mahakud, 2010) but these studies did not specifically test the pecking order theory. In addition, studies conducted in South Africa on capital structure determinants (Kasozi, 2009; DeWet, 2015; Mokuoane, 2016; Sibindi, 2017) were not specific to the pecking order theory. Therefore, having noted the importance of the pecking order theory of capital structure as supported by a number of researchers mostly in advanced economies, the purpose of this study is to examine how closely the corporate financing patterns or capital structure of JSE listed companies during the testing period of 2009 to 2019 are supported by the pecking order theory.

1.3 Purpose of the study

This research mainly aimed at determining the extent to which finance theory and finance practice are aligned through examination of the pecking order theory against financing practices of South African listed firms during the 2009 to 2019.

1.3.1 Research questions

The following research questions are derived from the main objective of the study:

Primary research question

To what extent do listed firms in South Africa follow the pecking order theory during their financing decision-making theory?

Secondary research questions

To what extent are the decisions relating to capital structure for listed firms in South Africa aligned with the pecking order theory?

What factors do CFOs of South African listed firms take into account when making decisions regarding capital structure?

1.3.2 Hypotheses

The hypotheses that address the primary research question are as follows:

H_0: Executives of listed companies in South Africa do not follow the pecking order theory when making capital structure decisions for their firms.

H_1: Executives of listed companies in South Africa follow the pecking order theory when making capital structure decisions for their firms.

1.4 Significance of the study

The research seeks to establish whether listed companies in South Africa adhere to the pecking order theory in the process of decisions relating to financing arrangements. The findings of the study will add to the existing literature on the testing of the pecking order theory in all economies. The findings may result in suggestions for further developments to the pecking order theory. Additional insights to the existing body of knowledge on the pecking order theory will provide future scholars and researchers with diverse sources of secondary data for their researches.

The findings of this research will also inform both potential and existing investors in South Africa on the general approach to funding of the JSE listed companies and therefore give investors some basis for their investment decisions. The research is also likely to aid companies' management in decision making towards building an optimal capital structure. This is likely to prompt management to ask themselves pertinent questions before they

establish a debt policy and when considering funding options. As a result of the empirical evidence of the pecking order theory of capital structure tiered funding, the company management and the Board of Directors are likely to consider the cost implications of each of their funding options before concluding on their funding decisions. As such, this study will provide reference to future researchers on capital structure with regards to South African and African companies in general.

1.5 Delimitations and limitations of the study

The research will look at empirically testing the pecking order amongst all South African JSE listed companies excluding financial services company, regulated utility companies and companies included in major mergers recently. The study will therefore use a sample of 332 companies from an initial list of 401 companies listed on the JSE spread across 31 sectors. The study will use the regression test of the pecking order theory of capital structure by determining a financing deficit from available information in the company's financials. This will be done by aggregating internal cash flows, investment, dividends and change in working capital.

1.6 Outline of the study

The study report is presented in five chapters, whose contents are briefly discussed below.

Chapter One: The first chapter provides an introduction of the research by outlining its context, the problem being investigated, the purpose of the study, and the limitations and delimitations of the study.

Chapter Two: The second chapter provides an examination of the literature relating to the pecking order theory and factors that are taken into account by firms during the process of making capital structure decisions. In this chapter, previous studies on capital structure decisions are also analysed to obtain insights into their findings and recommendations.

Chapter Three: The research methodology that was adopted in conducting the study is outlined and discussed in the third chapter. The chapter provides details of the research design and sampling methods used as well as the methods of data collection and analysis.

Chapter Four: The results of the study are presented in this fourth chapter. The chapter covers the presentation of the findings from regression analysis and hypothesis testing, explaining the relationships between the variables of the study.

Chapter Five: The conclusions that are drawn from the results of the study are presented in this final chapter. The chapter also presents the recommendations that are drawn from the findings.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this chapter, the theoretical framework of the study is presented. The chapter consists of the definition and overview of capital structure and the state of capital markets in Africa and, in particular, South Africa. The findings from different studies conducted on the research problem in developing countries, developed countries, and South Africa are also discussed in this chapter.

2.2 Definition and Overview of Capital Structure

Frank and Goyal (2009) defined capital structure as "a combination of various sources of long-term finance that include retained earnings, long-term loans, debentures, preference shares, and equity shares". According to Gangeni (2006), the study of capital structure attempts to the mix of financing sources that companies use to fund their operations. To fund its operations, a company can utilise internal finances or finance from outside. Baker and Wurgler (2002) referred to capital structure as the combination of debt and equity but giving priority over each other in a firm's financial decision to invest in order to maximise value for the company and the wealth of its shareholders.

There are more risks associated with debt financing, but it is less expensive for the firm since interest payment is a requirement at law and failing to pay leads to liquidation (Fama & French, 2005). Unlike debt financing, equity financing carries more costs but there is less risk attached to it since the firm is not required by law to remit dividends to investors during times of underperformance. When the degree of leverage is huge, the proportion of debt also becomes high, meaning that there are larger interest payments, which have a negative impact on the income that is at the disposal of shareholders (Firer et al., 2012).

Making the correct capital structure decisions is one the important tasks for ensuring the financial well-being of an organisation (Mokuoane, 2016). When companies make the wrong capital structure decisions, the result could be financial distress, bankruptcy, or even liquidation. Company executives have a duty to decide the form of capital structure that is required by the firm given it's the circumstances around its finances, funding strategies for long-term projects, as well as strategies for creating value for stakeholders (Anand, 2002). In order to deal with the capital structure decisions of the organization, two questions need to be addressed: that is, how should the firm fund its capital structure to finance its activities and how will the selected capital structure impact on the value of the firm? (Mokuoane, 2016).

2.3 Capital Markets in Africa

Stock exchanges play a critical role in the global economy. In addition to contributing to economic growth, stock exchanges have a social responsibility in the prudent allocation of resources and creation of employment among other obligations. The first stock exchange in Africa was established in 1861 and 15 decades later, there were 36 stock exchanges in the region, serving 43 economies and representing1400 listed firms (Raubenheimer, 2019). There has been a steady growth in these markets and they have demonstrated their capability to bring about prosperity on the continent. However, despite having success stories, exchanges in Africa are still characterised as being highly fragmented and illiquid. The regulatory environments under which they operate are regarded as weak (PwC, 2019). This characterisation is evidenced by dismal activities on the stock exchanges as well as shrinking investor participation across the markets. On the other hand, the continent is confronted with an infrastructure deficit of around USD108 billion, which could easily be accessed through local capital markets (Raubenheimer, 2019).

South Africa remains one of the leading economies in the African capital markets despite the many challenges impeding its economic growth. South Africa is followed by Kenya and Rwanda in the ranking in position 4 and 5 respectively, with the remaining five countries being Ghana, Côte d'Ivoire, Nigeria, Ethiopia, and Tunisia in that order (RMB, 2020). The economies with undeveloped capital markets are usually short of capital investment in the form of both equity and debt thereby stifling businesses of much needed liquidity for both production and investment to stimulate economic activity to attract foreign direct investment (Raubenheimer, 2019). This in turn creates low confidence by investors with regards to the economy's stock markets.

2.4 Capital Markets in South Africa

Khetsi and Mongale (2015) state that capital markets have, over the years, proven to be of high regard in South Africa. The South African stock market, which far exceeds that of other developing countries such as Indonesia and Mexico, largely accounts for the country's Gross Domestic Product (GDP) (Hassan, 2013). Therefore, the stock markets have played a significant role in the growth of the country's economy. Capital, markets as facilitated by stock exchanges, create a platform for companies to access funding in the form of equity and debt for both productivity and investment purposes.

The Johannesburg Stock Exchange (JSE) turned 132 years in 2019 and is currently the 19th largest stock exchange in the world. In 2019, JSE had a market capitalisation of more than USD1 trillion and is the largest stock market in Africa (Raubenheimer, 2019). JSE is assisting companies to raise capital on the primary and secondary markets and enabling investors to share in company growth. From modest beginnings, JSE has developed into an advanced, modern securities exchange, offering full electronic trading, clearing, and settlement in interest rate products, bonds, and equities as well as commodity, financial, and currency derivatives. JSE remains Africa's most liquid stock market with average daily trading more than US$1.4bn (RMB, 2020). This is notably greater than major African stock markets such as the Cairo Stock Exchange in Egypt, which is said to be trading at US$44m a day. This emphasises the maturity, liquidity and strength of South Africa's capital markets (RMB, 2020).

In addition to the equity market and to facilitate easy access to funding by businesses, there is the Bond Exchange of South Africa (BESA) which deals mainly with the issuance of bonds and derivatives (Marimhutu, 2019). Though BESA was granted exchange license in 1996, it was demutualised in August 2007 to enable the exchange to further its products and services as well as grow into other markets. In 2009, JSE acquired the exchange. BESA under JSE is now the biggest listed debt market in Africa by market capitalisation and liquidity. According to Saville and Gopaldas (2019) BESA's decision to demutualise and the JSE's subsequent acquisition of South Africa's bond market has afforded it to increase its reach, improved efficiency, and increased competitiveness. The exchange offers several platforms and services to meet the demands of the capital market players such as issuers, investors, market makers and traders locally, regionally, and internationally. Government debt makes most of

the bond market in South Africa as they are marketable. The total market turnover in 2019 exceeded ZAR 32 trillion (RMB, 2020). However, according to Hassan (2013), the corporate portion of the market remains smaller and less liquid, with issuance dominated by a few large companies mainly banks and financial companies which have replaced state-owned enterprises as the main corporate issuers.

South Africa remains one of the leading economies in the African capital markets despite the many challenges impeding its economic growth. According to PwC (2019), since 2014, capital raised from 43 IPOs recorded on the JSE was US$5.9 billion, representing 57% of total African IPO capital raised, and 34% in terms of transaction volume. This level of activity talks to the size and the depth of capital markets in South Africa compared to other countries in the continent. Despite this high degree of activity in the capital markets, RMB (2020) report indicated that amongst the RMB's Investment Attractiveness Rankings Top 10, South Africa fell to third place and was replaced by Morocco in the second spot from last year whilst Egypt remained first. This could be reflective of the country's recent constrained levels of economic growth and deteriorating investment environment such as the legal and political environment as well as the quality of institutional framework and human capital, which the host country creates and influences. Notwithstanding slipping in the rankings, the report shows that the country remains the continent's most sophisticated financial and capital market (RMB, 2020).

However, these positive assertions about South Africa's capital market must be considered together with its increasing economic risks: the country is grappling with lacklustre economic growth rates. Given the restrained and unrelenting electricity limitations, South Africa's GDP growth is forecasted at 0.6% and 1.0% in 2020 and 2021 (RMB, 2020). The previous years' economic upturn, though slow, is cantered on the slowly recovering global economic outlook and a somewhat supportive monetary policy.

Despite the availability of capital markets public funding platforms, it is not always easy and cheaper for companies to have access to these funding (Raubenheimer, 2019). To fill such funding gaps and augment the publicly available funding platforms, South Africa has a well-developed private equity and debt market which accommodates funding providers such as venture capitalists, private equity and angel investors as well as privately sourced debt from the banking industry (PwC, 2019).

2.5 The Pecking Order Theory

The pecking order theory was coined by Donaldson (1961). The theory provides a description of the order of choices in financing that are made by companies as a result of asymmetry of information. The assumption of the model is that firms favour funds generated from internal operations to debt as the number one source of funding. Therefore, the sequence of funding sources used is internal funds from retained earnings, short-term securities, debt, preferred stock, and common stock last. With the pecking order theory, it can be inferred that there is nothing such as the optimal capital structure since capital results from the sequence that firms follow in fulfilling their capital needs.

One of the main predictions of the pecking order theory is that leverage is negatively associated with profitability (Baker & Wurgler, 2002; Antoniou et al., 2008). Naturally, companies that are profitable have a high likelihood of tapping into retained earnings to finance their operations than seek financing from debt markets. This prediction is supported by findings from a number of studies (Booth et al., 2001; Bartoloni; 2013; Booth et al., 2001; Antoniou et al., 2008 Ahmad & Abbas, 2011;). The pecking order theory also predicts that the leverage of a firm has a negative relationship with asset tangibility. The basis for this assumption is that physical assets and low information asymmetry go hand-in-hand, which makes the issues of equity less expensive (Frank & Goyal, 2009). This prediction is supported by empirical evidence from Ahmad and Abbas (2011), Ahmed and Shabbir (2014), and Al-Najjar and Hussainey (2011). The third prediction of the pecking order theory is that there is positive relationship between leverage and growth. The implication from this prediction is that companies that have more investments and hold fixed profitability should accrue more debt as time goes by (Frank & Goyal, 2009). Finally, the hypothesis predicts that there is an inverse relationship between leverage and firm size (Frank & Goyal, 2009). This is because large companies are less subject to the information asymmetry between managers and investors and therefore incur low costs of borrowing (Rasiah & Kim, 2011).

