A comparative analysis of the impact of Covid-19 and the global financial crisis on capital structure: Evidence from the Johannesburg Stock Exchange

Master of Commerce in Finance (50% Research)

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ABSTRACT

Since Modigliani and Miller (1958) introduced the modern theory of capital structure, various studies have been conducted on capital structure. This study contributes to the existing capital structure literature by investigating how the Covid-19 pandemic impacted the capital structure of Johannesburg Stock Exchange (JSE) listed non-financial firms and comparing this impact to that of the 2008 global financial crisis. Furthermore, this study seeks to determine the relationship between capital structure and fundamental firm factors (business risk, profitability, firm size, growth, and asset tangibility). To conduct this analysis, the financial data of these firms for the 2005 to 2022 period is extracted from Bloomberg and the Generalized Method of Moments (GMM) model is used to conduct the analysis of this study. The results of this study indicate that Covid-19 did not have a statistically significant impact on the capital structure of the JSE listed non-financial firms whereas, the 2008 global financial crisis had a statistically significant impact. Overall, the results of this study are consistent with the empirical evidence reported by previous studies, and they provide evidence in support of both the trade-off theory and the pecking order theory.

Key words: Capital structure, global financial crisis (GFC), Covid-19 pandemic, capital structure determinants, JSE

DECLARATION

I, Thandiwe Mjeso (student number: 1799281), hereby declare that this dissertation is my own work and I have acknowledged the work of others throughout the dissertation. I submit this dissertation in fulfillment of the requirements of the Master of Commerce in Finance degree at the University of the Witwatersrand in Johannesburg. I declare that this dissertation has not been previously submitted for examination at this institution or any other institution.

Signature

19/06/2023

Date

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CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1. Introduction

This chapter provides a background and overview of this study, it highlights the purpose and benefits of the study, as well as the limitations. Section 1.2. provides a background and overview of existing literature on the topic covered in this study. Section 1.3. highlights the problem statement and how this study contributes to existing literature, while Section 1.4. states the objectives of the study and Section 1.5 notes the hypotheses. Section 1.6. outlines the benefits of this study and Section 1.7. concludes this chapter.

1.2. Background and overview

Capital structure is one of the widely researched topics in finance literature. This is because researchers across the globe have been interested in this topic since the seminal work of Modigliani and Miller (1958). The focal point of the capital structure debate has been whether an optimal capital structure exists and how fast firms adjust towards this optimal target. In addition to this, researchers have been investigating factors that are reliably important in determining the capital structure of firms. Considerable progress has been made in this regard, as there are firm-specific factors that have consistently proved to be correlated with capital structure (Chipeta & Deressa, 2016).

Understanding what impacts a firm's capital structure is important as firms need to always be adequately capitalised to ensure their survival especially during times of economic stress. It is for this reason that investigating the impact of crises on the capital structure and financing decisions of firms is important, as it may assist firms navigate crisis periods and stay operational post periods of economic turmoil. Both the Covid-19 pandemic and the 2008 global financial crisis showed that periods of economic stress can result in the bankruptcy and failure of firms (Mouton & Smith, 2016). Not all firms in South Africa and across the globe survived the global financial crisis and the Covid-19 pandemic, some firms declared bankruptcy due to the effects of these crises. This highlights the importance of understanding how crises impact the capital structure of firms.

Whilst Covid-19 was a health risk, it had far reaching economic implications. Governments across the globe had to enforce hard lockdowns which had a negative impact on the global economy. Auret, Chipeta, and Krishna (2013) argue that when the macroeconomic condition of a country changes the capital structure of the firms operating in that country also changes. Therefore, due to the economic impact that the Covid-19 pandemic had, it is expected that it would have some impact on the financing decisions of firms. According to Bill, Raffi and Sharma (2020), although some firms had cash reserves to deal with the financial difficulties posed by the Covid-19 pandemic, other firms had to resort to debt to survive the pandemic.

While firms experienced a decline in revenue due to the lockdowns and shutdowns that were implemented during the Covid-19 pandemic, which impacted the value of the firms, interest rates were low across the globe (Bill, et al., 2020). As a result, firms could access debt at lower costs therefore, in this study firms are expected to have increased their debt levels in response to the impact of the pandemic. In terms of the 2008 global financial crisis, firms could have either increased their leverage as many firms were in distress or deleveraged due to high debt costs and tightened lending policies. Bill, et al. (2020) examined the effect of the Covid-19 pandemic on the borrowing behavior of firms across 88 countries (including South Africa), their empirical analysis shows that the pandemic is associated with increased bank and non-bank borrowing.

The study of firm-specific determinants of capital structure is also important as each firm has its own capital structure (Mouton & Smith, 2016), even firms in the same industry have varying capital structures. Therefore, when it comes to capital structure, there's no "one size fits all". This makes it important for each firm's management to consider what impacts their firm's capital structure when making financing decisions. It is vital that firm managers are aware of and closely monitor the significant determinants of their capital structure (Chowdhury & Chowdhury, 2010), so that they can detect changes in the firm's capital structure and the firm's value. Conducting this study is important as it can potentially provide managers with useful insights on the determinants of capital structure, especially during times of economic turmoil and it can provide insights on efficient ways to adjust a firm's capital structure in response to a crisis.

Since the Covid-19 pandemic was a healthcare crisis, it's impact on the capital structure of firms in the healthcare industry might have been different to how it impacted firms in other industries. Moreover, the pandemic introduced the virtual world as the new norm as most people started working from home and resorted to online shopping during lockdown periods. As a result, the technology industry might have also adjusted their capital structure to cater for the increased need of their services and support. For these reasons, this study also offers an analysis of the impact of the crisis on the healthcare industry and the technology industry.

1.3. Problem statement

Although many researchers have conducted studies on capital structure, research on the impact of crises on the capital structure of firms especially in the African context is limited (Mouton & Smith, 2016). A study focusing on the impact of the 2008 global financial crisis on the capital structure of JSE listed firms has previously been conducted (see Mouton & Smith, 2016). However, to the author's best knowledge, there hasn't been a study that compares the impact of the 2008 global financial crisis (a financial crisis) and the Covid-19 pandemic (a health crisis) on the capital structure of JSE listed non-financial firms. Additionally, studies that particularly focus on the impact of Covid-19 on capital structure are scant although the Covid-19 pandemic resulted in some firms being bankrupt. This study offers a new contribution to the existing capital structure literature by conducting a comparative analysis of the impact of the Covid-19 pandemic and the 2008 global financial crisis on the capital structure of non-financial JSE listed firms.

There is ample evidence which enhances our understanding on the firm-specific factors that are reliably important in determining the capital structure of firms (see Chang, Chen, & Liao, 2014; Frank & Goyal, 2009; Mouton & Smith, 2016) while other works document the macroeconomic factors (Chipeta & Mbululu, 2013; De Vries & Erasmus, 2010; Mokhova & Zinecker, 2014) and non-traditional factors (Gwatidzo & Ojah, 2014) influencing the debt-to-equity choice.

While considerable progress has been made on factors that are reliably important in determining the capital structure of firms in various countries and industries, there is still a lack of clarity on the impact of crises on the capital structure and financing decisions of firms. Although how a firm adjusts its capital structure in response to economic stress is vital for the survival of the firm during

and post the crisis, there is limited research on the impact of crises on the capital structure of firms, particularly in the context of African markets (Mouton & Smith, 2016). It is important to determine how crises affect the capital structure of firms, because to survive a crisis firms need to be adequately capitalised.

1.4. Research objective

The primary objective of this study is to conduct a comparative analysis of the impact of Covid-19 and the 2008 global financial crisis on the capital structure of non-financial firms. The sub objectives of this study have been noted below.

- To analyse the impact of the Covid-19 pandemic on capital structure.
- To analyse the impact of the 2008 global financial crisis on capital structure.
- To determine the relationship between capital structure and fundamental firm factors (business risk, profitability, firm size, growth, and asset tangibility).

1.5. Hypothesis

Growth prospects, asset tangibility, firm size, and profitability have been identified by previous studies as the main firm-specific characteristics that have proven to be consistently correlated with capital structure (Chang, et al., 2014; Frank & Goyal, 2009; Rajan & Zingales, 1995). It is, therefore, the assumption of this study that the selected independent variables (business risk, profitability, firm size, growth, asset tangibility and the impact of the Covid-19 pandemic and the 2008 global financial crisis) can explain the dependent variable (capital structure). Based on this assumption, we can therefore hypothesize that the capital structure of a firm is determined by firm-specific characteristics, such as how profitable the firm is, the size and growth prospects of the firm, the asset structure of the firm and prevailing market conditions.

A firm's riskiness is impacted by the uncertainties of the environment that it operates in, firms are faced with a higher degree of default risk during periods of high market volatility and uncertainty. This implies that the capital structure of a firm is likely to change in response to prevailing market conditions (Auret, et al., 2013). Both the Covid-19 outbreak period and the 2008 global financial crisis represent periods where the global economy experienced high volatility and high levels of

uncertainty. In this study, firms are expected to alter their capital structure in response to the effects of the Covid-19 pandemic and the 2008 global financial crisis.

