An examination of the effect of the global financial crisis on the link between capital structure and firm performance.

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Preface and Acknowledgements

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Abstract

The study examines the effect of the global financial crisis on the link between capital structure and firm performance using panel data of the South African nonfinancial firms that were listed on the Johannesburg stock exchange (JSE) for the period between 2007 and 2012. The analysis is done by splitting the entire period into the during and post financial crisis and then combining the two datasets after controlling for the period type to examine if the crisis period had an impact on the link between capital structure and firm performance. The relationship is examined based on two prominent capital structure theories, that is, the trade-off theory and perking order theory. The perking order theory assumes that a negative link exists whereas the trade-off theory assumes that a positive relationship exists. ROA is used as a proxy for firm performance. The ratios of total liabilities, long term liabilities and short-term liabilities to total assets are used as proxies for capital structure. The study uses firm size, liquidity, and tangibility as control variables. The main findings based on the link between capital structure and firm performance show that there was an insignificant negative relationship between firm performance and all proxies of debt, that is, total debt, long term debt and short-term debt during the global financial crisis period while a strong statistically significant negative relationship existed between firm performance and both total debt and long-term debt after the global financial crisis and even after controlling for the period type. The relationship was much stronger with long term debt than with total debt. In contrast, the findings of this study show that there was no significant relationship between short term debt and firm performance during and after the global financial crisis and even after controlling for the period type. The findings of a negative relationship between firm performance and both total debt and long-term debt is consistent with the perking order theory. However, although the results show that the effect of the financial crisis was insignificant, controlling for the effect of the crisis period actually improved the link between capital structure and firm performance as the adjusted R-squared improved after controlling for the effect of the crisis period. The results also show that there was a significant negative relationship between firm size and performance for all the models considered and that the relationship was stronger after the financial crisis and even after controlling for the period type. Furthermore, the results show that there was a strong and significant positive relationship between liquidity and firm performance for all the models, even after controlling for the period type as well. Lastly, the results of this study show a negative link between tangibility and firm performance for all the models but that the relationship was significant only after the financial crisis period and for the combined period that controls for the period type. Overall, the results in Models 5 and 6 show that although the effect of the global financial crisis was insignificant, controlling for it improved the link between capital structure and firm performance as shown by the improvement in the adjust R-squared.

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1. Introduction

1.1 Background to the study

Arguments in prior studies show that the value of the firm is mainly dependant on management's past and future investment decisions and that investment decisions can be financed by either debt or equity or a mix of both (ul Islam and Iqbal, 2022). Since the value of a firm is dependent on management's investments decisions, it also implies that management must make the right choices when deciding on future investments and how those selected investments will be financed. Put together, this implies that, in order to maximise shareholder value, management's investment decisions and the concomitant financing plan should be such that the return on the investments is greater than the weighted average cost of the sources of financing required to purchases those investments. Consequently, since the financing decision by management should be such that the cost of capital is minimised or alternatively, the value of the firm is maximised, it therefore implies that the financing options chosen should have an impact on firm performance. This is because firm value can only increase if the discount rate (which in this case is the cost of capital) is minimised. Similarly, by choosing a financing mix that will result in the lowest cost of capital (that is, the optimal capital structure), management will be able to achieve a return on investments which will be greater than the cost of financing or cost of capital. Owing to the above viewpoint, it could also be argued that since the value of the firm is dependent on investment and financing decisions, it therefore means that the capital structure of a firm plays an important role in the firm's success (Kumar et al., 2017). The above view is also supported by evidence in existing studies. For instance, there is a strand of existing studies that show that there is a link between the financing decision (that is, capital structure) and firm's performance and success. Schultz (2017), for example, show that the firm's performance is an important criterion when firms are seeking for new financing irrespective of whether the sources are internal or external to the firm (Schultz, 2017). Consistent with the above line of thought, evidence in the most recent studies show that the firm's capital structure is inevitably linked to the performance of the firm (ul Islam and Iqbal, 2022).

However, in search of the link between capital structure and firm performance, many existing studies extensively examined the effect of capital structure on firm performance in general (San and Heng, 2011; Tan and Hamid, 2016) while others did so by considering a crisis period (Gabrijelcic et al., 2013). The focus of the current study is on the latter, where the effects of the global financial crisis of 2007 to 2009 is considered. A crisis period represents an extraordinary period with extraordinary outcomes that have adverse implications on the firm's profitability, liquidity, and growth (de Vries, 2013). Economies cross the globe entered into a recession during the global financial crisis of 2007 to 2009. Consequently, production, sales, disposable incomes and the demand for goods and services fell. The fall in the economic fundamentals had a direct impact on the firms' financial performance, which

in some instances led to financial distress depending on the firm's capital structure (de Vries, 2013). For example, during a crisis period, highly leveraged firms might struggle to meet all their debt obligations if they experience cash flows problems (de Vries, 2013). As a result, firms facing cash flows problems might be forced to restructure by exchanging debt for equity in order to lower their debt ratio (de Vries, 2013). For example, evidence in a study conducted by Duggal and Budden (2011) show that firms in the USA which had an incentive to lower their fixed costs including interest expenses, restructured their balance sheets by using more equity financing than debt financing. De Vries (2013) also opined that it was expected that firms had to reconsider their capital structures during the global financial crisis of 2007 to 2009 for them to adapt to the challenges presented by the recession. Arguments presented in an earlier study by Frank and Goyal (2004) further show that capital structure adjustments received growing interest since that helped to distinguish alternative theories of capital structure.