Criticism for pecking order theory has come on a number of levels. The inappropriateness of the pecking order approach arises from the fact that it will transmit a signal to the market (Myers & Majluf, 1984; Ross, 1977). Thus, the assumption will be that the issue of shares by management only comes if the value of the firm is overstated and this result in a drop of the share price. On the other hand, if a firm increases its debt, this will be viewed by the market

as a sign that management is confident of its ability to service the debt and this transmits a positive sign to the market, which increases the price or share price correspondingly. The efforts by management to predict the marketplace more significantly governs the financing arrangement of the firm as opposed to a perking order in which companies with leverage ratios that are low have a tendency of raising equity when they have a low share valuation, and the converse applies for firms that are have high leverage (Baker & Wurgler, 2002). In addition, Fama and French (2005) asserted that equity is often issued by companies that have the ability to issue debt or utilise funds generated internally. The implication therefore is that the trade-off and the pecking order theories cannot be regarded as mutually exclusive since decisions about financing arrangements can be explained by both of them. Furthermore, the issuance of share capital by firms usually comes when they are confident that investors will be in agreement with the rationale underlying such decisions (Dittmar and Thakor, 2007). Finally, management issue equity with higher values when they are confident that there will be available buyers for the shares (Alti & Sulaeman, 2012).

2.6 Other theories of capital structure

2.6.1 The trade-off theory

According to the trade-off theory, a firm chooses the amount of debt and equity finance to utilise by balancing the benefits and costs. The assumption of the trade-off theory of optimal capital structure, which has its basis on the works of Modigliani and Miller in the 1950s, is that companies obtain optimum capital structures by making a trade-off between tax savings from debt and costs of financial distress that arises when a company acquires too much debt. Thus, tax deductible interest is the major advantage derived from borrowings is tax advantage while the major costs are in relation to financial distress and the expense of personal tax that bondholders incur on receipt of interest income.

According to the static trade-off theory, which is a minor modification of the trade-off theory, companies set a target debt ration that offers maximum value to the organisation (Shyam-Sunder & Myers, 1999). Furthermore, companies add up on their debt till it reaches an optimum static point, which is known as the target capital structure. At that point, an extra unit of debt is equal to the cost of debt because of a greater possibility of being bankrupt. According to Frank and Goyal (2009), companies are referred to as following the static trade-off theory when a single period trade-off between the costs of bankruptcy and the benefits of debt determines their leverage.

The dynamic trade-off theory, which is another version of the trade-off theory, argues that there is a gradual adjustment of the financial structure over a period to achieve the target debt and a certain speed of adjustment (Frank & Goyal, 2009). Thus, dynamic behaviour or target adjustment behaviour is found in companies when they have a targeted level of debt and any nonconformities with such target are gradually eliminated over several time periods. Taking into account the fact that debt is expensive to issue and repurchase, the dynamic trade-off theory argues that companies that have an actual debt level that does not correspond with their target debt will only adjust towards target debt when the benefits of such a move are greater than the costs.

2.6.2 Agency cost theory

The assumption of the agency cost theory is that there can be information asymmetries and conflict of interest between principals and agents caused by the separation between owners, managers, and debt holders (Jensen & Meckling, 1976). In addition, the relationship between the management and owners of a firm can be equated to the relationship between a principal and an agent in which the management of the firm represents the agent and the principal is represented by the owners. According to Meyers (1977), there is another possible agency cost of debt that arises when companies are approaching bankruptcy. In such as case, there is no incentive for shareholders to make more investments in equity capital, even if there may be projects with positive net present values. This is mainly because holders of debt will mainly derive benefits from any values arising from the projects. The implication is that projects that increase value may not be accepted in the case of high debt levels. When it comes to financing through debt, managers are required by investors to explain their investment decisions. Managers are thus placed under constant monitoring, which they resent and would thus prefer financing from internal sources such as retained earnings (Frank & Goyal, 2009). Conflict of interests and assymetry of information that are created by agency problems lead to an increase in the cost of obtaining both external and internal finance to invest in projects (Meyers & Masjuf, 1984). As a result, after consideration for agency problems, the decision regarding the capital structure of a company has an impact on both its investment and financing decisions.

Shareholders often utilise debt in their capital structure in an effort to maximise their wealth. The assumption of the agency theory is that finacing through debt instils discipline in

managers and minimises agency costs by dealing with agency problems that can be viewed as a trade-off between benefits and costs of debt in the trade-off theory (Beaumont-Smith, 1991). This is because managers are compelled to repay the debt to save the firm from bankrupty. By utilising debt, managers are presented with debt obligations that can often reduce likelihood of agents to engage in opportunistic behaviour since debt reduces free cans flow which executives can use to work towards their own goals such as empire buiding, perquisites and perks, or investing in projects that yield a negative net present value.

The agency theory was criticised by Perrow (1986) on the grounds that it focuses solely on the agent's side of the agency problem and yet the cause of the problem can also lie with the principle. The theory has therefore not paid sufficient attention to the principals who mislead, exploit, and evade agents and can lead them into working in an unsafe working environment without the possibility of intervening intervening when the behaviour of the principal is opportunistic (Perrow, 1986).

2.6.3 The market timing theory

According to the market timing theory, capital structure results from firms' efforts to time the market (Baker & Wurgler, 2002). Thus, leverage is an outcome of efforts to time the equity market. The theory predicts that the issuance of equity by firm is less frequent when the economy is poorly performing but becomes more frequent when there is a boom. Therefore, companies for the improvement of market conditions to issue equity. Finance officers study the equity and debt markets and, depending on the one that is more favourable, they utilise that form of financing regardless of whether a need for funds is available. The issuance is deffered when the market is unfavourable (Frank & Goyal, 2009). Frank and Goyal (2009) pointed out that the market timimg theory makes correct assumptions for the anticipated effects of inflation and the market-to-book ratio but has not managed to back assumptions in the patterns of data presented by the trade-off theory is used as a stand-alone theory. In addition, the authors revealed that the model needs additional theoretical development support the experiential proof found in the data.

2.7 Firm-Level Determinants of Capital Structure

Several authors and researchers have cited different factors at firm-level that influence the choices of capital structure in different organisations. The commonly cited factors are dividend policy, risk, age, non-debt tax shield, debt tax shield, profitability, and asset

tangibility. This section discusses some of these factors with the aim of providing an understanding of what the main capital structure theories predict about them.

2.7.1 Asset tangibility

In a world that is characterised by information asymmetries, the asset structure of a company would directly influence its financing arrangement since physical resources are a source of security to lenders in their efforts to secure debt (Diamond, 1991). It is assumed by the trade-off theory that there is a positive association between debt and physical assets. It is therefore expected that as firms grow, they tend to be involved in more borrowing by virtue of possessing more assets that are tangible to offer as security and take advantage of the debt interest tax shield. Empirical evidence from De Vries (2010), Rajan & Zingales (1985) and Titman (1984) support the view as they found that physical properties are related with more debt since they are a source of collateral for loans at a lower cost of funds. This stems from the fact that lenders experience lower agency expenses from borrowing as the firm's tangible asset fetches a higher value at liquidation. Asset tangibility was also found to have a positive effect on leverage by Ramjee and Gwatidzo (2012), Frank and Goyal (2009) Fosu (2013b), Huang and Song (2006). In the view of Gwatidzo et al. (2016), security performs a fundamental part when dealing with information asymmetry effects in debt markets in South Africa regardless of the country having money markets that are more advanced than other countries in Africa.

During the course of their growth, firms acquire greater values of tangible assets (Frank & Goyal, 2009). For outsiders, it easier to value physical assets than non-physical assets. If tangible assets form a larger portion of a company's asset base, these should be taken as security, thereby reducing of suffering agency costs of debt by the lender (Rajan & Zingales, 1995). Thus, the more the tangible assets on the balance sheet of an organisation's, the more the willingness of lenders to avail loans and thus, the leverage should also be high. Taking the view of the trade-off theory, there is therefore an expectation with their growth, firms are likely to engage in more borrowing by virtue of possessing more physical assets to present as security so that they can enjoy more debt interest tax shield. Antoniou et al. (2008) supported this view by arguing that where bankruptcy is the case, physical assets have a higher likelihood of having a market value while incorporeal assets have a tendency of losing value. It is therefore assumed that there is a positive relationship between leverage and asset

tangibility. Empirical findings to support this assumption are from Antoniou et al. (2008) and Faulkender and Petersen (2006).

It is easier for outsiders to value tangible assets, which implies less information asymmetry. Agency costs are therefore likely to be reduced since companies can collateralise their debt (Frank & Goyal, 2009). Where there are lower levels of information asymmetry it would be less expensive to issue equity, which should make companies possessing more physical properties to have debt levels that are lower. This shows a negative prediction, which is aligned to the pecking order theory (Harris & Raviv, 1991). Frank and Goyal (2003) and Bharath et al. (2008) viewed asset tangibility as a substitute for the problems of asymmetry of information of a firm.

2.7.2 Firm size

Research has indicated that larger companies have cash flows that are more and have the ability to incur more debt and thus, are in a better position to access to diverse financing bases during times of financial distress (Titman, 1984). The trade-off theory supports a positive relationship between firm size and leverage. The rationale is that firms that are larger have preference for more debt because of the opportunity of bankruptcy costs that are lower and the tax shield advantage. Large firms can also easily access capital markets (Cheng, 2015). Empirical research by Al-Najjar (2011), Battaci and Ayaydin (2014), Cheng (2015) has supported the positive association between the size of a firm size and debt.

The increase in size of companies is anticipated to generate more profitability as well as accumulation of more tangible assets (Sibindi, 2016). Thus, would be expected that such companies will have a significant amounts of free cash flows. It is assumed by the pecking order theory assume that the growth of firms results in more profits, meaning that such firms can utilise resources that are generated internally as opposed to sourcing financing from the debt market. Thus, the expectation is that big companies are lowly geared as compared to small companies (Bartoloni, 2013). On the contrary, the market timing and trade-off theories expect large companies to have higher leveraged ratios than small companies since they are in a position to enjoy debt interest tax shields.

Contrary to the above, Titman and Wessels (1988) support an inverse relationship between leverage and firm size. The authors argue that there is a relationship between the cost of issuing debt and equity and the size of the firm. Small companies, in particular, incur much

more costs than large firms in the issuance of new equity and long-term debt. This implies that there may be greater leverage in small firms that in larger ones and small firms may prefer short-term debt through bank loans as opposed to issuing long-term debt because the choice is associated with fixed costs that are lower.

Rajan and Zingales (1995) were however of the view that the way in which size affects equilibrium leverage is not clear. It is more likely that larger firms are characterised by more diversification and their chances of failure are low; probably making size a reverse substitution for the likelihood of the occurrence of bankruptcy. If this assertion is true, size should therefore impact positively on the ability of firms to obtain debt. On the other hand, the size of a firm can also be regarded as a substitution for the amount of evidence accessible to external stockholders (Frank & Goyal, 2009). Thus, larger firms have less asymmetrical information, which minimises the extent to which share are undervalued. When such cases are present, firms prefer to finance their activities through equity compared to debt. The pecking order theory supports such behaviour since it assumes that an inverse relationship exists between leverage and the size of a firm. In summary, empirical evidence mostly points out that larger firms have a greater inclination towards issuing debt, compared to small firms.

2.7.3 Firm age/Reputation

One of the factors in that are important for determining the financing arrangements of companies is how old the firm is (Sibindi, 2016) There is an intricate link between the age of a firm and the other factors that determine capital structure decisions. For instance, firms in existence for longer periods are expected to be more profitable, thus having more resources at their disposal. These firms are therefore expected the financing hierarchy of the pecking order theory and fund their investments from retained earnings firms. However, another view is that as firms grow older, they gain a good standing in the debt market and can therefore be assessed positively. The reputational view was supported by Harris and Raviv (1991), who argued firms that have a longer repayment tend to have a better reputation and thus, reputation, lower borrowing costs.