Mouton and Smith (2016) found that the 2008 global financial crisis had an impact on the identified determinants of capital structure as risk, asset tangibility, and profitability were the most significant determinants of capital structure prior to the 2008 global financial crisis. However, post the 2008 global financial crisis, profitability became insignificant while asset tangibility and risk proved to have a stronger influence on capital structure. Therefore, we can hypothesize that the Covid-19 pandemic and the 2008 global financial crisis affected the significance of the capital structure determinants.

Based on the above assumptions and arguments, and on the objectives of this study, the below hypotheses and alternative hypotheses are formulated:

$H_{1:}$ Covid-19 does not have a significant impact on capital structure.
$H_{1a:}$ Covid-19 has a significant impact on capital structure.

$H_{2:}$ The 2008 global financial crisis does not have a significant impact on capital structure.
$H_{2a:}$ The 2008 global financial crisis has a significant impact on capital structure.

$H_{3:}$ Fundamental firm factors (business risk, firm size, profitability, growth, and asset tangibility) do not have a significant impact on capital structure.
$H_{3a:}$ Fundamental firm factors (business risk, firm size, profitability, growth, and asset tangibility) have a significant impact on capital structure.

Breaking down the hypotheses can assist in ensuring that both the primary and sub objectives of the study are achieved, it allows for the isolation of the effect of the Covid-19 pandemic and the effect of the 2008 global financial crisis on the capital structure of JSE listed non-financial firms. This makes it easier to determine the impact of the Covid-19 pandemic versus that of the 2008 global financial crisis on the capital structure of the firms examined in this study.

1.6. Potential benefits of this study

This study focuses on a topic that has limited research which is the impact of the Covid-19 pandemic on the capital structure of firms. Therefore, it extends the literature that exists on the impact of crises on the capital structure of firms. Conducting a comparative analysis of the impact of a health crisis and a financial crisis on capital structure is a new contribution that this study makes to existing capital structure literature. Furthermore, by narrowing down the analysis to the healthcare industry and the technology industry, this study offers results that show how the crisis periods affected the healthcare and technology industries as Covid-19 was a health crisis that resulted in increased technology usage.

Since the aim of this study is to compare the impact that the Covid-19 pandemic and the 2008 global financial crisis had on the capital structure of firms. The study can help firms navigate crisis periods by highlighting how crises impact the capital structure and financing decisions of firms. The results of this study can provide guidance to a firm's management on factors that they need to closely monitor when making financing decisions during periods of economic stress. Analysing if firms reacted the same way to the Covid-19 pandemic and the 2008 global financial crisis could also be beneficial to firm managers.

1.7. Conclusion

This chapter provided a background and overview of this study, it highlighted the importance of conducting a study on how crises impact a firm's capital structure. Additionally, it outlined the objectives of this study and the benefits of conducting this study. The next chapter provides a review of the existing capital structure literature.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

This chapter provides a review of the extensive capital structure literature, from its theories to the relationship that capital structure has with its determinants. Section 2.2. describes the theories of capital structure and considers existing literature on these theories. Section 2.3. discusses the empirical evidence on capital structure and its determinants and Section 2.4. briefly discusses the impact of a crisis on the capital structure of firms. Section 2.5 concludes this chapter.

2.2. Theories of capital structure

Many researchers have conducted studies on capital structure, some examining if an optimal capital structure exists and others exploring if firms have a target capital structure. Since Modigliani and Miller's 1958 seminal work, many researchers have attempted to prove that an optimal capital structure exists and that it does have an impact on the value of the firm. According to De Vries and Erasmus (2010), this implies that by using an optimal capital structure that has been tailored for a specific firm, the firm's management could maximise the firm's value, which is ultimately the aim of every firm, to create shareholder value and maximise the value of the firm. This capital structure debate has led to the development of many theories of capital structure.

Various theories have been proposed to try and explain the differences in debt ratios across firms. These theories suggest that a firm's capital structure depends on the equity and debt financing costs and benefits associated (Titman & Wessels, 1988). Although many capital structure theories have been proposed, reconciling the theoretical and empirical studies that have been conducted thus far has resulted in the trade-off theory and the pecking order theory being the two major capital structure theories (Myers, 1984). Researchers have found strong evidence in support of both the trade-off theory and the pecking order theory depending on the country and industry that their study focused on. It is for this reason that, Fama and French (2002) suggest that the trade-off theory and the pecking order theory should be viewed as complementary and not in isolation. Ramjee and Gwatidzo (2012) found evidence that suggests that the capital structure decisions of South African listed firms follow both the trade-off theory and the pecking order theory. The capital structure theories have been discussed below.

2.2.1. Trade-off theory

The trade-off theory was advanced by Kraus and Litzenberger (1973), they introduced the interest tax shields and the potential financial distress costs associated with debt into a state preference model. The trade-off theory suggests that there are costs and benefits associated with utilising debt, the costs of high debt levels include increased financial distress risk, bankruptcy costs and underinvestment problems while the benefits include increased tax shields and reduced agency costs (Ramjee & Gwatidzo, 2012). The trade-off theory asserts that an optimal capital structure that maximises a firm's value exists therefore, a firm's management will set a target capital structure which they will gradually move towards (De Vries & Erasmus, 2010).

Graham and Harvey (2001) surveyed company Chief Financial Officers (CFOs) about their capital structure. They reported that majority of the surveyed CFOs confirmed that they have a target debt ratio, lending support to the trade-off theory. According to Shyam-Sunder and Myers (1999), a firm weighs the costs and benefits associated with debt and achieves an optimal capital structure by equating the present value of the marginal benefits to the present value of the marginal costs. The trade-off theory also posits that profitable firms will attmept to shield their earnings from tax by taking advantage of the interest tax shields associated with debt and utilising debt more (Chipeta & Deressa, 2016). However, majority of the empirical evidence regarding leverage and profitability does not support the tade-off theory, most of the studies show that profitable firms tend to borrow the least (see Jarallah, Saleh, & Salim, 2019; Rajan & Zingales, 1995; Ramjee & Gwatidzo, 2012).

The trade-off theory also suggets that firms with risky intangible assets will be more exposed to financial distress costs compared to firms with safe tangible assets, therefore, firms with relatively safe tangible assets are expected to borrow more (Chipeta & Deressa, 2016). Most of the capital structure studies confirm a positive and statistically significant relationship between asset tangibility and capital structure (Mouton & Smith, 2016; Ramjee & Gwatidzo, 2012). The trade-off theory is one of the main theories that many studies have considered and found supportive evidence for.

2.2.2. Pecking order theory

Contrary to the trade-off theory, the pecking order theory suggests that a well-defined debt-to-equity ratio does not exist. The pecking order theory was formalised by Myers and Majluf (1984) who argued that firms prefer internal financing to external financing and when external financing is the only option available, firms tend to prefer debt over equity. Previous studies have showed that firms prefer utilising internal financing (such as retained earnings) compared to external financing (debt, preference shares or the issuing of new equity). The pecking order theory asserts that managers prefer to utilise financing options with the least information costs first due to the information asymmetries that exist between managers and shareholders (Ramjee & Gwatidzo, 2012). Therefore, if a firm requires external financing, it will issue the safest security first (Myers, 1984). According to Barlay and Smith (2005), once retained earnings have been exhausted, firms will utilise debt with shorter maturities followed by long-term debt, and will issue equity as a last resort.

Various studies have provided empirical evidence in support of the pecking order theory, for instance, Jarallah, et al. (2019) used data from Japanese non-financial firms listed on the Tokyo Stock Exchange to empirically test the traditional trade-off model against the pecking order model. Their results showed that the financing pattern of Japanese firms is consistent with the pecking order theory which predicts that the internal financial deficit drives external debt financing. Although there are studies that have presented evidence supporting the pecking order theory, there are also studies that have provided evidence that opposes the pecking order theory predictions. Overall, the evidence on the pecking order theory seems to largely depend on the methodology used (Chipeta & Deressa, 2016).

2.2.3. Market timing theory

Baker and Wurgler (2002) proposed the market timing theory, they posit that capital structure is the cumulative outcome of past attempts to time the equity market. The essence of the market timing theory is that firms time the issuing of equity, they tend to issue equity when their stocks are overvalued and issue debt when their stocks are undervalued. Baker and Wurgler (2002) argue that firms issue equity when they believe that their shares are overvalued and they repurchase

equity when they believe that their shares are undervalued. Therefore, the issuing of shares is highly related to the market's valuation of the firm's shares.

One of the main focuses of capital structure literature has been whether an optimal capital structure exists, and the market timing theory suggests that firms that time the market do not have an optimal capital structure (Baker & Wurgler, 2002). In essence, financing decisions that result from market timing (timing equity issues vs when to resort to debt) accumulate into the firm's capital structure over time. According to Flannery and Rangan (2006), if market timing is the dominant influence on a firm's leverage, then firms do not have a target capital structure that they gradually move towards. The market timing theory also suggests that the leverage ratio of a firm is positively related to the market equity premium (Antoniou, Guney, & Paudyal, 2008). Therefore, when a firm needs external capital and their stock is undervalued the firm is likely to resort to debt instead of issuing equity and when their stock is overvalued they are likely to issue equity instead of debt.