According to Diamond (1991), companies that do not have a long time in business may not have a good reputation and find it difficult to obtain funding from outside. However, their reputation improves with time and can now be in a position to qualify for less costly funding that includes debt. Literature provides evidence that a substantial number of companies face

liquidation in three years from the date of commencing operations (Gwatidzo, Ntuli, & Mlilo, 2016). Thus, companies that have been in business for longer periods are less risky as they have gone through several shockwaves and survived during the period, they have been operating. Their ability to obtain financing in capital markets is therefore influenced by such reputation and endurance. The trade-off theory therefore assumes that the reputation of a firm or age are positively related with leverage. To measure age, the number the period from the time the firm was incorporated is used. Studies by Ezeoha (2008) and Hall et al. (2004) form some of the empirical evidence that has supported the positive association between the age of a firm and leverage has been supported in studies by

2.7.4 Profitability

Empirical findings and theoretical evidence on the association between profitability and leverage is mixed (Sibindi, 2016). According to the pecking order theory, firms that have high profitability levels are likely to utilise internal resources more than debt or equity to fund their operations and only resort to debt financing when retained earnings reach near exhaustion (Beattie et al., 2006). The result is a lower debt ratio. In addition, outside financing is considered to be more costly as a result of information asymmetries and costs of bankruptcy (Cheng, 2015).

There is an association between profitability and the availability of internal funds, which may also imply an association between profitability and leverage. Thus, the association between leverage and profitability is negative (Baker & Wurgler, 2002). The findings of Bartoloni (2013) support the inverse association between profitability. Bartoloni (2013) argues that firms that are more profitable have a tendency of using funds generated from internal operations more, as indicated by the inverse association between a company's return on sales and debt ratio. Furthermore, the part played by the profitability of a company in reducing the need for external finding is applicable to all firms despite their size, which is determined by employment. However, large companies are less sensitive to variations in to profit.

The static trade-off theory, on the other hand assumes that the leverage of a firm has a positive association with its profitability (Mokuoane, 2016). Thus, firms that are highly profitable are expected to utilise more debt with the aim of benefitting from the interest tax shield on debt as well as maximizing the worth of the company. One reason for the positive

leverage-profitability relationship could be the fact that, firms that have high profits make higher savings from utilising debt and have lower probability of bankruptcy (Sibindi, 2017). Myers (2001) supported such view with the argument that having high profits means company has more income that is subject to tax, and the company is capable of paying more debt in the absence of the risk of financial distress.

However, an inverse association between leverage and a firm's profitability is assumed in the dynamic trade-off theory. The argument is that because companies store up cash flows in the to fund operations (Hovakimian et al., 2004; Leary & Roberts, 2005), which decreases the levels of debt. Chen and Strange (2005), Frank and Goyal (2003) and Myers (2001) reveal that firms that are highly profitable in any industry have a tendency of borrowing engaging in less borrowing. This observation is logically explained by the fact that profitable firms are able to retain significant portions of their returns as earnings and utilise these for financing opportunities for growth without the need for obtaining debt or share financing. Firms like these therefore display different funding patterns that are in contrast with the static trade-off theory.

2.7.5 Growth

As the growth opportunities of a company increase, the pitfalls associated with financial risks and problems of agency associated with debt also grow. On the other hand, the problem of free cash flow is reduced. According to the pecking order theory, there is a positive relationship between firm growth and leverage since growth comes with more investments. Frank and Goyal (2005) states that the larger and more mature firms tend to utilise more debt in their mix of financing options. Firms that have more opportunities for growth has a high likelihood to seen for additional capital from outside since funds generated from within may not be sufficient (Alzomaia, 2014). This means that companies that have high opportunities for growth are have a higher probability of high debt ratios. Empirical evidence from Cassar and Holmes (2003) and Marsh (1982) has proved that there is a direct association between leverage and the growth of an enterprise.

Conversely, an inverse association between the growth opportunities of a firm and leverage is assumed by the trade-off theory. According to Antoniou et al. (2008), the negative association emanates from two sources. Firstly, with the expectation of growth, financial distress is expected to increase and this forces managers to minimise debt in their financing

arrangements. Growing firms have more options to invest in neutral and high-risk projects, thus making creditors reluctant to lend funds at lower interest rates due to the high risk involved (Ahmad and Abbas, 2011). Debt therefore becomes more expensive for growing firms, making them issue more equity. Secondly, due to information asymmetries, firms use utilise equity rather than debt when higher anticipated growth emanates from overvaluation.

The assumption of the agency is that there is a two-way association between prospects for growing and leverage. The assumption of a negative growth is supported by the fact that increased growth comes with bigger risk results in moral hazard effects (Dasilas & Papasyriopoulos, 2015). The intangibility of prospects for growth means that they firms cannot use them as security for debt. Thus, firms have a tendency of using less debt with the aim of realising the full advantages of growth prospects in the future. According to the agency theory, there is a positive relation, considering that the growth of companies avails space for unscrupulous conduct by management. To deal with this behaviour, according to Yinusa (2015), firms can use more borrowing in the financing arrangement. However, there is mixed empirical evidence on the relationship between firm growth and leverage. According to some research, firms that are growing fast utilise more debt than firms that are growing slowly (Brigham & Gapenski, 1994; Brigham & Ehrhardt, 2003). On the other hand, Frank and Goyal (2003) argued that this association is not clear as it is depended upon the source of growth; that is from physical capital, or from human capital.

2.7.6 Non-debt tax shield

The non-debt tax shield prediction is principally a departure from the trade-off theory. The assumption came from DeAngelo and Masulis (1980), on the basis of Miller's (1977) model which regarded personal income factor that determines capital structure. Their argument was depreciation-related tax deductions and tax credits for investment can be taken to be alternatives for the tax benefits of debt financing. Non-debt tax shield results in a reduction in the level of earnings, thus reducing the expected level of interest tax savings and reducing the advantage of using high debt financing.

According to the trade-off theory, the leverage of a company is negatively associated with non-debt tax shield. According to Frank and Goyal (2009), non-debt tax shield alternatives such as depreciation expense, operating loss, and investment tax credits have an inverse relationship with leverage. Thus, companies that have higher non-debt tax shield figures are

expected to have lower borrowing levels. Thus, the motivation of a firm to borrow declines as non-debt tax shields increase.

2.8 Empirical evidence

Despite the existence of all the theories of capital structure, there are mixed empirical findings. In this section, some findings from different studies conducted in developed and developing countries as well as South Africa are discussed.

2.8.1 Empirical evidence from developed countries

Shyam-Sunder and Myers (1999) tested the pecking order theory and the trade-off theory by examining the funding conduct of 157 United States companies for the period 1971 to 1989. The findings indicate that the time-series variance in debt ratios was explained by a simple pecking order model than by the static trade-off theory. Th conclusion of the research was that the choice between equity and debt is better explained by the pecking order theory for the companies sampled.

Graham and Harvey (2001) conducted a survey on 392 Chief Finance Officers (CFOs) of Fortune 500 companies in which questions associated with capital structure and expenses associated with financing were posed with the aim of establishing the issues that influence the decision-making process of the CFOs. The survey found preservation of the company's rating for credit and flexibility in finances as the major issues influencing decisions to issue. The importance of flexibility of financing seems to be aligned to the theory of pecking order since, from Myers and Majluf's (1984) argument, companies need financial slack in order to be independent of external funds. However, Graham and Harvey (2001) posited that the findings are not aligned to the perking order theory since companies that value flexibility in financing are those whose asymmetry of information is relatively low. Therefore, such companies will not experience huge problems in obtaining share financing and thus do not have much motivation for maintaining flexibility in financing.

Frank and Goyal (2003) tested the reliability of the pecking order theory, among other theories, on a broad cross-section of US publicly traded firms for the period 1971 to 1998. The report indicated that, as opposed to the pecking order theory, net equity issues track the financing deficit more closely than debt issues. Frank and Goyal (2003) also argued that contrary to the common suggestions, funds generated from internal operations are not

adequate meet all the investment needs. On the contrary, the authors found that companies heavily use funds from outside. In addition, Frank and Goyal (2003) found that equity funding is not dominated by debt funding in magnitude.

Chuan-Hao et al. (2013) conducted a study to test pecking order behaviours from the viewpoint of domestic and multinational corporations (MNCs) in the United States (US). The findings of the study revealed that to some extent, the financing behaviour of US companies are consistent with the POT. Furthermore, the study found that the PTO is more applicable to MNCs than domestic corporations. The results from curvilinear regression models showed concave relationship between net debt issues and financing deficits for both domestic firms and MNCs, indicating that deficits for the firms are financed with debts first and equities are only issued when firms reach their debt capacity, with the pecking order effects still being larger for MNCs than domestic firms (Chuan-Hao et al., 2013).

A study by Lemmon and Zender (2010), which was an extension of Shyam-Sunder and Meyers' (1999), established the incorporation of the capacity for debt puts the theory in a better position to predict the financing conduct of the large companies assessed over an extended period. From the findings, it can be noted that the theory is more applicable to companies without constraints in relation to the issuing of debt, the financing deficit factor being 0.79 (contrary Shyam-Sunder and Meyers' (1999) 0.75 that was obtained from the same sample size) after eliminating the influences of huge figures of deficits by incorporating a quadratic term of deficit. Lemmon and Zender (2010) further argued that the firm's debt capacity is affected by credit ratings. Where the restrictions of a firm in issuing debt are fewer because their debt outstanding is rated, pecking order behaviour is present. However, where debt outstanding is not rated, companies do not exhibit pecking order behaviour because of constraints related to issuing of debt imposed by the capacity to issue debt. Lemmon and Zender (2010) concluded that the pecking order theory correctly describes firm financing behaviour if debt capacity is controlled.

2.8.2 Empirical evidence from developing countries

While the greater portion of the survey literature focuses on markets in developed countries, there are a number of studies that have been conducted in emerging markets. Mukherjee and Mahakud (2010) conducted a study in India, aimed at investigating the elements determining financing arrangements in manufacturing firms during the period 1993/1994 to 2007/2008.

The survey applied the partial-adjusted model and used the generalised method of moments (GMM) to ascertain the factors that affecting financing arrangements. According to the results, the most important variables that determine the desired financing arrangement are variables relating to the company and these include market-to-book ratio, size, market-to-book ratio, profitability, and tangibility. In addition, factors such as firm size and distance between the target and observed leverage, and growth opportunities were found to determine the speed of adjustment to target leverage for the companies. The overall results were found to be aligned to the dynamic trade-off theory.

Gwatidzo and Ojah (2009) assessed the factors determining capital structure for Zimbabwean listed firms as well as those in South Africa, Nigeria, Kenya, and Ghana with emphasis on the extent to which the characteristics of firms and institutional differences determine the way capital is raised by firms. The findings indicate that companies in Africa use as much debt as those in developing countries such as Turkey, Malaysia, South Korea, Brazil, Thailand, and Mexico. According to the findings, African companies have a tendency of relying heavily on internal financing. Where they opt for external finance, they choose mostly short-term debt to fund their production activities. The findings indicate some support for the pecking order theory. Furthermore, the companies' profitability, age, asset tangibility, and size are significantly associated with leverage, thus, implying that the most important determinants for capital structure in Africa are remedies for inadequate institutional infrastructures (Gwatidzo & Ojah, 2009).

Narmandakh (2014) analysed the determinants of capital structure on listed companies in Mongolia utilising accounting information for the period 2010 to 2013. The study was guided by the pecking order theory. The study found that the impact of a number of firm-specific factors associated with the pecking order theory such as liquidity and profitability are consistent with the pecking order theory predictions. Asset tangibility was however found have an inverse association with leverage, thereby contradicting the pecking order theory which assumes a positive association. The size of a company was found to be positively related to leverage, which is in line with the static trade-off theory. Thus, three out of four variables that were tested followed the pecking order theory (Narmandakh, 2014).

2.8.3 Empirical evidence from South Africa

Ramjee and Gwatidzo (2012) conducted a survey to establish factors that determine financing arrangement decisions for 178 companies on the JSE for the period 1998 to 2008. The survey examined the speed of adjustment towards the debt ration as well as the determinants of target capital structure for listed companies in South Africa. The findings indicated that there exists a desired ratio of debt-equity for companies in South Africa. Furthermore, the study established that the companies incur larger costs for transaction when making adjustments to achieve a desired ratio of debt than to a desired ratio of long-term debt. The following are further findings from the study: companies holding a bigger percentage of physical properties have debt ratios that are higher; companies that are higher in profitability have lower levels of leverage; bigger companies have levels of leverage that are lower; and companies that are growing fast have preference for debt rather than equity when sourcing finances. In addition, companies prefer internal as opposed to external sources when they require finance. The evidence from Ramjee and Gwatidzo's (2012) survey suggests that South African companies follow the trade-off and pecking order hypotheses when making capital structure decisions.

Popoola (2016) examined financing arrangements of companies in South Africa that are listed on the JSE for the period 2005 to 2013 by testing the pecking order theory and the trade-off theory. The results showed that share prices, the financing practices, and performance of listed corporates in South Africa were largely not influenced by theory of capital structure. Thus, from the results, South African industrial companies do not usually practice capital structure decisions in line with theories of capital structure.

Another South African study was conducted by Sibindi (2017). The study analysed the elements that determine financing arrangements in financial companies listed on the JSE, focusing on banks and insurance companies. The results were in collaboration with those that were obtained by Ahmed et al. (2010), Ahmed and Shabir (2014), and De Haan and Kakes (2010), in which there was evidence that insurance companies conform to the pecking order theory in their financing behaviour.

Moyo, Wolmarans, and Brümmer (2013) tested the pecking order and trade-off theories on corporate financing decisions and estimated the speed of adjustment towards leverage of South African firms. The study used a cross-section of 21 retail, 21 mining, and 42 manufacturing firms listed on the JSE for the period 200 to 2010. From the study, a positive relationship between leverage and profitability was found and this is aligned to the trade-off

theory. The negative relationship between non-debt tax shields and leverage further supported the trade-off theory. In support of the pecking order theory, growth rate and capital expenditure were found to be positively correlated with leverage while asset tangibility was negatively related with leverage. The positive correlation on dividends paid and the negative correlation on financial distress supported both the trade-off and the pecking order theories. In addition, the results indicated that retail, mining, and manufacturing firms in South Africa have target leverage ratios and the true speed of adjustment towards target leverage was found to be 57.64% for book-to-debt ratio and 42.44% for market-to-debt ratio (Moyo et al., 2013).

2.9 Research gaps

From the review of different empirical studies developed and developing countries in this chapter, it has been noted that there are mixed findings on support for the pecking order theory. The findings of some studies have shown strong support for the pecking order theory while other studies found weak support. Furthermore, some studies have revealed strong support for the pecking order theory in some of the determinants of capital structure while finding weak support in the other determinants. In addition, some studies found strong support for the trade-off theory. It was also noted that the majority of studies on capital structure conducted in developing countries were not specific to the pecking order theory. This study therefore sought to test the pecking order theory with companies listed on the JSE and add on to the current body of knowledge.

2.10 Conclusion

This chapter presented the theoretical framework of the study. The chapter provided the definition and overview of capital structure and the state of capital markets in Africa and, in particular, South Africa. The assumptions and predictions of the pecking order theory were discussed in detail and the different determinants of capital structure as presented by different authors were examined. The findings from different studies conducted on the research problem in developing countries, developed countries, and South Africa were also discussed in this chapter.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The research methodology that was employed in this study is discussed and explained in this chapter. The research philosophy, approach, design, and methodology are outlined and the different choices are motivated. The chapter also discusses that population of the study and the selection of the sample and further outlines how data was collected and analysed. The variables that were used in the study as well as the model that was adopted are also outlined and explained in this chapter.

3.2 Research Philosophy and Approach

This study was underpinned by the positivism research philosophy. Research philosophy refers to beliefs and assumptions about how the data relating to research phenomena should be collected, analysed, and utilised (Denzin & Lincoln, 2011). These assumptions are important as they influence the understanding of research questions and the selection of methods for collecting and analysing data. The two major research philosophies used in social science research are positivism and interpretivism (Baker, 2009). Positivism makes use of existing theory to develop hypotheses that are then tested during the research process. Positivism depends on quantifiable observations and makes use of data collection methods that are highly structured. Since the aim of this study was to examination whether the pecking order theory is applicable to the capital structure decisions of listed companies in South Africa, positivism was found to be the appropriate research philosophy. The philosophy provides an opportunity to utilise quantitative methods of data collection and analysis which can provide relationships between variables of the study as well as the basis for accepting or rejecting the hypothesis of the study.

In line with the chosen philosophy, the study followed a deductive approach. According to Bryman (2012), a deductive approach begins with theory and hypothesis development. The theory and hypotheses are then observed or measured to prove or disprove them. In this study, the pecking order theory will be analysed with the aim of understanding its assumptions and how it has been applied in other studies. The following hypothesis: Listed companies in South Africa do not pursue the pecking order theory when making capital structure decisions; was tested and conclusions were made on whether the pecking order theory is applicable in the financing arrangement decisions of South African listed firms.

3.3 Research Methodology

Kelemen and Rumens (2008) defined research methodology as the path that is followed by researchers in the process of conducting research. It describes the work plan of the research. According to Saunders et al. (2016), three broad types of research methodology are qualitative, quantitative, and mixed methods. This study will adopt the quantitative methodology, which is in line with the selected research philosophy. Quantitative research involves collecting and analysing numerical data that is analysed to produce patterns, make predictions, test causal relationships, and provide a basis for accepting or rejecting hypotheses (Bryman, 2012). This study was conducted using the quantitative approach since it involved testing whether South African listed companies follow the pecking order theory in their capital structure decisions. The study involved testing relationships between variables such as debt and profitability, firm size, growth, asset tangibility and others. The quantitative approach also made it possible to collect data from a large sample of listed companies. Researcher bias is also minimised, and the findings of the study can be generalised to the entire population (Saunders et al., 2016).

3.4 Population and Sampling

Wiid and Diggines (2013) defined a population as the entire collection of objects or elements that the researcher intends to draw information and conclusions from. The population for this study consisted of all the companies that are listed on JSE, excluding companies in the financial services sector, regulated utility companies, and companies that have recently been included in major mergers. From the population of listed companies, a sample was selected. The study focused on a sample of 197 companies from an initial list of 401 companies listed on the JSE spread across 31 sectors. This formula was used to calculate the sample size:

$$Sample\ size = \frac{z^2\ \times p(1-p)}{e^2} \Big/ \left[1 + (\frac{z^2 \times p(1-p)}{e^2 N}\right]$$

Where z is the z score, p is the standard deviation, e is the standard error, and N is the population size. The confidence level used in this study is 5%. The sample size is therefore:

$$Sample\ size = \frac{1.96^2\ \times 0.5(1-0.5)}{0.05^2} \Big/ \left[1 + \left(\frac{1.96^2 \times 0.5(1-0.5)}{0.05^2 \times 401}\right)\right] = 197$$

The companies were therefore selected using probability sampling. In probability sampling, all the elements in the population have an equal and known chance of being selected into the sample (Saunders et al., 2016). Among the probability sampling techniques, stratified sampling will be used. Stratified sampling involves dividing the population into sub-groups that are known as strata according to a defined criterion and then selecting a number of elements or objects from each stratum (Bryman, 2012). Firstly, the companies were categorised by size that is large, medium, and small. The logarithm of total sales was used in measuring the size. As they grow, companies are expected to have added sales and become more profitable (Sibindi, 2016). This stratification is based on the assumption that small companies will follow the pecking order theory compared to large companies due to information asymmetry (Kasozi, 2009).

Secondly, the large companies were categorised according to their debt ratios; that is high, moderate, and low debt ratios. This decision is based on Meyer's (1984) assumption that pecking order theory works well in companies exhibiting moderate debt ratios. Lastly, companies were also grouped into dividend and non-dividend paying companies. According to Bhaduris (2002), dividends are a signal of financial health to outsiders. It is therefore expected that a company which constantly pays dividends will experience less asymmetric information when it goes to the equity market financing. Stratification by size was done before selection to ensure heterogeneity in the sample. The rest of the stratification criteria were applied after selection.

3.5 Data collection

This research was conducted using secondary data which consists of literature survey and annual financial statements of the selected listed companies. The first phase of data collection was literature survey. Literature survey focused on analysing previous studies on the determinants of capital structure to obtain insights into the methodologies that were used as well as the findings from such studies. Such information is crucial for developing the hypotheses of assumptions and hypotheses that were tested in this study. The second phase of data collection was obtaining the financial statements of the sample companies. This information was obtained from the JSE database which contains all annual financial statements of South African publicly listed companies between 2009 and 2019. These records revealed information such as profitability, and sources of financing as well as information required to calculate ratios necessary for decision making in this study.

3.6 Variables and measures

3.6.1 Dependent variables

In this study, the primary dependent variable used is book leverage. There has been a major debate on whether to use book leverage or market leverage. Most researchers have used the book value of debt as a proxy for the market value of debt. It can be very difficult to determine the market value of debt, and from research it has been established that the difference between book value and market value of debt is very little (Nuri, 2000). Aurebach (1985) used the book value (transformed by the use of assumptions about the initial age structure of such debt, new issues' maturity, and the coupon rate of the issues) to calculate that market value of debt. However, such data cannot be readily found in the sources of secondary data and it is therefore not easy to determine the market value of debt using the book value. Some studies have indicated that the implication is to a large extent not different regardless of which value was used.

3.6.2 Independent variables

The independent variables for this study are made up of selected firm-level determinants of capital structure and these are size, growth, asset tangibility, and profitability.

- **Firm size**

The logarithm of total sales was used in measuring the size. With more growth, firms are expected to make added sales and become more profitable (Sibindi, 2016). The logarithm of sales or net sales has been used a number of studies to capture the effect of size (Barclay & Smith, 2005; Rajan & Zingales, 1995; Titman & Wessels, 1988). On the other hand, studies by Booth et al. (2001) and Murherjee and Mahakud (2010) have used the value of assets to measure size. In this study, the logarithm of total sales was preferred because the theory that is being tested assumes that with more growth, companies generate higher profits and can therefore resources that are generate internally rather than utilising financing from the debt market. The pecking order theory therefore assumes an inverse association between the size of a firm and leverage.

- **Growth**

The growth variable was measured using the market-to-book value. Empirical studies that used the market-to-book value ratio to define growth include Booth et al. (2001) and Frank and Goyal (2009). Firms with higher market-to-book ratios are often assumed to have more future growth opportunities. Meyers (1977) argued that there may be a concern that debt could be a limiting factor to a firm's ability to take advantage of such growth opportunities when they are available. Goyal (2002) found that the decline in growth opportunities for firms results in an increase in the use of debt financing by such firms. Other studies used the annual growth rate of total assets to measure the growth variable. Studies that used this measure include Anarfor (2015) and Titman and Wessels (1988), among others. The rationale behind this definition of growth is that the companies with a higher rate of growth tend to have higher growth prospects.

- **Asset tangibility**

Asset tangibility is defined in this study as the ratio of fixed assets to total assets. Immovable assets are a source of collateral value and with a high value, the company would be afforded a favourable standing in the debt market; thus, having access to borrowing at rates that are lower. The motivation to use the fixed assets to total assets ratio as a measure for asset tangibility came from a number of studies that used the measure (De Jonghe & Oztekin, 2015; Frank & Goyal, 2009; Rajan & Zangales, 1995).

- **Profitability**

To capture the effect of profitability, different measures have been used in various empirical studies since profitability is defined in several ways. This study adopted return on assets (ROA) (net income divided by total assets) as a measure of profitability. Some of the empirical studies that used ROA as an indicator of profitability include Booth et al. (2001) and Anarfor (2015). Return on equity is another measure of profitability that can be used. Companies with a high return on equity are usually more capable of generating cash internally and therefore less dependent on debt financing (Marimhutu, 2009).

Table 3.1 provides a summary of the variables used in this study.

Table 3.1: Variables used in the Study

	Measurement	**Formula/Proxy**
Dependent Variable: Net debt issued	ΔTD	Current total debt – previous year's total debt
Independent Variable: Financing deficit	DEF	Dividend payments + capital expenditures + change in working capital – operating cash flows after interest and tax
Independent variable: Size	Total sales	
Independent variable: Growth	Annual growth rate of total assets	Market-to-book Ratio
Independent variable: Asset tangibility	Ratio of fixed assets to total assets	$\frac{Fixed\ Assets}{Total\ Assets}$
Independent variable: Profitability	ROA	$\frac{Net\ Income}{Total\ assets}$

- **Financing deficit**

Yulianto et al. (2016) defined financing deficit as utilisation of cash flow to add on to the assets which would have been less than the changes in retained earnings and current liabilities. This implies that retained earnings should provide a guarantee on short-term obligations, which are supposed to be greater than the purchase of assets. In terms of the pecking order model where current liabilities are greater than retained earnings and less than asset purchases, giving rise to a financing deficit, it should be fulfilled through external debt financing. The condition for the financing deficit occurs when the company has to invest and make payments for dividends and add to working capital which is more than the generated cash flows.