Virk, Ahmed and Nisar (2014) observed the core principle of the market timing theory, that firms issue equity when their prices are high. They found evidence that firms consider market valuations in the short run when issuing equity but the results lost economic significance when the tests of persistence were applied. Flannery and Rangan (2006) also found evidence in support of the market timing theory while, Frank and Goyal (2009) highlighted that the limitation of the market timing theory by itself, is that it does not offer predictions for many of the patterns found in the data whereas, the trade-off theory does.

2.2.4. Agency costs theory

Jensen and Meckling (1976) advanced the agency theory, they suggested a theory of how a firm's governance is based on the conflict of interest that exists between a firm's managers, owners, and debt finance providers. The agency problem emerges from the conflict of interest that exists between managers and owners (Marandu & Sibindi, 2016). Managers do not always make decisions that are in the best interest of firm owners for example, the availability of free cash flow can result in managers over investing in suboptimal projects that do not increase the firm's value.

Conflict of interest also arises between debtholders and equity holders as they have differing claims on the business (Myers, 2001). According to Jensen (1986), the agency problem can be mitigated by increasing managers shareholding or by increasing the amount of debt in the firm's capital structure. Baker and Wurgler (2002) suggest that the agency problem can guide the decision to have more or less debt in the capital structure of a firm, as debt financing can inhibit managers from making unprofitable investments.

The agency theory asserts that an optimal capital structure can be achieved by minimising agency costs that arise from conflicts of interest that exist between firm managers, owners, and other relevant stakeholders (Rasiah & Kim, 2011). According to the agency theory, profitability is positively related to leverage, firms that are more profitable tend to utilise more debt due to debt's disciplining role on managers. The agency theory also suggests that leverage is positively related to efficiency, an increase in leverage results in increased efficiency (Berger & di Patti, 2006). Some studies found evidence that supports the agency theory (see De Jonghe & Oztekin, 2015; Jun & Jen, 2003) while others found evidence that contradicts the agency theory (see Al-Najjar & Hussainey, 2011).

2.2.5. Signalling theory

The signalling theory emerges from the information asymmetries that exist between firm managers and shareholders, it was advanced by Ross (1977). According to Ross (1977), if managers have inside information about the firm's prospects their capital structure choice signals information to the market. If firm managers are optimistic about the firm's future earnings and cash flow they can issue debt to signal their confidence to the market that the firm will have sufficient cash flow to service the debt. Failure to honor debt obligations can result in bankruptcy. Therefore, a firm's leverage ratio can be influenced by the signals that firm managers want to send to the market about the firm's prospects.

If managers believe that their firm is undervalued they will avoid issuing equity and they will resort to debt as a source of external financing, whereas if they believe that their firm is overvalued they will issue equity instead of debt. Barclay and Smith (2005) suggest that the signalling theory assumes that the primary function of financing decisions is to communicate firm managers'

confidence in the firm's prospects. Managers can send signals to the market in various ways which usually impact the firm's capital structure. For example, increasing leverage is potentially one of the effective signals that managers can use, as it indicates that the firm will be able to make the interest payments required over the tem of the debt security (Barclay & Smith, 2005).

Managers can also use their dividend policy to send the market signals about the firm's future cash flow. Antoniou, et al. (2008) suggest that an increase in dividends signals increased future earnings which can result in the firm's cost of equity financing being lower, making equity financing a better alternative to debt financing. Increasing leverage serves as a more credible signal of higher future cash flows as managers have more discretion in terms of issuing dividends, they can reduce or decide to not issue dividends during periods of financial distress. Whereas, with debt they are obligated to make interest payments. Antoniou, et al. (2008) found evidence that supports the signalling theory, they found an inverse relationship between leverage and dividends in the United States of America, which is in support of the view that dividend payments convey a message about the firm's future earnings, the equity cost of capital is lower for high dividend paying firms which results in equity financing being a better option for these firms.

2.2.6. Contracting cost theory

The contracting cost theory can be traced back to the work of Myers (1977), he suggested that a firm that is finding it difficult to service its debt may have to forgo valuable investment opportunties leading to the underinvestment problem. The contracting cost theory posits that firms whose value is mainly made up of the present value of intangible investment opportunities are likely to have lower debt ratios. To mitigate the adverse effects of the underinvestment problem, these firms follow a conservative debt issuing approach (Chipeta & Deressa, 2016).

The contracting cost theory suggets that the potential underinvestment problem related to issuing debt increases as growth opportunities increase, resulting in firms having lower leverage (Barclay & Smith, 2005). Numerous studies have tested the contracting cost theory, some studies found a positive correlation between growth opportunites and leverage, while other studies found a negative correlation. According to Chipeta and Deressa (2016), the results presented by studies that tested the contracting cost theory using different growth proxies are dependent on the growth

proxy utilised. Among other scholars, Barclay and Smith (2005) found empirical evidence in support of the contracting cost theory, while Graham and Harvey (2001) did not find evidence that supports the contracting cost theory.

2.3. Empirical evidence on capital structure and its determinants

The independent variables that are utilised in this study are firm characteristics that have been identified by empirical literature as factors that are likely to influence the capital structure of a firm. Therefore, each independent variable is expected to have an impact on the capital structure of the JSE listed firms that are examined in this study. Empirical evidence on capital structure and each determinant has been briefly discussed below.

2.3.1. Capital structure

The capital structure of a firm refers to the amount of debt compared to equity that a firm chooses to utilise for financing its activities. Previous studies have shown that there are benefits and costs that must be considered when making financing decisions. Appropriately balancing these benefits and costs can assist a firm in achieving an optimal capital structure which is why firms are said to have target capital structures which they gradually adjust towards. It is important to note that firms may not always be operating at their targeted leverage levels as various shocks can shift firms away from their target capital structure (Ramjee & Gwatidzo, 2012).

The capital structure of a firm can be measured using different financial ratios, which can be based on the book value or market value of equity. According to De Vries and Erasmus (2010), these leverage measures both have their own strengths and weaknesses. Market value represents the primary input when calculating the weighted average cost of capital and it better depicts the ownership between debt holders and equity holders (Modigliani & Miller, 1958). While book value is the value of a firm according to its balance sheet, it shows the real worth of a firm's assets. According to Harris and Raviv (1991), each measure can generate different results leading to different interpretations.

2.3.2. Business risk

Business risk refers to the possibility of a firm's operations or the environment that it operates in causing it to generate earnings that are lower than expected. It measures the effects of market uncertainties on the firm's earning ability. High risk firms usually have volatile cash flows and high financial distress costs, the trade-off theory predicts that risky firms use less debt (Chang, et al., 2014). Contrary to this, the pecking order theory predicts that high risk firms have more debt if firms with volatile stocks have severe adverse selection. The results presented by Frank and Goyal (2009) support the trade-off theory as they reported a negative relationship between firm risk and leverage. Mouton and Smith (2016) examined firm-specific determinants of the capital structure of the top 40 JSE listed firms, also reported an inverse relationship between business risk and capital structure. According to the authors, this negative relationship shows that a higher volatility in earnings results in a higher probability of bankruptcy due to difficulties in meeting debt obligations.

2.3.3. Profitability

Profitability refers to the ability of a firm to generate income relative to its assets, it is measured using the return on assets ratio (De Vries & Erasmus, 2010). Chipeta and Deressa (2016) conducted a study on firms in Sub-Saharan Africa and found firm profitability to be the most significant predictor of capital structure for these firms. According to Frank and Goyal (2009) the tax and bankcruptcy costs perspective predicts that profitable firms use more debt, this is because firms with high profitability face lower financial distress costs and find interest tax shields more valuable. The static trade-off theory posits that profitable firms borrow more as they have a greater need to shield their income from taxation. While the pecking order theory suggests that profitable firms have less leverage over time as they use internal funds to support their investment opportunties and are less likely to seek debt financing (Chang, et al., 2014). Empirical literature in the United States supports the notion that leverage is negatively related to profitability (Harris & Raviv, 1991).

2.3.4. Firm size

Firm size refers to how big or small the firm is. Large firms that are well diversified face lower default risk and older firms that are reputable face lower debt related agency costs. Thus, the trade-off theory predicts that large and mature firms tend to have higher leverage compared to small

firms (Frank & Goyal, 2009). The pecking order theory predicts a negative relationship between firm size and leverage (Mouton & Smith, 2016). This is likely because the pecking order theory asserts that firms prefer using internal financing over external financing and large firms usually have a better pool of internal funds compared to small firms. Several studies have reported a positive relationship between firm size and leverage, lending support to the trade-off theory (see Chang, et al., 2014; Rajan & Zingales, 1995). Similarly, studies from African countries report a significant positive relationship between firm size and leverage (see Chipeta & Deressa, 2016; Gwatidzo & Ojah, 2009)

2.3.5. Growth

This refers to the firm's growth prospects. There are theoretical disagreements regarding the relationship between growth opportunities and leverage. The trade-off theory suggests that leverage has an inverse relationship with growth opportunities (Chang, et al., 2014). This implies that firms with high growth opportunities have lower leverage. Contrary to this, Ramjee and Gwatidzo (2012) investigated the capital structure determinants of JSE listed firms for the 1998 to 2008 period and found a positive relationship between growth and leverage. They also found that fast growing firms prefer debt to equity when raising capital.