3.7 Data preparation

Data collection was followed by data preparation. Data preparation refers to the processing of data in preparation for the analysis stage (Cant et al., 2011). The process involves converting raw data to a reduced form that is appropriate for analysis and interpretation (Coldwell & Herbst, 2004). The data obtained in this study were in the form of financial statements of selected companies that are listed on the JSE for the period 2009 to 2019. These include statements of financial position, statements of comprehensive income, cash flow statements, and statements of changes in equity. Data preparation involved calculating the different financial ratios that were suitable for analysis. Microsoft Excel spreadsheets were used in this stage. The spreadsheets were checked for accuracy and the data were then captured into EViews programme for analysis.

3.8 Data analysis

Data analysis was defined by Flick (2013) as the evaluation of data with the use of logical and analytical reasoning with the aim of deriving meaning and answering the research questions. Data analysis in this research will involve examining the collected data to establish relationships between variables of the study and finding the basis for accepting or rejecting the hypotheses of the study. Statistical analysis will be conducted using EViews software. Regression analysis will be conducted to test the hypotheses of the study.

3.8.1 Model Specification

The prediction of the pecking order theory is that the internal financing deficit (whereby a capital outflow results in a financing deficit by the same amount) is the one that drives external debt financing (Shyam-Sunder & Myers, 1999). Retained earnings, debt, and equity form the three sources of funding that companies can utilise. From the point of view of the investor, there is higher risk in using equity than debt and therefore, there is need for a higher return on equity. From the point of view of the company, there is a preference for retained earnings over debt and debt over equity. Thus, a firm will fund its projects, first with internal funds, and when it has exhausted this source, it will make use of debt. The use of equity will come only as a last resort because it has high costs of financial. Under normal operating conditions, firms will not use equity and thus, there will be a match between financing deficit and the net debt issued. The pecking order theory can be tested using the financing deficit variable, which is an element of different cash flow-based elements created by summing up internal cash flows, investments, dividends, and working capital.

This section presents the model that will be used to test whether South African listed firms, in their capital structure practices, follow a financing hierarchy, that is, utilising fund generated from within, and then borrowing, and lastly, shares. The model is based on simple panel regression model adapted from other studies that they tested it in developed and developing economies (Chirinko & Singha, 2000; Fama & French, 2002; Frank & Goyal, 2003; Shyam-Sunder & Myers, 1999). The following equation is used:

$$\Delta D_{it} = \alpha_{it} + \beta_{pot} DEF_{it} + \mathcal{E}_{it} \qquad (3.6.1)$$

where: ΔD_{it} *= amount of long-term debt issued;* β_{pot} *= pecking order coefficient; and* DEF_{it} *= financing deficit*

The financing deficit can be measured as follows:

$$DEF_t = DIV_t + X_t + \Delta W_t + R_t - C_t \qquad (3.6.2)$$

where: DIV_t *= Dividend payments,* X_t *= capital expenditures,* ΔW_t *= net increase in working capital (change in operating working capital + change in cash and cash equivalents + change in current debt),* R_t *= current portion of long-term debt, and* C_t *= operating cash flows after interest and tax.* A positive deficit shows that the firm invests/uses more than it generates internally while a negative finance deficit shows that the firm generates more cash than it invests/uses, with positive free cash flow (Kayhan & Titman, 2007). A positive financial deficit has a stronger effect on capital structure than a negative financial deficit (Lew, 2013).

Equation 3.6.2 was modified by Frank and Goyal (2003) through the removal of the current long-term debt part since it was part of the change in working capital. Shyam-Sunder and Myers' (1999) model was adapted further by other authors with the aim of taking into account the financing deficit size and whether it was a positive (deficit) or negative (surplus) (Chirinko and Singha, 2000; De Jong et al., 2010; Lemmon & Zender, 2010). Further modification to the models by the above authors was done by Cross (2010) with the aim of incorporating short-term debt on the left side of the equation and eliminating it from working capital. Cross' (2010) reason both long-term and short-term debt are external financing

sources and the pecking order theory does not necessarily consider the term structure of the debt that is utilised in funding the financing deficit. In addition, there are severe implications on working capital that can arise from the timing of long-term debt. According to Cross (2010), this arises from the reclassification of long-term debt to short-term debt in the balance sheet when it is less than 12 months from expiry, and the result is a huge financing deficit because of its effect on working capital.

The revised model is therefore as follows:

$$DEF_t = DIV_t + X_t + \Delta W_t - C_t \quad (3.6.3)$$

$$\Delta D_{it} = \alpha_{it} + \beta_{pot} DEF_{it} + \mathcal{E}_{it} \quad (3.6.4)$$

where ΔW_t = *inventory + debtors + cash and cash equivalents – creditors; and* ΔD_{it} = *change in long-term debt and change in short-term debt*

The revised equations 3.6.3 and 3.6.4 take into account the modifications addressing the shortfalls of the model by Shyam-Sunder and Myers (1999). The pecking order test implicitly makes different exogeneity assumptions and uses a different set of information set than is usually found in empirical research on leverage and leverage adjusting behaviour (Frank & Goyal, 2003). The conventional set of variables was explained by Harris and Raviv (1991) and the variables were distilled into a simple cross-sectional model by Zingales (1995). Such variables should therefore not be excluded from consideration as they have survived many tests. Frank and Goyal (2003) presented a regression of leverage that is based on four factors. The model is as follows:

$$\Delta D_i = \beta_T \Delta T_i + \beta_{MTB} \Delta MTB_i + \beta_{LS} \Delta LS_i + \beta_P \Delta P_i + \beta_{DEF} DEF_i + \varepsilon_i \quad (3.6.5)$$

where: *T denotes asset tangibility, MTB denotes market-to-to-book ratio, LS denotes log sales, P denotes profitability*.

3.8.2 Regression analysis

Linear and multiple regression models are used in quantitative analysis to determine the relationships between dependent and independent variables (Field, 2009; Kahane, 2008). A t-test can be conducted to test the null hypothesis. Where the t-test result is significant, with a

p-value of .05 and below, the null hypothesis is rejected and if the p-value is greater than .05 (p>.05), the null hypothesis is accepted. Rejecting the null hypothesis means that the independent variable has a significant influence on the dependent variable (Menard, 2008).

3.8.3 Hypothesis testing

The following hypotheses were developed for the study:

H_0: Executives of listed companies in South Africa do not follow the pecking order theory when making capital structure decisions for their firms.

H_1: Executives of listed companies in South Africa follow the pecking order theory when making capital structure decisions for their firms.

The hypotheses will be tested using regression analysis techniques. The results from the regression model will be used to accept or reject the hypotheses. Where the p-value is less than .05 (p<.05), the null hypothesis will be rejected, thereby concluding that executives in South Africa follow the pecking order theory when making capital structure decisions for their firms. If the p-value is greater than .05 (p>.05), the null hypothesis will be accepted, thus concluding that executives of listed companies in South Africa do not follow the pecking order theory when making capital structure decisions for their firms.

3.9 Ethical Considerations

The research mainly used financial information that is publicly available and accessed online from financial websites. This includes but not limited to open data, data available on request, data commercially sold and data with limited availability. The research had no contact with human participants. The research focused mainly on document analysis, literature review as well quantitative datasets. Most of the data came from companies published annual financial reports. All material and/or literature used in this research were properly referenced. Authors and researchers were properly acknowledged. A record of all sources that were referred to in the research is listed under references and footnotes.

3.10 Conclusion

This chapter discussed and explained the research methodology and design that were employed in this study. The study was underpinned by the positivist research philosophy which advocates for the use of quantitative methods in data collection and analysis. The

chapter also discussed that population of the study and the selection of the sample and further outlined how data was collected and analysed. The variables that were used in the study as well as the model that was adopted were also outlined and explained in this chapter.

CHAPTER FOUR: PRESENTATION OF RESULTS AND DISCUSSION

4.1 Introduction

In this chapter, the results from the empirical models used to test the pecking order theory hypothesis are presented Firstly, the descriptive statistics of the dependent variables plus the independent variables used in the study are presented. This is followed by results from tests for normality. The Pearson correlation coefficients and their respective levels of significance are also presented to see whether any multicollinearity among the variables used in the study exists. This is followed by the presentation of the findings from the empirical models used to test the hypotheses of the study.

4.2 Summary statistics

Table 4.1 shows the descriptive statistics of the variables used in the study. The maximum and minimum values of the variables reflect the heterogeneity of the firms which formed part of the sample used in this study. This can be seen for example from the minimum (58.90%) and the maximum (120.81%) values for the Return on Assets of the companies, which reflect that the companies were widely distributed in terms of financial performance. The Jarque Bera statistics for all the variables are statistically significant at the 1% significance level showing that the null hypothesis of normality can be rejected for all the variables. Thus, all the variables are not normally distributed.

Table 4.2 shows the estimates of the Pearson correlation coefficients. The associations between most of the pair wise relationships are statistically significant at the 1% significance level showing that the correlation coefficients are statistically different from zero. The significance levels of the Pearson correlations also show that there are significant relationships among the variables which warrant econometric modelling. Also, it can be noted that the correlation coefficients between most of the variables are less than 0.5 except for the relationship between the Return on Assets (ROA) and the Return on Equity (ROE) which is 0.84. This makes sense since ROA and ROE both measure financial performance and are intuitively expected to be highly correlated. For this reason, ROA and ROE are used in different equations as alternate measures of performance.

Table 4.1: Descriptive statistics

	Tangibility	ΔD	DEF	MTB	ROA	ROE	GROWTH	SIZE
Mean	58.7	1,067,380,425	2,865,592,228.76	2.57	6.60	16.59	6	22.75
Median	48.75	72,168,000	648,618,800	2.03	5.66	15.32	8	22.95
Maximum	29.9	75,166,000,000	119,463,000,000	83.41	120.81	297.28	40.58	26.17
Minimum	21.43	- 65,752,000,000	- 37,330,779,900	-721.25	58.09	-37.57	-60.45	11.85
Std. Dev.	0.88	6,958,400,971	9,051,555,143	20.44	9.75	24.32	0.36	1.94
Skewness	1.76	3.61	6.07	- 34.13	1.53	0.88	-4.46	-0.91
Kurtosis	6.54	53.30	61.33	1,211.04	22.06	24.56	117.68	4.43
Jarque-Bera	1,616.40***	151,143.55 ***	166,075.2***	79,300,882***	23,538.2***	29,442.7*	781,686.2***	44.0***

Notes: ***, **, * denote statistical significance at the 1% level; ΔD, DEF, MTB, ROA, ROE, TANG, GROWTH, SIZE denote net debt issued, financing deficit, Market to Book, Return on Assets, Return on Equity, asset tangibility, the annual growth rate of total assets and logarithm of sales. Asset tangibility is given as a percentage.

Table 4.2: Pearson correlation

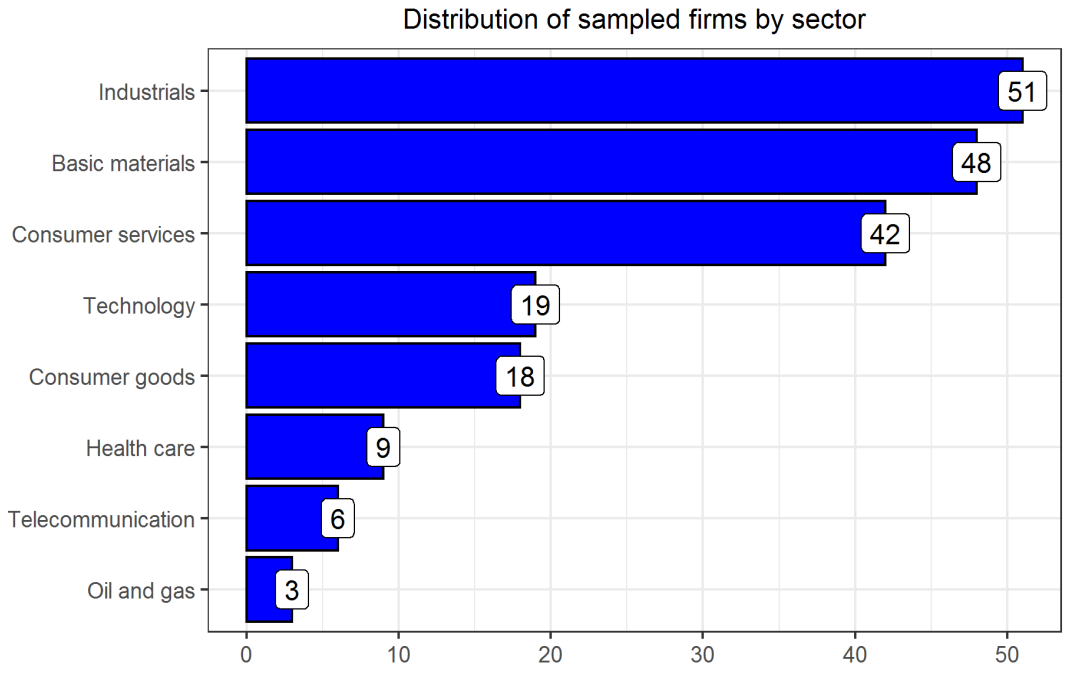
	ΔD	DEF	MTB	ROA	ROE	TANG	GROWTH	SIZE
ΔD	1.0000							
DEF	0.7706***	1.0000						
MTB	-0.0186	-0.0750**	1.0000					
ROA	-0.1170***	-0.0801**	0.3819***	1.0000				
ROE	-0.1038***	-0.0877**	0.4658***	0.8316***	1.0000			
TANG	0.0375***	0.1730***	-0.1017***	-0.1777***	-0.1409***	1.0000		
GROWTH	0.0158	-0.017513	0.1268***	0.1948***	0.2057***	-0.0376	1.0000	
SIZE	0.3876	0.5059***	0.0346	-0.0048	0.0447	0.0687**	0.0026	1.0000

Notes: ***, **, * denote statistical significance at the 1% level; ΔD, DEF, MTB, ROA, ROE, TANG, GROWTH, SIZE denote net debt issued, financing deficit, Market to Book, Return on Assets, Return on Equity, asset tangibility, the annual growth rate of total assets and logarithm of sales

Multicollinearity exists when the inter-correlations among the explanatory variables are high (usually more than 0.8). Checking for multicollinearity is important for multiple regression models as multicollinearity tends to increase the standard errors of regression coefficients. Table 4.2 shows that the inter-correlations are less than 0.8 except for the correlation between ROA and ROE. Since ROA and ROE are not used together in the same model, there is, therefore, no fear of multicollinearity among the variables of the study.

In line with previous studies, financial firms were excluded from the sample since they have leverage levels that are regulated. All in all, the sample contained 197 companies with an unbalanced panel. Companies that were included in the sample but later delisted before the end of the sample period were included in the analyses to guard against survivorship bias. The sample eventually consisted of 1379 firm years. The distribution of the sampled companies by sector is visualised in Figure 4.1:

Figure 4.1: Distribution of sampled firms by sector



As shown in Figure 4.1, the majority of the sampled companies were from the industrial index followed by the basic materials index, which are the indices with the most constituent firms compared to other indices. The distribution of the firms by sector shows heterogeneity in the sampled companies reflecting that the sample closely mirrors the population excluding the companies which belong to the financials index.

4.3 Empirical results

4.3.1 Unit root tests

To guard against spurious ordinary least squares estimators arising from non-stationary panel data, all the variables used in the study were tested for the presence of unit roots. Testing for unit roots was done for the panel data using the Levin, Lin and James Chu (2002) and the Im, Pesaran and Shin (2003) panel unit root tests as well as the ADF (Maddala & Wu, 1999) and the PP (Hadri, 2000) Fisher-type tests. Research has shown that panel unit root tests are less likely to commit a Type II error than the individual unit root tests as panel data captures more information. The results for the unit roots tests for the panel data are displayed in Table 4.3.

Table 4.3: Panel unit root summary

Panel unit root summary		
Method	*Variable*	*Statistics*
Levin, Lin & Chu[a]	ΔD	21.3143***
Im, Pesaran and Shin[b]	ΔD	-11.7721***
ADF[c]	ΔD	600.469***
PP[c]	ΔD	644.777***
Levin, Lin & Chu	TANGIBILITY	-57.2326***
Im, Pesaran and Shin	TANGIBILITY	-2.22981***
ADF	TANGIBILITY	185.810***
PP	TANGIBILITY	189.337***
Levin, Lin & Chu	DEF	-24.2374***
Im, Pesaran and Shin	DEF	-15.1395***
ADF	DEF	611.847***
PP	DEF	736.301***
Levin, Lin & Chu	SIZE	0.67083***
Im, Pesaran and Shin	SIZE	6.67367***
ADF	SIZE	195.941***
PP	SIZE	238.362***
Levin, Lin & Chu	GROWTH	-21.7547***
Im, Pesaran and Shin	GROWTH	-16.8502***
ADF	GROWTH	748.673***
PP	GROWTH	821.075***
Levin, Lin & Chu	MTB	-45561.9***
Im, Pesaran and Shin	MTB	-2965.14***
ADF	MTB	303.785***
PP	MTB	352.950***
Levin, Lin & Chu	ROA	-5.39287***
Im, Pesaran and Shin	ROA	3.70175***
ADF	ROA	374.340***
PP	ROA	433.963***

Notes: Null hypothesis: The variable has a unit root

***p<0.01, [a] t-test, [b]Wald statistic, [c]Fisher Chi-square

The null hypotheses of all the unit root tests described in Table 4.3 assume unit root processes. The results in Tables 4.3 show that the null hypotheses of the presence of unit roots in all the variables can be rejected at the 99% confidence level. This means that the variables are stationary (I(0)) processes and the estimation of the panel OLS-based models will not give spurious estimates.

4.3.2 Testing the pecking order theory

Findings from the econometric model outlined in the previous chapter in Equations 3.6.3 and 3.6.4 are reported first in this section. The model considers variations in liability in determining whether financial shortfall is the driver of the change, thereby confirming the theory of the pecking order if it is in the affirmative. In addition, the model assumes a one-to-one relationship between financial deficit and variations in debt. To determine the appropriate model between pooled, random effects and fixed effects models, the Hausman test is estimated first. However, the findings from all the estimators are reported for robustness. The null hypothesis of the Hausman test is that the preferred model is the random effects model while the alternative hypothesis is that the preferred model is the fixed effects model. The results from the Hausman test are presented in Table 4.4.

Table 4.4: Results from the Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	84.0392	1	0.0000

The results from the Hausman test in Table 4.4 show that the statistics are statistically significant at the 1% level and therefore that the null hypothesis of the random effects model being preferred can be rejected. Thus, the preferred model for examining the theory of pecking order using the data for this study is the fixed effects model. The results from the models tested using the pooled ordinary least squares, random effects and fixed effects estimators are shown in Table 4.5.

While previous studies have scaled the variables reported in Table 4.5 as a means of controlling for firm size, this study adopts the Marimuthu and Singh (2021) approach where the variables are unscaled to avoid the risk of manipulating the coefficients. Various points can be noted from Table 4.5 on the findings on testing the pecking order hypothesis using the

listed companies listed on the JSE between 2009 and 2020. Firstly, the financing deficit coefficients had low but modest values, ranging between 0.3912 and 0.5087 across all the models used. However, the preferred fixed effects model had the highest explanatory power compared to the random effects and pooled ordinary least squares.

Table 4.5: Testing for the pecking order theory

	OLS	FE	RE
Financing deficit	0.4295***	0.5087***	0.4295***
	(0.000)	(0.000)	(0.000)
Constant	0.000	0.0000	0.0000
	(0.7987)	(0.5999)	(0.3685)
F-statistic	2951.6	1353.9	3139.1
Prob>F	0.0000	0.0000	0.0000
Hausman			84.03***
R-squared	0.5998	0.6608	0.5998
Adjusted R-squared	0.5994	0.6234	0.5994

N**otes**: OLS, FE, RE represent the results estimated using the pooled ordinary least squares, fixed effects and random effects models using Equation 3.6.4 respectively, *** shows statistical significance at the 1% level, standard errors are shown in parentheses, the F-statistic tests the null hypothesis of the financing deficit's coefficient being equal to unity. The dependent variable is the change in long-term.

The financing deficit coefficient was consistently substantial at the 1% level throughout the representations. The preferred model is the random effects model since the Hausman test statistic is significant at the 1% level leading to the rejection of the null hypothesis that the preferred model is the random effects model. Thus, the fixed effects model is the preferred model. According to the results, there is a positive effect financing deficit on the variation in short term debt as well as the long-term debt. However, the results from the F-test as shown in Table 4.5 which test whether the DEF is equal to unity, are not accepted for all the model specifications. The F-test for the restriction that the coefficient DEF is equal to unity is done following Marimuthu and Singh (2021). The null hypothesis is that the DEF coefficient is equal to one against the alternative hypothesis that the coefficient is not equal to one. This means that the null hypothesis of executives following the pecking order theory can be rejected and this shows that issues of debt do not do a good job in pursuing the deficit in financing. It can also be noted that the adjusted R squared for the preferred fixed effects model is 0.66 indicating that deficit in financing explains 66% of the long-term debt.

According to Frank and Goyal (2002), when testing for the financing deficit there is need for disaggregating the financing deficit and after disaggregating the financing deficit, there

should be positive sign and a unit coefficient on investments as well as working capital. The assumption of the pecking order theory is that after manipulating for cash flows from within the firm, there should be a rand-for-rand match between investments should increases in issues of debt. The evidence presented in Table 4.6, estimated through the fixed effects procedure following a Hausman test, therefore refutes the pecking order theory as the coefficients on investments in immovable properties as well as variation in working capital are statistically insignificant at the conventional levels of significance. As the Hausman test statistic shows, the null hypothesis that the random effects model is the preferred model can be rejected for the fixed effects model. Thus, the disaggregation of the financing deficit provides evidence that the null hypothesis of the company executives of JSE-listed companies following the pecking order theory can be rejected. Table 4.6 also shows that the adjusted R squared is 0.63 for the model using net debt issued as the dependent variable while the models using issues of gross debt and variation in the ratio of debt have adjusted R squared values of 0.24 respectively. This shows that the first model gives a better goodness of fit compared to the other two.

Table 4.6: Disaggregating the financing deficit

	Net debt issued	Gross debt issued	Δ in debt ratio
Constant	-0.0021***	-0.0156***	-0.0422***
	(0.000)	(0.001)	(0.000)
Cash dividends	0.6231	0.0403	0.2539
	(0.567))	(0.879)	(0.485)
Investments	0.0226	0.6751	0.3473**
	(0.678)	(0.563)	(0.011)
Δ working capital	0.0128	0.0349	0.0617
	(0.345)	(0.348)	(0.433)
Internal cashflow	-0.6457	-0.2385	0.4789
	(0.789)	(0.765)	(0.667)
Hausman test	81.03***	80.34***	83.76***
N	1379	1379	1379
Adjusted R^2	0.63	0.24	0.24

The table shows estimates from the regression model: $\Delta D_{it} = \beta_1 DIV_t + \beta_2 I_t + \beta_3 \Delta W_t + \beta_4 C_t + e_{it}$. The dependent variables are amount of gross or net debt issued and change in the debt ratio respectively; "Internal cash flow" is after interest and taxes. N is the number of observations (firm-years), standard errors are shown in parentheses, ***, ** show statistical significance at 1% and 5% respectively.

4.3.3 Conventional leverage regressions

Frank, Vidhan and Goyal (2002) pointed out the importance of later testing to subsequently testing for the pecking order theory using conventional leverage regressions. Running the regressions in first differences biases the conventional variables towards zero and may lead to

some loss of accuracy. However, this allows using a model that nests both the conventional variables and pecking order theory by running the regressions in first differences. The results from the conventional leverage regressions modelled using Equation 3.6.5 in Chapter 3 are shown in Table 4.7. The conventional leverage regressions reported in Table 4.7 are run using OLS, fixed effects as well as random-effects models. For each specific model (OLS, fixed effects and random effects), sub-models are reported, one which includes the financing deficit and the other which does not include the financing deficit in line with Frank, Vidhan and Goyal (2002). The comparisons of the empirical conventional leverage regressions with theoretical predictions are shown in Table 4.8.