2.3.6. Asset tangibility

The asset structure of a firm comprises of tangible and intangible assets; it is defined as the ratio of a firm's fixed assets divided by the firm's total assets (De Vries & Erasmus, 2010). In the results presented by Mouton and Smith (2016), asset tangibility indicated a significant positive relationship with the debt-to-equity ratio which suggests that the JSE top 40 companies they examined will increase their debt levels as their asset tangibilty increases. Ramjee and Gwatidzo (2012) also found that firms with a larger propotion of tangible assets have higher debt ratios.

Table 2.1: A summary of the relationship between capital structure and its determinants

Variable/Determinant	Proposed Relationship	Sources
Capital structure	The trade-off theory suggests that an optimal capital structure that maximises a firm's value exists, while the pecking order theory asserts that an optimal capital structure does not exist.	(De Vries & Erasmus, 2010; Graham and Harvey, 2001; Myers and Majluf, 1984)
Business risk	High risk firms tend to have volatile cash flows and high financial distress costs. The trade-off theory proposes an inverse relationship between business risk and the capital structure of a firm.	(Chang, et al., 2014; Frank & Goyal, 2009; Mouton & Smith, 2016).
Profitability	The trade-off theory posits that profitable firms prefer debt financing due to the tax shield it offers. The pecking order theory suggests that profitable firms prefer to utilise internal funds, so they have less leverage over time.	(Chang, et al., 2014; Myers, 2001)
Firm size	Larger firms usually have stable cash flows which leads to a low possibility of financial distress and better credit ratings thus, they have improved borrowing capacity. The trade-off theory proposes a positive relationship between firm size and profitability, in contrast the	(Frank & Goyal, 2009; Mouton & Smith, 2016)

	pecking order theory proposes a negative relationship.	
Growth	Growth firms usually need capital to finance their growth opportunities, the trade-off theory suggests that firms that are in their growth phase borrow less due to the cost of financial distress. Whereas the pecking order theory proposes a positive relationship between growth and leverage.	(Chang, et al., 2014; Mouton & Smith, 2016; Ramjee & Gwatidzo, 2012)
Asset tangibility	Firms with tangible assets are expected to borrow more, the trade-off theory posits a positive relationship between asset tangibility and leverage.	(Chipeta & Deressa, 2016; Mouton & Smith, 2016)

Source: Author's compilation

2.4. Evidence of the impact of a crisis on a firm's capital structure

A firm's financing decisions become more difficult during times of economic turmoil, where the economic environment in which the firm operates proves to be unstable. Even more so when the global economy is unstable (has high levels of uncertainty) which was the case during the outbreak of Covid-19 and the 2008 global financial crisis. Mouton and Smith (2016) investigated the impact that the 2008 global financial crisis had on the capital structure of the top 40 JSE listed companies. They found that the 2008 global financial crisis did not have a significant impact on the capital structures of the sample companies. However, it seems to have had an impact on the identified determinants of capital structure as risk, asset tangibility, and profitability were found to be the most significant determinants of capital structure prior to the 2008 financial crisis. Whereas post the 2008 global financial crisis, profitability became insignificant while risk and asset tangibility proved to have a stronger influence on capital structure (Mouton & Smith, 2016).

Fosberg (2013) conducted a study on the effect of the 2008 global financial crisis on short-term debt financing and the results of the study showed that the financial crisis resulted in firms increasing their short-term debt from 1.3% of assets in 2006 to 2.2% in 2008. However, this increase in short-term debt financing was reversed in 2009 which suggests that the increase in short-term debt financing was not necessarily desired as it was reversed as soon as the financial crisis subsided. The analysis conducted by Fosberg (2013) suggested that majority of the short-term debt financing increase was caused by the financial crisis, this is likely due to the financial situation that most firms found themselves in.

Demirguc-Kunt, Martinez-Peria and Tressel (2015) examined how firms' capital stuctures evolved during the global financial crisis across 79 countries and found that firm leverage and debt maturity decreased in advanced and developing contries, even in countries that did not experience the crisis. The deleveraging and decrease in maturity were significant for private firms. The significance of the results of the study differed depending on the countries' legal systems , information sharing mechanisms and amongst listed and unlisted firms. This shows that besides firm specific characteristics there are other factors that may impact the capital structure of a firm which include country specific factors such as a country's legal system and how developed the country is.

The Covid-19 pandemic resulted in high levels of uncertainty in the global economy and is expected to have had an impact on the capital structure of firms as many countries witnessed drastic decreases in interest rates in a short period of time, making debt more affordable. Haque and Varghese (2021) studied the impact of Covid-19 on the capital structure of publicly listed United States firms, their estimates propose that leverage declined by 5.3% from the pre-shock mean of 19.6%, while debt maturity moderately increased. This de-leveraging effect was found to be more evident in firms that are exposed to significant rollover risk pre-Covid while firms who were most vulnerable to social distancing mantained their leverage ratios and thus became over-leveraged (Haque & Varghese, 2021).

Since interest rates were at an all-time low during the highly volatile period of the Covid-19 pandemic, the expectation is that firms would lean more towards debt financing during the

pandemic as the equities market experienced extreme volatility. The equities market was one of the hardest hit during the pandemic, most firms saw their share price drop to low levels.

2.5. Conclusion

This chapter reviewed the extensive literature of capital structure and its theories, it discussed the empirical evidence on the relationship between capital structure and its determinants. It also briefly discussed how crises impact the capital structure of a firm. It is evident that previous studies have found evidence that supports or contradicts the theories of capital structure depending on the country and market environment that the studies were conducted in. Although the trade-off theory and the pecking order theory may provide opposing predictions on how capital structure decisions are made, it is not uncommon to find evidence supporting both theories for the same data set (Chipeta & Deressa, 2016). For instance, Ramjee and Gwatidzo (2012) found evidence that indicates that the capital structure decisions of South African listed firms follow both the trade-off theory and the pecking order theory. Their results suggest that, in support of the trade-off theory a target debt-to-equity ratio does exist for South African firms and inline with the pecking order theory when South African firms require financing, they prefer internal to external sources of finance. It is evident from the body of existing literature that the theories of capital structure are important in explaining the capital structure decisions of firms. It is also clear that the firm characteristics that have been identified by previous studies have a relationship with the firm's capital structure and can be used to determine the capital structure of a firm. The next chapter discusses the data and research methodology of this study.

CHAPTER 3: DATA AND RESEARCH METHODOLOGY

3.1. Introduction

This chapter focuses on the data and methodology used in this study. Section 3.2. describes the data used and how it was collected, Section 3.3. defines the dependent and independent variables utilised in this study and Section 3.4. shows the estimation model. Section 3.5. briefly discusses the specification tests and Section 3.6. concludes this chapter.

3.2. Data

Majority of the studies previously conducted on the determinants of capital structure and the impact of the 2008 global financial crisis on capital structure focused on non-financial firms, this is likely because financial firms are prone to regulation that influences their capital structure (Chipeta & Deressa, 2016), and in addition to available internal and external financing options, they also receive funds through deposits, investments, and premiums. For these reasons, this study also focuses on non-financial firms, specifically firms listed on the JSE. The financial data of these firms is obtained from the firms' financial statements on Bloomberg, and the study focuses on the January 2005 to June 2022 period. This period was selected with the intention of examining a period that includes the 2008 global financial crisis and the Covid-19 outbreak period, making it possible to compare the effects of the Covid-19 pandemic to that of the 2008 global financial crisis. The study examines data from 109 JSE listed firms across different industries over 18 years, the list of firms and industries examined in this study has been included in Appendix A.

As this study also aims to determine the relationship between company-related factors and a firm's capital structure, it is important to analyse factors that are likely to influence the capital structure decisions of a firm. Empirical literature has identified four company-related factors that have shown to be consistently correlated with capital structure, these factors are firm size, growth prospects, profitability, and asset tangibility (Chang, et al., 2014; Frank & Goyal, 2009; Rajan & Zingales, 1995). In line with empirical literature, the factors that are examined in this study are business risk, firm size, profitability, growth, and asset tangibility.

3.3. Variables

The dependent variable is the capital structure as proxied by the debt ratio while the independent variables are the selected factors; business risk, firm size, profitability, growth, and asset tangibility as proxied by the relevant financial ratios. Dummy variables for the Covid-19 pandemic and the 2008 global financial crisis are utilised. These dummy variables make it easier to control for the effect of the Covid-19 pandemic and the 2008 global financial crisis on the capital structure decisions of the firms examined in this study. The global financial crisis has two dummy variables as it was broken down into two different periods, GFC 1 which covers the 2008-2009 period and GFC 2 which covers the 2008-2010 period. This was done to cater for the spillover effects that the global financial crisis might have had on the global economy in 2010.

Since Covid-19 was a health crisis that led to an increased utilisation of the virtual world, to see how it impacted the capital structure of firms in the healthcare industry and firms in the technology industry, dummy variables have been utilised to isolate firms in these industries and study the crisis' impact on their capital structure. Table 3.1 below shows the dependent and independent variables that are used in this study together with the proxy/measure for each variable.

Table 3.1: Dependent and independent variables utilised in this study

Variable	Proxy/Measure	Sources
Dependent variable:		
Capital structure	Total debt ratio= total debt / total assets Long term debt ratio = long-term debt / total assets	(Chipeta & Deressa, 2016)
Independent variables:		
Business risk	Standard deviation of EBIT / total assets	(Chipeta & Deressa, 2016; Mouton & Smith, 2016)
Profitability	EBIT / total assets	(Chipeta & Deressa, 2016; Mouton & Smith, 2016)
Firm size	Natural logarithm of total assets	(Chipeta & Deressa, 2016; Frank & Goyal, 2009)
Growth	Annual growth in total assets	(Chipeta & Deressa, 2016)

Asset tangibility	Fixed assets / total assets	(De Vries & Erasmus, 2010 and Mouton & Smith, 2016)
Dummy variable for the Covid-19 pandemic	Takes a value of 1 for the pandemic period (2020-2022) and 0 for the pre-Covid period (2005-2019).	Authors' compilation
Dummy variable for the 2008 global financial crisis	GFC 1: Takes a value of 1 for the crisis period (2008 – 2009) and 0 for the pre-crisis and post-crisis period (2005-2007; 2010-2022). GFC 2: Takes a value of 1 for the crisis period (2008 – 2010) and 0 for the pre-crisis and post-crisis period (2005-2007; 2011-2022).	Authors' compilation
Industry dummy variables	covid_health: Takes a value of 1 if the firm is in the healthcare industry otherwise 0. covid_tech: Takes a value of 1 if the firm is in the technology industry otherwise 0.	Authors' compilation

Source: Author's compilation

3.4. Estimation model

Various estimation techniques have been used in finance literature and amongst these are panel data estimation techniques (see Chipeta & Deressa, 2016; Mouton & Smith, 2016). This study utilises panel data estimation models for the following reasons: Firtslty, panel data models account for cross-sectional and time series data concurrently. Secondly, panel data models control for firm-specific heterogeneity. There are several panel data estimation models which include the fixed effects model (FEM), the random effects model (REM), the ordinary least squares model (OLS) and the generalised method of moments (GMM).

Although these models can be used for data analysis, some of the models have shortcomings that make them unsuitable for this study. For example, with the FEM it is impossible to estimate the

effect of variables that do not vary over time (Kohler & Kreuter, 2009). The REM has a bias problem that can be introduced by partial pooling (Clark & Linzer, 2015), while OLS requires a large data set to obtain reliable results. The Blundell and Bond (1998) system GMM was chosen as the preferred estimation model for this study as it is a dynamic panel data model that controls for endogeneity. According to Chipeta and Deressa (2016), GMM estimators offer some advantages over linear regression models, they control for endogeneity and account for autocorrelation in the presence of a lagged dependent variable. GMM controls for endogeneity by internally transforming the data, this internal transformation entails substracting a variable's past value from its present value (Ullah, Akhtar, & Zaefarian, 2018). Compared to the Arellano and Bond (1991) difference GMM estimator, the system GMM estimator is more efficient as it reduces the loss of valuable information arising from transformations by estimating the differenced and level equations simultaneously (Chipeta & Deressa, 2016).

Following Mouton and Smith (2016), the basic estimation model for the panel regression utilised is stated as follows:

$$y_{i,t} = \alpha + \beta X'_{i,t} + cr_t + \mu_{i,t} \quad (1)$$

Where,

$y =$ the dependent variable (firm leverage/capital structure as proxied by the debt ratio)

$i =$ an individual firm

$t =$ time

$\alpha =$ the intercept term

$\beta =$ vector of parameters to be estimated for the independent variables

$X =$ the independent variables (business risk, profitability, firm size, growth, and asset tangibility)

$cr =$ crises dummy variable (controls for the effects of the Covid-19 pandemic and the 2008 global financial crisis)

$\mu =$ the error term

The dependent and independent variables have been discussed in Section 3.3 of the study and the proxies utilised for the variables have been defined in Table 3.1.

To determine how quickly firms adjusted their capital towards their target leverage following the 2008 global financial crisis and the Covid-19 pandemic and how the crisis periods impacted the capital structure of firms in the healthcare industry and the technology industry the below specification is utilised:

$$y_{i,t} = \alpha + (1-\delta)y_{i,t-1} + \beta X'_{i,t} + indus_t + cr_t + \mu_{i,t} \quad (2)$$

Where,

$y =$ the dependent variable (firm leverage/capital structure as proxied by the debt ratio) and $(1-\delta)$ is the coefficient on the lagged dependent variable (firm leverage) which ranges between zero and one and measures the adjustment speed.

$i =$ an individual firm

$t =$ time

$\alpha =$ the intercept term

$\beta =$ vector of parameters to be estimated for the independent variables

$X =$ the independent variables (business risk, profitability, firm size, growth, and asset tangibility)

$indus =$ industry dummy variable (specifically for the healthcare industry and the technology industry)

$cr =$ crises dummy variable (controls for the effects of the Covid-19 pandemic and the 2008 global financial crisis)

$\mu =$ the error term

3.5. Specification tests

When using the GMM it is important to check for autocorrelation and instrument validity, this is to ensure that there is no second order autocorrelation and that the instruments used in the model are valid. As a result, to check for autocorrelation and instrument validity, the first order and second order autocorrelation as well as the sargan test specification tests were run. For the autocorrelation test, a p-value that is greater than 10% shows that there is no autocorrelation and for the sargan test, a p-value that is greater than 10% shows that the instruments are valid.

Testing for multicollinearity which is the existence of a perfectly linear relationship between the independent variables is also important. If the correlation coefficient of two variables is close to one then these variables are considered to be highly correlated and multicollinearity exists (Barton & Peat, 2014). The existence of multicollinearity is a problem as it can result in less reliable statistical inferences. Heterogeneity which indicates that there is variability in the data used can be detected using Cochran's Q test which is based on a chi-squared distribution. The results of Cochran's Q test can be interpreted by interpreting the p-value, a p-value that is less than 0.10 indicates that there is statistically significant heterogeneity (Pereira, Patsopoulos, Salanti, & Ioannidis, 2010). The Hausman test can be utilised to test for endogeneity, which occurs when an explanatory variable is correlated with the error term. A p-value that is greater than 0.05 suggests that endogeneity does not exist.

3.6. Conclusion

This chapter has described the data and variables utilised in this study. It has also explained the estimation model and the justification for the choice of model. The next chapter provides an analysis of the data and discusses the results.

CHAPTER 4: DATA ANALYSIS AND RESULTS DISCUSSION

4.1. Introduction

This chapter presents the results of this study. Section 4.2. provides an analysis of the descriptive statistics of the data utilised in the study, while Section 4.3. shows and interprets the correlation matrix of the dependent and independent variables. Section 4.4. presents the regression results and Section 4.5. analyses the impact of Covid-19 on the capital structure of firms in the healthcare industry and the technology industry. Section 4.6. concludes this chapter.

4.2. Descriptive statistics

Table 4.1 below shows the descriptive statistics of the variables utilised in this study. This includes the average, standard deviation, minimum and maximum values of the dependent and independent variables. On average, the leverage of the JSE listed firms as proxied by the total debt ratio is 0.22 versus 0.15 when proxied by the long-term debt ratio. The average debt ratio of these firms is low, regardless of the leverage measure used, this shows that on average these firms had more assets than liabilities during the period under review. However, the maximum values of both the debt ratios used in this study is close to 1 (0.94) and above 1 (1.03) which implies that the firms also had a high dependence on debt at some point. A high debt ratio can be seen as a sign of financial weakness as it indicates a high dependence on debt.

Table 4.1: Descriptive statistics

Variable	Mean	Std. dev.	Min	Max
Total debt ratio	0.2215	0.1606	0	1.0285
Long-term debt ratio	0.1523	0.1423	0	0.9437
Business risk	0.2082	1.2453	-0.1037	38.1736
Profitability	0.1157	0.1158	-0.7202	1.4948
Firm size	9.3650	1.5095	0.5525	13.0701
Growth	0.2553	3.7432	-0.8423	147.8938
Asset tangibility	0.4269	0.2648	0	0.9926
Covid-19 pandemic	0.1779	0.3826	0	1
GFC 1	0.0949	0.2931	0	1
GFC 2	0.1442	0.3514	0	1
No. of observations	1,602			

The average size of the firms as measured by the natural logarithm of total assets is 9.37 while the maximum is 13.07. On average, the JSE listed firms had an annual growth rate of 25.5% in their total assets, the average asset tangibility of the firms is 42.69% of total assets. This implies that on average, 42.69% of the firm's assets was made up of fixed assets. The mean (0.12) and maximum (1.49) values of the profitability variable show that the firms were on average profitable during the period under review, while the standard deviation of 0.12 indicates that there was low variability in the firm's profitability.

4.3. Correlation matrix

A correlation matrix which shows the correlation coefficients of the dependent and independent variables is presented in Table 4.2 below. The purpose of this correlation matrix is to determine if multicollinearity exists, it is to find out if the independent variables are correlated. A high correlation between the independent variables indicates that multicollinearity exists which is a problem as it can result in less reliable statistical inferences.