Table 4.7: Results from conventional leverage regressions

	OLS		Fixed Effects		Random effects	
	(1)	(2)	(1)	(2)	(1)	(2)
Constant	0.0107***	0.0048***	0.0108***	0.0032***	0.0110***	0.0048***
	(0.0000)	(0.0000)	(0.0000)	(0.0003)	(0.0000)	(0.0000)
ΔTangibility	0.0009***	0.0009***	0.0009***	0.0009***	0.0009***	0.0009***
	(0.0004)	0.0003	(0.0004)	(0.0003)	(0.0003)	(0.0003)
ΔMTB	-0.0037***	-0.0037***	-0.0037***	-0.0036***	-0.0037***	-0.0037***
	(0.0012)	(0.0011)	(0.0012)	(0.0012)	(0.0011)	(0.0011)
Δlog sales	0.0097	0.0136	0.0088	0.0100	0.0097	0.0136
	(0.2567)	(0.3453)	(0.543)	(0.6984)	(0.7256)	(0.8723)
ΔProfitability	-0.1137***	-0.0952***	-0.1056***	-0.0871***	-0.1129***	-0.0952***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
DEF		0.0000***		0.0000***		0.0000***
		(0.0000)		(0.0000)		(0.0000)
F-statistic	2856.1	2398.2	2287.9	2198.1	2909.3	2790.2
Prob>F	0.000	0.0000	0.0000	0.000	0.000	0.000
Hausman χ^2					82.265***	85.023***
R squared	0.0342	0.0558	0.1448	0.1164	0.0342	0.0558
Adj R squared	0.0296	0.0500	0.0517	0.0195	0.0296	0.0500

Notes: The table shows regression estimates from Equation 3.6.5, ***, **, * denote statistical significance at the 1%, 5% and 10% respectively. Tangibility, Market to Book (MTB), the logarithm of sales (log sales) and Profitability are measured in first differences. MTB is defined as the ratio of the market value of assets to the book value of assets. Log sales are defined as the natural logarithm of constant sales and Profitability is defined as the ratio of operating income to book value of assets (ROA). Heteroscedastic robust standard errors are reported in parentheses. The dependent variables are the change in long-term debt (Eq. 1) and change in short-term debt (Eq. 2). The F-statistic shows the overall significance for the model where null hypothesis states that the model with no independent variables fits the data as well as the model. The null hypothesis of the Hausman test is that the preferred model is the random effects.

As shown in Table 4.8, all the conventional variables have estimated coefficients that are in line with theoretical predictions and are statistically significant at the conventional levels of significance except the natural logarithm of sales which has the correct sign but statistically insignificant at any of the conventional levels of significance. The signs of the coefficients are negative on MTB, positive on asset tangibility, positive on firm size and negative on profitability. Model 2 of the conventional leverage regressions include the financing deficit, and the presumption is that the addition of this explanatory variable should wipe out the

effect of the conventional variables if the pecking order theory is relevant (Frank, Vidhan & Goyal, 2002). However, as seen in Table 4.7 the addition of the financing deficit variable does not significantly affect the coefficients of the conventional variables. The statistical significance of the variables does not change significantly, and the magnitudes of the coefficients only change marginally. The DEF coefficients also deviate from theoretical predictions of the pecking order theory as it is significantly different from one. However, the DEF coefficient is statistically significant at the highest level of significance, giving evidence of the empirical relevance of the financing deficit. The results from the conventional leverage regressions therefore reject the pecking order theory but this does not mean that the financing deficit should be ignored.

Table 4.8: Comparison of results with theoretical predictions

Variable	Results	Theoretical predictions
Tangibility	+ve **	+ve
MTB	-ve ***	-ve
Log Sales	+ve	+ve
Profitability	-ve***	-ve
DEF	+ve*** (different from 1)	Coefficient close to 1

4.3.4 Robustness

To check the robustness of the empirical results presented in Tables 4.5 and 4.7, the models are re-estimated using alternative metrics for profitability and leverage. This section presents the results using the Return on Equity as an alternative measure of firm profitability and amount of long-term debt issued as an alternative measure of leverage. The results from the estimations using Equation 3.6.4 and 3.6.5 are shown in Tables 4.9 and 4.10. As shown in Tables 4.9 and Table 4.10, even after using alternative measures of profitability and leverage, the results remain qualitatively similar. Thus, the results are robust to the use of alternative measures of profitability as well as leverage.

Table 4.9: Testing for the pecking order theory using alternative leverage proxies

	OLS	FE	RE
Financing deficit	0.3234***	0.2087***	0.4265***
	(0.0001)	(0.0001)	(0.0002)
Constant	0.000***	0.0000***	0.0000***
	(0.0001)	(0.0002)	(0.0002)
F-statistic	3251	1453	2214
Prob>F	0.0000	0.0000	0.0000
Hausman test			82.97***
R-squared	0.4597	0.5534	0.5789
Adjusted R-squared	0.4378	0.5267	0.5578

N**otes**: OLS, FE, RE represent the results estimated using the pooled ordinary least squares, fixed effects and random effects models using Equation 3.6.4 respectively. *** shows statistical significance at the 1% level,

heteroscedastic robust standard errors are shown in parentheses, the F-statistic for testing the null hypothesis of the financing deficit's coefficient being equal to unity. The dependent variable is total long-term debt.

Table 4.10: Results from conventional leverage regressions using alternative leverage and profitability proxies

	OLS		Fixed Effects		Random effects	
	(1)	(2)	(1)	(2)	(1)	(2)
Constant	0.0209**	0.0048	0.0108	0.0032**	0.0110	0.0038
	(0.0039)	(0.3842)	(0.3834)	(0.0003)	(0.2745)	(0.3687)
ΔTangibility	0.0006***	0.0009***	0.0009***	0.0009***	0.0009***	0.0009***
	(0.0000)	0.0003	(0.0004)	(0.0003)	(0.0003)	(0.0003)
ΔMTB	-0.0026***	-0.0037***	-0.0037***	-0.0036***	-0.0037***	-0.0037***
	(0.0003)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
Δlog sales	0.0097	0.0136	0.0088	0.0100	0.0097	0.0136
	(0.3425)	(0.1952)	(0.2198)	(0.2172)	(0.2072)	(0.7854)
ΔProfitability	-0.1234***	-0.0952***	-0.1056***	-0.0871***	-0.1129***	-0.0871***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0002)
DEF		0.0000***		0.0000***		0.0000***
		(0.0000)		(0.0000)		(0.0000)
Hausman test						88.45***
R squared	0.0231	0.0426	0.0745	0.1265	0.0442	0.0358
Adj R squared	0.0126	0.0324	0.0556	0.1195	0.0396	0.0500

Notes: The table shows regression estimates from Equation 3.6.5. ***, **, * denote statistical significance at the 1%, 5% and 10% respectively. MTB is Market-to-Book, t and DEF is deficit. MTB is defined as the ratio of the market value of assets to the book value of assets. Log sales are defined as the natural logarithm of constant sales and Profitability is defined as the ratio of operating income to book value of assets (ROE). Standard errors are reported in parentheses. The dependent variable is the total long-term debt issued.

4.4 Discussion

The results reported in the previous section do not indicate strong support the pecking order theory at least within the sample period used and the specific sample used. The expectation was a positive association between asset tangibility and leverage as outlined in the theoretical assumptions of the pecking order theory presented in Table 4.8. The theoretical predictions are corroborated by the evidence presented in the findings in Table 4.7. The findings show a positive relationship between the leverage of a firm and asset tangibility. The explanation for this is that companies that have high levels of physical properties have a tendency of being highly levered as they normally have the high collateral to pledge in exchange for additional debt. These results corroborate previous results from the studies done on the elements that determine financing arrangements in South Africa. Gwatidzo, Ntuli and Mlilo (2015) report a positive association between asset tangibility and leverage using a quantile regression model which gives estimates across the whole conditional distribution of the variables. The authors report that the relationship is lower for lowly-levered firms while it is higher for highly levered firms. This result shows that even in South Africa, which has the most developed and

probably the deepest financial markets in Africa, collateral plays an important function in ameliorating the effects of asymmetry of information in markets for debt.

MTB, which is used as a proxy for growth in the conventional leverage regressions, is negatively and significantly associated with leverage in all the regression models. This result is in contrast to Chipeta and Deressa (2016), who report a positive relationship that is significant between growth options and the performance of a firm, though their proxy for growth was a change in total assets. Gwatidzo, Ntuli and Mlilo (2015) use the MTB to proxy growth opportunities of firms and report a positive but insignificant relationship between growth options and leverage. The negative relationship between growth options as measured by MTB is in line with Myres (1977)'s proposition that growth firms borrow the least due to the potential underinvestment problem. Myres (1977)'s underinvestment proposition states the underinvestment problem as an agency problem that culminates from a company foregoing projects with positive Net Present Value because debt holders would capture a portion of the benefits of the project, leaving insufficient returns to the equity shareholders. Ultimately the company will fail to invest in new profitable projects, and this may lead to debt overhang as debt will continue increasing while growth opportunities dissipate.

Firm size was found to be an insignificant predictor of firm leverage for listed companies on the JSE within the sample period. Though the results show a positive relationship between firm size and leverage, the coefficient of firm size as proxied by the natural logarithm of sales is not statistically significant at any of the conventional levels of significance. This contrasts with Gwatidzo, Ntuli and Mlilo (2015) as well as Chipeta and Deresa (2016) who all reported statistically significant associations between firm size and leverage. Larger firms tend to have minimal information asymmetry and a conscious desire to protect their reputations by honouring their debt contracts. The size of these large firms makes them have an appetite for large projects and in the process requiring capital beyond internally generated funds. The combination of the need to borrow and the willingness of lenders to extent debts to these large firms lead to a positive relationship between firm size and leverage.

Consistent with the pecking order financing theory, the coefficient on the profitability variable is negative and statistically significant. According to the pecking order hypothesis, there is an inverse association between leverage and profitability since a company that is profitable is expected to have more earnings that are retained over time (Chipeta & Deresa,

2016). The retained earnings could be channelled towards financing a company as a first choice when a firm wants to buy new assets or financing a new project. This reduces the need for external financing. This corroborates the findings of Alves and Ferreira (2011) who investigated the predictors of capital structure in a cross-country panel consisting of 31 countries singled out profitability as the most important predictor of leverage. The finding is also consistent with other studies done on South Africa to determine the determinants of capital structure for JSE-listed firms (Chipeta & Deresa, 2016; Moyo Brummer & Wolmarams, 2013).

4.5 Conclusion

The chapter outlined the findings from the analyses done to examine the pecking order theory as well as determining the factors that affect the capital structure of companies listed on the JSE for the period 2009 to 2020. The results show no significant evidence pointing to the pecking order theory in a South African context as the financing deficit coefficients all deviated from unity using different model specifications. However, though the financing deficit coefficient was well less than one to support the pecking order theory, the coefficient was statistically significant at the highest conventional confidence interval, showing that the financing deficit remains empirically relevant from a South African context. On the second hypothesis of the study which sought to determine the factors that company executives of JSE-listed companies consider in their financing decisions, the evidence significantly showed the importance of collateral in the amount that companies are willing to borrow. Companies with more asset tangibility were found to be the companies that were significantly associated with more debt. Company size, proxied by the natural logarithm of sales was insignificantly associated with leverage, even though the sign was as predicted by theory. Growth and profitability were also reported as significant predictors of company leverage. The next chapter synthesises the study by giving a summary of the findings, conclusion as well as recommendations for future studies.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This final chapter synthesises the research by giving a summary of the research results as well as the conclusions drawn from the findings relative to the research hypotheses that were proposed for the study. The policy implications of the study findings together with avenues for future research are also outlined in this chapter. The chapter ends with a conclusion section that summarises this chapter.

5.2 Summary of findings

This study aimed to test the pecking order hypothesis using a sample of 197 companies listed on the main board of the Johannesburg Stock Exchange between 2009 and 2020. The factors that influence firm leverage were also explored using the conventional leverage regressions. Financial firms were excluded from the study sample in line with exiting literature because these firms have sector-specific leverage ratios they comply with which are regulated by regulatory authorities. Testing the pecking order theory was achieved by using a model which hypothesised a one-to-one association between the variations in debt and financial deficit. Using this model, the pecking order theory is supported if the coefficient of the financing deficit is statistically close to one.