Table 4.2: Correlation matrix

	Total debt ratio	Long-term debt ratio	Business risk	Profitability	Firm size	Growth	Asset tangibility	Covid-19 pandemic	GFC 1	GFC 2
Total debt ratio	1.0000									
Long-term debt ratio	0.8649	1.0000								
Business risk	-0.0655	-0.0736	1.0000							
Profitability	-0.2311	-0.2260	0.0936	1.0000						
Firm size	0.1548	0.1986	-0.1639	-0.1172	1.0000					
Growth	-0.0251	-0.0253	-0.0029	-0.0084	-0.0665	1.0000				
Asset tangibility	0.2108	0.2260	-0.0296**	-0.1230	0.0068	-0.0157**	1.0000			
Covid-19 pandemic	0.1472	0.1740	-0.0567	-0.0869	0.1453	-0.0226**	0.0169	1.0000		
GFC 1	-0.0379**	-0.0402**	0.0421**	0.1211	-0.0748	-0.0065	-0.0384**	-0.1506	1.0000	
GFC 2	-0.0611	-0.0571	0.0475**	0.1380	-0.0883	-0.0093	-0.0368**	-0.1909	0.7888	1.0000

** = significant at the 5% level

The correlation matrix can also be used to highlight the correlation between the dependent and independent variables. The correlation coefficients presented in Table 4.2 indicate that business risk, profitability and growth are negatively correlated with leverage, while firm size and asset tangibility are positively correlated with leverage. According to Barton and Peat (2014), if the correlation coefficients between the independent variables is greater than 0.8 then multicollinearity is a problem. As presented in Table 4.2, all the independent variable pairs have a correlation coefficient that is less than 0.8 which means multicollinearity is not a problem and the statistical inferences of this study are reliable.

4.4. Regression results

This section presents and discusses the results of this study. Section 4.4.1. presents the results with the total debt ratio as a proxy for leverage, while Section 4.4.2. presents the results with the long-term debt ratio as a proxy for leverage. Furthermore, the results of the two global financial crisis periods utilised in this study are reported separately.

4.4.1. An analysis of the results with the total debt ratio as a proxy for leverage

As presented in Table 4.3, the regression model utilised is a good fit as the p-value is statistically significant at the 1% level. The lagged version of the dependent variable (total debt ratio) has a coefficient of 0.57 and is statistically significant at the 1% level, which implies that there are statistically significant costs of adjusting capital structure. This coefficient is a measure of the adjustment costs and if it is closer to 1 then it means that the adjustment costs are high whereas, if it is closer to zero the adjustment costs are low. In this case, the adjustments costs are slightly high. The average adjustment speed can be derived using this coefficient, one minus the coefficient value equals the average adjustment speed at which the firms adjust to their target capital structure (i.e., 1 - 0.57 = 0.43). Therefore, in this case the average adjustment speed is 43% which is below 50%, this indicates that the firms do not adjust towards their target capital structure fast.

The capital structure coefficients are statistically significant at the 1% level regardless of the capital structure proxy used or the global financial crisis period examined. These results show that there are adjustment costs which implies that firms have a target capital structure that they gradually

adjust towards and there are costs attached to these adjustments, this supports the trade-off theory which suggests that firms have an optimal capital structure that they gradually move towards.

Table 4.3: Capital structure and the independent variables – GFC 1 and GFC 2

	Total debt ratio as a proxy for capital structure – GFC 1	**Total debt ratio as a proxy for capital structure – GFC 2**	**Long-term debt ratio as a proxy for capital structure – GFC 1**	**Long-term debt ratio as a proxy for capital structure – GFC 2**
	(1)	**(2)**	**(3)**	**(4)**
Capital structure	0.5746***	0.5827***	0.5774***	0.5744***
	(0.0755)	(0.0767)	(0.0933)	(0.0893)
Business risk	-0.0011	-0.0008	-0.0004	-0.0004
	(0.0012)	(0.0011)	(0.0012)	(0.0015)
Profitability	-0.1626*	-0.1626*	-0.1841**	-0.1874**
	(0.0904)	(0.0960)	(0.0934)	(0.0958)
Firm size	0.0344***	0.0349***	0.0372***	0.0367***
	(0.0097)	(0.0099)	(0.0090)	(0.0090)
Growth	0.0003	0.0003	0.0006*	0.0006
	(0.0005)	(0.0005)	(0.0003)	(0.0003)
Asset tangibility	0.1077	0.0951	0.1405**	0.1323**
	(0.0967)	(0.1021)	(0.0653)	(0.0627)
Covid-19 pandemic	0.0007	0.0005	0.0043	0.0064
	(0.0089)	(0.0090)	(0.0085)	(0.0085)
GFC 1 or GFC 2	0.0252***	0.0136**	0.0226***	0.0116*
	(0.0082)	(0.0068)	(0.0068)	(0.0064)
_cons	-0.2652	-0.2653	-0.3289	-0.3202
	(0.1205)	(0.1225)	(0.0965)	(0.0950)
No. of observations	1,493	1,493	1,493	1,493
Wald statistic	0.0000	0.0000	0.0000	0.0000
First order autocorrelation	0.0001	0.0000	0.0000	0.0000
Second order autocorrelation	0.7714	0.7869	0.9377	0.9747
Sargan	0.1466	0.0893	0.1687	0.2373

Significance level: *=10%, **=5%, ***=1%
The WC robust standard error is reported in parentheses

The results of the specification tests which have been reported in Table 4.3 show that there is first order autocorrelation which is expected because of the GMM model and its transformations however, there is no second order autocorrelation. Therefore, we fail to reject the null hypothesis that there is no autocorrelation. The results of the sargan tests show that the instruments that are being utilised are valid. Thus, we fail to reject the null hypothesis that overidentifying restrictions are valid. Both specification tests have been met.

The results presented in Table 4.3 show that business risk has a negative relationship with capital structure which is in support of the trade-off theory and is in line with the findings of prior studies (see Frank & Goyal, 2009; Mouton & Smith, 2016). Although the relationship is not statistically significant, it shows that a higher volatility in income increases the probability of bankruptcy due to difficulties in honoring debt obligations (Mouton & Smith, 2016). The relationship between profitability and capital structure is negative and statistically signficant, this is in line with most studies that show that profitable firms tend to borrow the least (Jarallah, et al., 2019; Rajan & Zingales, 1995; Ramjee & Gwatidzo, 2012). This negative relationship supports the pecking order theory, as it suggests that profitable firms use internal finance and only at the near exhaustion of internal funds will they turn to debt financing.

Firm size and capital structure have a positive relationship that is statistically significant at the 1% level, this supports the trade-off theory which posists that larger firms tend to have higher leverage. This is consistent with studies that have reported a positive relationship between firm size and leverage (see Chipeta & Deressa, 2016; Gwatidzo & Ojah, 2009). The relationship between growth and capital structure is positive however, it is not statistically significant when the total debt ratio is used as a proxy for capital structure, so is the relationship between asset tangibility and capital structure. The positive relationship between asset tangibility and capital structure supports the trade-off theory. In this case, since the relationship obeserved between business risk, growth, asset tangibility and capital structure is not statistically significant we fail to reject the null hypothesis that business risk, growth and asset tangibility do not significantly affect the capital structure of the firms.

Although the coefficient of the Covid-19 pandemic dummy variable is positive, the p-value shows that the pandemic did not have a statistically significant impact on the firms' capital structure. Contrary to this, the global financial crisis dummy variable is statistically significant, which shows that the global financial crisis had a significant impact on the firms' capital structure. This means that the JSE listed firms examined in this study reacted differently to the health crisis than they did to the financial crsis. As opposed to the health crisis, the positive and statistically significant relationship between GFC 1, GFC 2 and capital structure implies that the financial crisis resulted

in increased leverage. This is likely because of the significant negative reaction of share prices to the external shock of the global financial crisis, as share prices went down drastically during the financial crisis (Steytler & Powell, 2010).

The second column of Table 4.3 shows the results of the second global financial crisis period (2008-2010) with the total debt ratio as a proxy for capital structure. The results are largely similar to the results reported for the first period of the financial crisis (2008-2009). The global financial crisis still has a statistically significant impact on the capital structure of the firms, the coefficient remains positive indicating that the global financial crisis resulted in increased leverage. Even for the 2008 to 2010 period, firms seem to have reacted differently to the financial crisis versus the health crisis in terms of adjusting their capital structure, the Covid-19 variable is still not statistically significant. This is posibbly because firms might have had cash reserves to deal with the financial difficulties presented by the Covid-19 pandemic. Therefore, they did not have to borrow more during the Covid-19 pandemic.

Additionally, firms might have realised the importance of risk management post the 2008 global financial crisis and might have implemented efficient risk management systems and strategies post the financial crisis that helped them mitigate the impact of the health crisis. Overall, we fail to reject the null hypothesis that Covid-19 does not have a significant impact on capital structure while we reject the null hypothesis that the 2008 global financial crisis does not have a significant impact on capital structure.