The variables used in the study were tested for stationarity using the robust unit root tests for panel data. The findings show that the variables were all stationary at levels showing that the use of these variables in ordinary least squares-based models would not produce spurious results. To guard against violating some OLS assumptions, standard errors were adjusted for heteroscedasticity in the regression models. In the model used, the variables were not scaled to guard against compromising the model estimates in line with Govan (2010). The model for used shows the financing deficit having a statistically significant positive coefficient but the subsequent F-test shows that the coefficient is statistically different from unity, giving weak support of the theory that was tested.

The pecking order theory is then tested using the conventional leverage regressions following Frank, Vidhan and Goyal (2002). Two models are used to test the pecking order theory as well as to determine the factors that influence the levels of leverage for companies listed on the main board of the Johannesburg Stock Exchange. The first model includes the empirical

predictors of leverage in first differences in line with Frank, Vidhan and Goyal (2002) while the second model incorporates the financing deficit as a variable for further explanation. To support the theory, the coefficient of the financing deficit should wipe out the effect of the conventional variables upon being added as an additional explanatory variable. Instead, the addition of the financing deficit to the conventional leverage regression had no much impact on the extent and importance of the coefficients of the conventional variables. Thus, there is weak support of the pecking order theory on the JSE using the conventional leverage regressions. On the other variables included in the conventional leverage regression as predictors of firm leverage, all of them were consistent with what theory would predict. Asset tangibility and firm size were both positive while Market to Book and profitability were both negative in line with theoretical predictions. All the conventional predictors of leverage were statistically significant at the 1% and 5% significance levels except for firm size which was not statistically significant at any of the conventional levels of significance. Thus, for the sample of companies used in this study and the sample period selected, there is weak support for the pecking order theory while leverage is determined by growth options as proxied by MTB, asset tangibility as well as profitability. However, the financing deficit remains empirically relevant as seen by its statistical significance.

5.3 Suggestions for future study

This study has attempted to examine the pecking order theory using a sample of non-financial firms listed on the main board of the Johannesburg Stock Exchange. A limitation of the model used in this study is that it only considered firm-specific factors in determining the predictors of leverage. Future research could include macroeconomic variables as additional predictors of the financing decisions of listed firms in South Africa as empirical evidence shows that these macroeconomic are important in the leverage-financing deficit nexus.

5.4 Conclusion

This study was conducted with the aim of testing the pecking order hypothesis as well as examining the factors that influence the capital structure decisions using companies that are listed on the main board of the Johannesburg Stock Exchange over 12 years from 2009 to 2020. A total of 197 companies excluding financial companies were selected to be used in the study using stratified random sampling. Pooled ordinary least squares, fixed effects and random effects models with heteroscedasticity robust standard errors were used. The results from the model employed to test the pecking order hypothesis show weak evidence of

executives adhering to the pecking order theory in their decisions regarding financing. The conventional leverage regressions run to determine the factors that influence the capital structure were found to be consistent with theoretical predictions except for firm size which had the correct sign as predicted by theory but statistically insignificant. The weak evidence of the pecking order theory using the sample and study period used in this study could be a result of less acute information asymmetry in South Africa compared to other developing countries in which strong support for the pecking order theory have been reported.

The results from this study can equip both domestic and foreign investors, firm's financial managers, academicians, researchers and other stakeholders concerning financing behaviour of the South African listed firms.

For academicians, the study gives additional empirical evidence to answer one of the most arguable topics in corporate finance in relation to how firms determine their capital structure. The study also contributes to the capital structure study in South Africa where the finance literature has not been thoroughly investigated.

Additionally, the South African companies can reflect on the findings from this paper as a reference and a starting point to consider more appropriate capital structure in order to maximize firm's value. As for policy makers, given that South African firms seem to depend heavily on debt to finance their capital structure and the country's financial markets relative to developed countries have not yet developed a variety of financing options, the government could focus on coming up with policies that could improve the financial markets in terms of products and funding options available to firms.

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APPENDICES

Appendix A: Output from EViews

Dependent Variable: CHANGE_DEBT
Method: Panel Least Squares
Date: 04/30/21 Time: 12:56
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 186
Total panel (unbalanced) observations: 1379

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEF	0.429507	0.00000	40.90232	0.0000
C	-2.66E+08	0.7987	-2.664776	0.0078

R-squared	0.599857	Mean dependent var	9.70E+08
Adjusted R-squared	0.599498	S.D. dependent var	5.03E+09
S.E. of regression	3.18E+09	Akaike info criterion	46.60191
Sum squared resid	1.13E+22	Schwarz criterion	46.61089
Log likelihood	-26048.47	Hannan-Quinn criter.	46.60531
F-statistic	1673.000	Durbin-Watson stat	1.814651
Prob(F-statistic)	0.000000		

Dependent Variable: CHANGE_DEBT
Method: Panel Least Squares
Date: 04/30/21 Time: 12:59
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 186
Total panel (unbalanced) observations: 1379

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEF	0.508731	0.0000	38.09191	0.0000
C	-4.94E+08	0.5999	-4.941847	0.6554

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.660842	Mean dependent var	9.70E+08
Adjusted R-squared	0.623420	S.D. dependent var	5.03E+09
S.E. of regression	3.09E+09	Akaike info criterion	46.63334
Sum squared resid	9.58E+21	Schwarz criterion	47.13616
Log likelihood	-25956.03	Hannan-Quinn criter.	46.82341
F-statistic	17.65917	Durbin-Watson stat	2.123798
Prob(F-statistic)	0.000000		

Dependent Variable: CHANGE_DEBT
Method: Panel EGLS (Cross-section random effects)
Date: 04/30/21 Time: 13:01
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 186
Total panel (unbalanced) observations: 1379
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEF	0.429507	0.010182	42.18146	0.0000
C	-2.66E+08	0.368576	-2.748112	0.4321

Effects Specification		
	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	3.09E+09	1.0000

Weighted Statistics

R-squared	0.599857	Mean dependent var	9.70E+08
Adjusted R-squared	0.599498	S.D. dependent var	5.03E+09
S.E. of regression	3.18E+09	Sum squared resid	1.13E+22
F-statistic	1673.000	Durbin-Watson stat	1.814651
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.599857	Mean dependent var	9.70E+08
Sum squared resid	1.13E+22	Durbin-Watson stat	1.814651

Dependent Variable: CHANGEDEBTRATIO
Method: Panel Least Squares
Date: 04/30/21 Time: 15:49
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 176
Total panel (unbalanced) observations: 1211

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHANGETANG	0.000906	0.000381	2.380264	0.0175
CHANGEMTB	-0.003700	0.001191	-3.106178	0.0020
CHANGESIZE	0.009727	0.020161	0.482471	0.6296
CHANGEPROFITABILITY	-0.113770	0.030950	-3.675971	0.0003
C	0.010713	0.003826	2.800299	0.0052

R-squared	0.034279	Mean dependent var	0.013817
Adjusted R-squared	0.029685	S.D. dependent var	0.103152
S.E. of regression	0.101610	Akaike info criterion	-1.729466
Sum squared resid	8.682900	Schwarz criterion	-1.701449
Log likelihood	736.5643	Hannan-Quinn criter.	-1.718732
F-statistic	7.462908	Durbin-Watson stat	2.113321
Prob(F-statistic)	0.000007		

Dependent Variable: CHANGEDEBTRATIO
Method: Panel Least Squares

Date: 04/30/21 Time: 15:50
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 176
Total panel (unbalanced) observations: 1211

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHANGETANG	0.000931	0.000394	2.363996	0.0183
CHANGEMTB	-0.003714	0.001235	-3.006152	0.0027
CHANGESIZE	0.008808	0.021811	0.403839	0.6864
CHANGEPROFITABILITY	-0.105602	0.030738	-3.435497	0.0006
C	0.010800	0.003840	2.812470	0.0050

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.144875	Mean dependent var	0.013817
Adjusted R-squared	0.051732	S.D. dependent var	0.103152
S.E. of regression	0.100449	Akaike info criterion	-1.664333
Sum squared resid	7.688514	Schwarz criterion	-1.193643
Log likelihood	788.0129	Hannan-Quinn criter.	-1.483994
F-statistic	1.555399	Durbin-Watson stat	2.383088
Prob(F-statistic)	0.001819		

Dependent Variable: CHANGEDEBTRATIO
Method: Panel Least Squares
Date: 04/30/21 Time: 15:49
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 176
Total panel (unbalanced) observations: 1211

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHANGETANG	0.000906	0.000381	2.380264	0.0175
CHANGEMTB	-0.003700	0.001191	-3.106178	0.0020
CHANGESIZE	0.009727	0.020161	0.482471	0.6296
CHANGEPROFITABILITY	-0.113770	0.030950	-3.675971	0.0003
C	0.010713	0.003826	2.800299	0.0052

R-squared	0.034279	Mean dependent var	0.013817
Adjusted R-squared	0.029685	S.D. dependent var	0.103152
S.E. of regression	0.101610	Akaike info criterion	-1.729466
Sum squared resid	8.682900	Schwarz criterion	-1.701449
Log likelihood	736.5643	Hannan-Quinn criter.	-1.718732
F-statistic	7.462908	Durbin-Watson stat	2.113321
Prob(F-statistic)	0.000007		

Dependent Variable: CHANGEDEBTRATIO
Method: Panel Least Squares
Date: 04/30/21 Time: 15:50
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 176
Total panel (unbalanced) observations: 1211

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHANGETANG	0.000931	0.000394	2.363996	0.0183
CHANGEMTB	-0.003714	0.001235	-3.006152	0.0027
CHANGESIZE	0.008808	0.021811	0.403839	0.6864
CHANGEPROFITABILITY	-0.105602	0.030738	-3.435497	0.0006
C	0.010800	0.003840	2.812470	0.0050

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.144875	Mean dependent var	0.013817
Adjusted R-squared	0.051732	S.D. dependent var	0.103152
S.E. of regression	0.100449	Akaike info criterion	-1.664333
Sum squared resid	7.688514	Schwarz criterion	-1.193643
Log likelihood	788.0129	Hannan-Quinn criter.	-1.483994
F-statistic	1.555399	Durbin-Watson stat	2.383088
Prob(F-statistic)	0.001819		

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.311187	4	0.0538

Dependent Variable: CHANGEDEBTRATIO
Method: Panel Least Squares
Date: 04/30/21 Time: 15:57
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 78
Total panel (unbalanced) observations: 831

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHANGETANG	0.000968	0.000393	2.466542	0.0139
CHANGEMTB	-0.003699	0.001224	-3.023303	0.0026
CHANGESIZE	0.010054	0.021758	0.462101	0.6441
CHANGEPROFITABILITY	-0.087161	0.030919	-2.818981	0.0049
DEF	2.22E-12	5.01E-13	4.432278	0.0000
C	0.003289	0.004096	0.802968	0.4222

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.116430	Mean dependent var	0.012818
Adjusted R-squared	0.019568	S.D. dependent var	0.100434
S.E. of regression	0.099446	Akaike info criterion	-1.683870
Sum squared resid	7.397358	Schwarz criterion	-1.212176
Log likelihood	782.6482	Hannan-Quinn criter.	-1.502993
F-statistic	1.202015	Durbin-Watson stat	2.415160
Prob(F-statistic)	0.117191		

Dependent Variable: CHANGEDEBTRATIO
Method: Panel EGLS (Cross-section random effects)
Date: 04/30/21 Time: 15:57
Sample (adjusted): 2009 2020
Periods included: 12
Cross-sections included: 78
Total panel (unbalanced) observations: 831
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHANGETANG	0.000970	0.000374	2.590476	0.0098
CHANGEMTB	-0.003704	0.001166	-3.176207	0.0015
CHANGESIZE	0.013600	0.019909	0.683087	0.4947
CHANGEPROFITABILITY	-0.095244	0.030755	-3.096848	0.0020
DEF	1.59E-12	3.69E-13	4.303843	0.0000
C	0.004866	0.003930	1.238329	0.2159

Effects Specification	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.099446	1.0000

Weighted Statistics

R-squared	0.055814	Mean dependent var	0.012818
Adjusted R-squared	0.050092	S.D. dependent var	0.100434
S.E. of regression	0.097886	Sum squared resid	7.904838
F-statistic	9.753715	Durbin-Watson stat	2.258052
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.055814	Mean dependent var	0.012818
Sum squared resid	7.904838	Durbin-Watson stat	2.258052

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.769858	5	0.1694