4.4.2. An analysis of the results with the long-term debt ratio as a proxy for leverage

Table 4.3 also shows the results of the long-term debt ratio as a proxy for capital structure. The regression model utilised is a good fit as the p-value is statistically significant at the 1% level. The results of the specification tests showed that there is no second order autocorrelation, and that the instruments are valid. The lagged version of the dependent variable (long-term debt ratio) has a coefficient of 0.58 and is statistically significant at the 1% level, which implies that there are statistically significant costs of adjusting capital structure. The average adjustment speed is 42% which indicates that the firms do not adjust towards their target capital structure fast. These results

support the trade-off theory which posits that firms have a target capital structure which maximises firm value and they adjust towards this target capital structure gradually.

As per the results presented in Table 4.3, the relationship that the explanatory variables have with capital structure is the same whether the total debt ratio or the long-term debt ratio is used as a proxy for capital structure. However, the statistical significance of some of the variables has changed. The coefficients of business risk and profitability suggest a negative relationship between the variables and capital structure. Business risk remains insignificant while profitability remains a significant determinant of capital structure. Therefore, we fail to reject the null hypothesis that business risk does not significantly impact capital structure, while we reject the null hypothesis that profitability does not significantly impact the capital structure of the firms, as the results suggest otherwise.

The negative relationship between business risk and capital structure supports the trade-off theory while the negative relationship between profitability and capital structure contradicts the trade-off theory. The trade-off theory suggests that higher profitability leads to higher leverage due to the tax benefit that debt financing provides however, the results of this study suggest that more profitable firms borrow less. Mouton and Smith (2016) also found a negative relationship between business risk, profitability and capital structure.

Firm size, growth and asset tangibility have a statistically significant positive relationship with capital structure. Contrary, to the total debt ratio results, the p-values for growth (0.072) and asset tangibility (0.032) suggest that these variables are significant determinants of capital structure. These results confirm that since the capital structure of a firm can be measured using different ratios, each measure can generate different results and therefore lead to different interpretations as Harris and Raviv (1991) suggested. The results suggest that large firms, growth firms and firms with a high proportion of tangible assets tend to borrow more. The positive relationship observed between firm size, asset tangibility and capital structure supports the trade-off theory, while the positive relationship between growth and capital structure supports the pecking order theory, which suggests that firms that are in their growth phases tend to rely more on external financing as

internal funds are limited. In this instance, we reject the null hypothesis that firm size, growth and asset tangibility do not significantly impact capital structure.

The Covid-19 pandemic variable remains insignificant while the global financial crisis variable still shows that the financial crisis had a positive statistically significant impact on the firms' capital structure. This implies that the JSE listed firms examined in this study did not significantly adjust their capital structure in response to the effects of the health crisis. However, they increased their leverage in response to the external shocks of the financial crisis. This is likely due to the drastic decline in share prices that was experienced during the global financial crisis, firms could not resort to issuing equity to acquire funds as most stocks were undervalued due to the market volatility experienced during that period.

Column 4 of Table 4.3. shows the results of the second global financial crisis period (2008-2010) with the long-term debt ratio as a capital structure proxy. The results are largely consistent with the results reported for the first period of the financial crisis (2008-2009). However, in this case, growth is not a significant capital structure determinant. Thus, in this instance, we fail to reject the null hypothesis that growth does not have a significant impact on capital structure. This is consistent with the results reported by Mouton and Smith (2016) who reported growth as an insignificant determinant of capital structure.

4.5. The impact of Covid-19 on the capital structure of firms in the healthcare industry and the technology industry

Since Covid-19 did not have a statistically significant impact on the JSE listed firms examined in this study when the analysis is conducted on the industries together, a further analysis was done. To further probe Covid-19's impact on the firms' capital structure, firms that are in the healthcare industry and the technology industries were analysed in insolation. To achieve this, dummy variables were created for the two industries and interactions of the industry dummy variables with the Covid-19 pandemic were generated. These two industries were specifically selected because the Covid-19 pandemic was a healthcare crisis therefore, it might have impacted the capital structure of the healthcare industry differently to the other industries. Additionally, because the

pandemic introduced the virtual world as the new norm with most people working from home and resorting to online shopping during lockdown periods, the technology industry might have also adjusted their capital structure to cater for the increased need of their services and support.

The results are presented in the table below, like the previous regressions, the results are presented in a way that shows the two leverage proxies and the two global financial crisis periods utilised in this study separately. Column 1 and 2 of Table 4.4 show the results with the total debt ratio as a proxy for capital structure for GFC 1 and GFC 2, respectively. The p-values for both the covid_health and the covid_tech variables show that Covid-19 did not have a statistically significant impact on the capital structure of firms in the healthcare and technology industries. The global financial crisis variable remains positive and statistically significant, which shows that the firms reacted differently to the health crisis versus the financial crisis. The results imply that there was an increase in leverage during the financial crisis for firms in the healthcare and technology industries.

Table 4.4: Industry specific results - GFC 1 and GFC 2

	Total debt ratio as a proxy for capital structure – GFC 1	**Total debt ratio as a proxy for capital structure – GFC 2**	**Long-term debt ratio as a proxy for capital structure – GFC 1**	**Long-term debt ratio as a proxy for capital structure – GFC 2**
	(1)	**(2)**	**(3)**	**(4)**
Capital structure	0.5632*** (0.0721)	0.5741*** (0.0725)	0.5728*** (0.0909)	0.5749*** (0.0880)
Business risk	-0.0012 (0.0014)	-0.0009 (0.0013)	-0.0005 (0.0013)	-0.0003 (0.0015)
Profitability	-0.1713* (0.0896)	-0.1707* (0.0950)	-0.1871** (0.0894)	-0.1879** (0.0924)
Firm size	0.0340*** (0.0094)	0.0343*** (0.0095)	0.0382*** (0.0086)	0.0383*** (0.0086)
Growth	0.0003 (0.0005)	0.0003 (0.0005)	0.0006* (0.0003)	0.0006* (0.0003)
Asset tangibility	0.1189 (0.0952)	0.1070 (0.0999)	0.1432** (0.0647)	0.1333** (0.0619)
covid_health	0.0188 (0.0315)	0.0178 (0.0332)	0.0143 (0.0354)	0.0132 (0.0350)
covid_tech	0.0053 (0.0178)	0.0034 (0.0190)	-0.0334 (0.0477)	-0.0347 (0.0492)
GFC 1 or GFC 2	0.0248*** (0.0084)	0.01275* (0.0068)	0.0218*** (0.0067)	0.0107* (0.0063)
_cons	-0.2639** (0.1138)	-0.2626** (0.1149)	-0.3383*** (0.0922)	-0.3348*** (0.0911)
No. of observations	1,493	1,493	1,493	1,493
Wald statistic	0.0000	0.0000	0.0000	0.0000

Significance level: *=10%, **=5%, ***=1%
The WC robust standard error is reported in parentheses

The results for the second period of the global financial crisis are consistent with the results reported for the first period. Covid-19 still does not have a statistically significant impact on the capital structure of the firms.

Column 3 and 4 of Table 4.4 show the results with the long-term debt ratio as a proxy for capital structure for GFC 1 and GFC 2, respectively. The results in both instances are consistent with the previous results where the total debt ratio was the capital structure proxy in terms of the impact of the health crisis and the financial crisis on the firms' capital structure. Consistent with the previous results, Covid-19 did not have a statistically significant impact on the capital structure of the two industries even when the dependent variable is changed to the long-term debt ratio. Whereas the

global financial crisis still had a positive and statistically significant impact on the firms' capital structure. Thus, we fail to reject the null hypothesis that Covid-19 did not have a significant impact on capital structure, while we reject the null hypothesis that the global financial crisis did not have a significant impact on the capital structure of the firms.

4.6. Conclusion

This chapter has provided an analysis of the data utilised in this study, it has also presented and discussed the regression results. It is evident from the results presented in this chapter that the JSE listed firms examined in this study reacted differently to the Covid-19 pandemic versus the global financial crisis. Regardless of the dependent variable used, Covid-19 did not have a statistically significant impact on the capital structure of the firms. Whereas the global financial crisis had a statistically significant impact on the capital structure of the firms for both periods of the financial crisis used and both capital structure proxies. The statistical significance of the growth and asset tangibility explanatory variables varied depending on the capital structure proxy used. The next chapter provides a summary of this study, notes the limitations, provides recommendations, and concludes the study.

CHAPTER 5: CONCLUSION

5.1. Summary

Various studies have examined country specific and industry specific determinants of capital structure, but a limited number of studies have investigated the impact of crises on capital structure, specifically in the African context. This study contributes to the capital structure literature by analysing the impact of the Covid-19 pandemic on the capital structure of JSE listed non-financial firms versus the impact of the 2008 global financial crisis. In addition to this, the study determines the relationship between capital structure and fundamental firm factors (business risk, profitability, firm size, growth, and asset tangibility). The study focuses on JSE listed non-financial firms, the financial data of these firms for the 2005 to 2022 period is extracted from Bloomberg and dynamic panel data regression models are utilised to analyse the data.

The main objective of this study was to conduct a comparative analysis of the impact of Covid-19 and the 2008 global financial crisis on the capital structure of JSE listed non-financial firms. The results of the study showed that the firms examined in this study reacted differently to the health crisis and the financial crisis in terms of adjusting their capital structure. Covid-19 did not have a statistically significant impact on the firms' capital structure while the global financial crisis had a statistically significant impact regardless of the capital structure proxy utilised or the global financial crisis period analysed. This might be due to firms being more prepared to deal with a global crisis in terms of resources such as risk management teams, risk systems and capital management structures after having to deal with the global financial crisis in 2008.

Additionally, some firms might have had cash reserves or internal finance to deal with the financial difficulties that came with Covid-19 therefore, not having to significantly adjust their leverage. Firms might have also utilised lessons learnt during the 2008 global financial crisis to devise effective strategies to deal with the financial effects of the Covid-19 pandemic. Since most firms implemented working from home for their employees, this might have assisted in decreasing capital-intensive costs for the firms

5.2. Limitations of the study

It is difficult to obtain the financial data of firms that are not listed on the JSE as private firms are not legally obligated to make their financial data publicly available. As a result, the conclusions of this study are limited to the inclusion of publicly listed firms only. Although a vast number of variables may affect a firm's capital structure decisions, it is difficult to identify all these variables and have them included in one study. Therefore, this study is limited to the analysis/inclusion of a few variables. The firm characteristics that are analysed in this study are based on previous capital structure research. Lastly, post-Covid data is limited, as the impact was mostly felt in 2020 with spillover effects into 2021 and 2022.

5.3. Recommendations

The results of this study are useful to firm managers as the results provide insights on determinants of a firm's capital structure, highlighting factors that firm managers need pay attention to when making financing decisions. Managers can therefore utilise the findings of this study as a guide when identifying factors that influence their firm's capital structure. Furthermore, the results of this study show how crises impact the capital structure of firms which might be useful in helping firms navigate and survive crisis periods by appropriately adjusting their capital structures during these periods. The methodology and findings of this study can also be utilised to determine if the capital structure of a company is changing and to identify the determinants of the change.

5.4. Conclusion

The results of this study have shown that the company related determinants of capital structure that have been identified by previous studies (Chang, et al., 2014; Frank & Goyal, 2009; Mouton & Smith, 2016) indeed have a relationship with capital structure and therefore have an impact on a company's capital structure decisions. The results indicate that the JSE listed firms examined in this study depict a negative relationship between the firms' capital structure and the business risk and profitability explanatory variables, this is consistent with the findings of Mouton and Smith (2016). This negative relationship implies that when business risk and profitability increase, these JSE listed firms will decrease their leverage.

Firm size, growth and asset tangibility were found to have a positive relationship with capital structure for the JSE listed non-financial firms, with firm size being consistently statistically significant, while growth and asset tangibility had varying statistical significance depending on the capital structure proxy utilised. This positive relationship indicates that when firm size, growth and asset tangibility increase, the firms will increase their leverage. Overall, the study found evidence in support of both the trade-off theory and the pecking order theory, this is consistent with the findings of Ramjee and Gwatidzo (2012) that suggest that the capital structure decisions of South African listed firms follow both the trade-off theory and the pecking order theory. According to Chipeta and Deressa (2016), it is not uncommon to find evidence supporting both theories for the same data set.

In terms of the impact of crises on capital structure, this study found that the 2008 global financial crisis had a statistically significant impact on the capital structure of the JSE listed non-financial firms, while Covid-19 did not have a statistically significant impact. Even when analysing firms in the healthcare industry and the technology industry separately, Covid-19 was not found to be statistically significant. This implies that the JSE listed firms examined in this study reacted differently to the external shocks of the health crisis versus that of the financial crisis. Further research that analyses a longer post-Covid period can be conducted to further analyse its impact on capital structure and a similar study that focuses on financial firms can also be conducted in future.

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APPENDICES

Appendix A: List of JSE listed firms examined in this study

Share Code	Industry Name	Subsector Name
ARI	Basic Materials	General Mining
THA	Basic Materials	General Mining
ADH	Consumer Discretionary	Education Services
RBX	Industrials	Construction
GND	Industrials	Transportation Services
MUR	Industrials	Engineering and Contracting Services
MTH	Consumer Discretionary	Specialty Retailers
PAN	Basic Materials	Gold Mining
BID	Consumer Staples	Food Retailers and Wholesalers
KRO	Technology	Software
APN	Health Care	Pharmaceuticals
FTB	Real Estate	Diversified REITs
L2D	Real Estate	Retail REITs
RFG	Consumer Staples	Food Products
CSB	Consumer Discretionary	Home Improvement Retailers
WBO	Industrials	Engineering and Contracting Services
GFI	Basic Materials	Gold Mining
IMP	Basic Materials	Platinum and Precious Metals
LHC	Health Care	Health Care Facilities
AFE	Basic Materials	Chemicals: Diversified
DTC	Technology	Computer Services
FFB	Real Estate	Diversified REITs
SAP	Basic Materials	Paper
ACL	Basic Materials	Iron and Steel
SNH	Consumer Discretionary	Diversified Retailers
AGL	Basic Materials	General Mining
KIO	Basic Materials	Iron and Steel
NPH	Basic Materials	Platinum and Precious Metals
CFR	Consumer Discretionary	Luxury Items
ANH	Consumer Staples	Brewers
SSW	Basic Materials	Platinum and Precious Metals
DGH	Consumer Staples	Distillers and Vintners
HDC	Industrials	Industrial Suppliers
TGA	Energy	Coal
GRT	Real Estate	Diversified REITs
ITE	Consumer Discretionary	Home Improvement Retailers
DRD	Basic Materials	Gold Mining
CCO	Real Estate	Diversified REITs
MCG	Telecommunications	Cable Television Services
RES	Real Estate	Retail REITs
DCP	Consumer Staples	Drug Retailers
SPP	Consumer Staples	Food Retailers and Wholesalers
NTC	Health Care	Health Care Facilities
NRP	Real Estate	Real Estate Holding and Development

TSG	Consumer Discretionary	Casinos and Gambling
EMI	Real Estate	Diversified REITs
TFG	Consumer Discretionary	Apparel Retailers
CLS	Consumer Staples	Drug Retailers
AMS	Basic Materials	Platinum and Precious Metals
MTA	Consumer Discretionary	Auto Parts
SUI	Consumer Discretionary	Casinos and Gambling
SAC	Real Estate	Diversified REITs
COH	Consumer Discretionary	Education Services
VOD	Telecommunications	Telecommunications Services
FFA	Real Estate	Diversified REITs
BAW	Industrials	Diversified Industrials
HYP	Real Estate	Retail REITs
OMN	Basic Materials	Chemicals: Diversified
AFT	Industrials	Building Materials: Other
MLI	Real Estate	Industrial REITs
BVT	Industrials	Diversified Industrials
GLN	Basic Materials	General Mining
AVI	Consumer Staples	Food Products
BTI	Consumer Staples	Tobacco
FBR	Consumer Discretionary	Restaurants and Bars
TBS	Consumer Staples	Food Products
TKG	Telecommunications	Telecommunications Services
SHP	Consumer Staples	Food Retailers and Wholesalers
EXX	Energy	Coal
BYI	Technology	Software
RLO	Industrials	Electrical Components
ATT	Real Estate	Diversified REITs
KAP	Industrials	Diversified Industrials
SRE	Real Estate	Office REITs
NPN	Technology	Consumer Digital Services
PPC	Industrials	Cement
MRP	Consumer Discretionary	Apparel Retailers
AIP	Health Care	Pharmaceuticals
HAR	Basic Materials	Gold Mining
PPH	Consumer Discretionary	Diversified Retailers
MSP	Real Estate	Real Estate Holding and Development
RDF	Real Estate	Diversified REITs
TRU	Consumer Discretionary	Apparel Retailers
IPF	Real Estate	Diversified REITs
RBP	Basic Materials	Platinum and Precious Metals
PIK	Consumer Staples	Food Retailers and Wholesalers
BHG	Basic Materials	General Mining
ANG	Basic Materials	Gold Mining
MTN	Telecommunications	Telecommunications Services
MEI	Health Care	Health Care Facilities
WHL	Consumer Discretionary	Diversified Retailers
EQU	Real Estate	Industrial REITs
SPG	Industrials	Transportation Services

OCE	Consumer Staples	Farming, Fishing, Ranching and Plantations
S32	Basic Materials	General Mining
MKR	Energy	Alternative Fuels
ARL	Consumer Staples	Farming, Fishing, Ranching and Plantations
HMN	Real Estate	Retail REITs
LBR	Consumer Staples	Food Products
PRX	Technology	Consumer Digital Services
MNP	Industrials	Containers and Packaging
BLU	Telecommunications	Telecommunications Services
SSS	Real Estate	Storage REITs
SSU	Consumer Discretionary	Hotels and Motels
TXT	Industrials	Transportation Services
VKE	Real Estate	Retail REITs
SOL	Basic Materials	Chemicals: Diversified
AEL	Technology	Computer Services
LTE	Real Estate	Real Estate Holding and Development

Source: Bloomberg