In contrast, arguments in another strand of literature state that firms do not appear to adjust their capital structures quickly (see for example, Lemmon et al., 2008). Duggal and Budden (2004), for example, found that capital structures of firms are stable over a longer period of time and that firms that have high or low leverage tend to remain so for a period of over 20 years, hence, suggesting that firms do not adjust their capital structures quickly. However, the arguments in Duggal and Budden (2004) and Lemmon et al. (2008) could be limited to a certain extent because one would normally expect to see capital structures changing to match the swings in business cycles. For example, during periods where there is a boom, one would expect to see too much economic activity, with more firms seeking various types of funding to finance their growth. Likewise, one would expect disinvestment in a recessionary period when firms start to face problems of various magnitude. Consequent to that, in a crisis period, most firms would find it difficult to maintain stable capital structures as they try to adjust to adverse economic conditions.

The above viewpoint is supported by extant studies that suggest that, on average, firms tend to change their capital structures in various ways in order to adjust to adverse circumstances during crises periods (de Vries, 2013). Furthermore, on the basis of theory, Demirguc-Kent et al. (2020) argued that the financial crisis may affect the firm's capital structure in different ways. Following this argument, Demirguc-Kent et al. (2020) stated that lenders and borrowers will be hesitant to lock-in capital in long term investments during the crisis period due to an increase in uncertainty and risk and a decrease in expected returns. Similarly, due to the increase in the probability of default, Demirguc-Kent et al. (2020) argued that lenders would require more compensation (that is increase in the term premium) for long term lending, which in turn would make long term loans less desirable to short term loans. Thus, as risks and business opportunities become more and more uncertain under the crisis period, firms that fail to commit to long term loans might opt to alter their leverage and debt maturities (Gurkaynak and

Wright, 2012; Dick et al., 2013). In addition, Brunnermeier and Oehmke (2013) also argued that high volatility during a crisis period increases the firm's incentive to short debt maturity despite the high roll over costs that are associated with short term debt. Furthermore, Brunnermeier and Oehmke (2013) argued that if firms value financial flexibility during turbulent times, they will be less likely to enter into long term contracts, which will consequently lead to a decline in long term loans. Based on this line of argument, it implies that the issuance of long-term debt declines during periods of economic crisis (Brunnermeier and Oehmke, 2013). This also implies that any new issues of debt will be short term issuances which will be driven mostly by demand and supply considerations (Demirguc-Kent et al., 2020).

On the basis of the above, Milbradt and Oehmke (2014) argued that the maturity composition of debt is important since it determines the extent to which assets are financed by liabilities that expose the company to roll over risks. Consequent to that view, Milbradt and Oehmke (2014) stated that a decrease in the maturity of debt shifts rollover risks away from lenders to companies, which results in refinancing risks that may have a negative impact on the long-term productive assets and the growth of the company. In addition to the aforementioned, evidence in the studies conducted in the United States of America (USA) (see for example, Duchin et al., 2010, Almeida et al., 2012) and in Belgium (see for example, Vermoesen et al., 2013) found that companies that had higher short-term debt outstanding before the financial crisis experienced higher decreases in investment during the crisis. Myers (1977), on the other hand, argued that shorter maturities could help to mitigate the underinvestment problem of debt financing in periods of rising uncertainty and become more attractive to borrowers since short term debt is less sensitive to future investment opportunities relative to the value of long-term debt.
On the other hand, Jensen and Meckling (1976) using the economic theory, argued that the extent to which the crisis period affects the capital structure of companies through higher uncertainty, higher risk and lower returns depends on the characteristics of the financial systems and the institutional environment in which the firms operate. Therefore, through the use of the agency theory, Jensen and Meckling (1976) argued that an increase in the volatility of returns would encourage shareholders to take more risk (that is the risk shifting effect) especially in countries where monitoring and bankruptcy costs are high. Furthermore, Diamond (2004) argued that the shortening of debt maturities and the consequent deleveraging are likely to be bigger in countries where contracts are difficult to enforce, the example being, environments where bankruptcy laws and procedures are such that the liquidation of assets is costly.

A study by Demirguc-Kent et al., (2020) shows that leverage, the use of long-term debt and debt maturity all decreased amongst all the companies that used long term debt in the period following the beginning of the global financial crisis. In addition, Demirguc-Kent et al., (2020) observed that the patterns were in both developed and developing countries and in countries that did not experience the

systematic banking crisis and across different types of companies. They also found that the decline in debt maturity following a financial crisis was both statistically and economically significant even after controlling for company characteristics that affect capital structure and unobserved time invariant company specific factors (Demirguc-Kent et al., 2020)

Therefore, based on the evidence in existing studies that show that companies are more than likely to alter their capital structures during periods of economic crisis because of higher uncertainty, higher risk and low returns, and that the refinancing risks may have a negative effect on the long term productive assets and company growth, it is therefore necessary to examine the impact the 2007 and 2009 global financial crisis has had on the link between capital structure and firm performance in the context of an emerging economy with sophisticated financial systems that resemble those of developed economies. In pursuit of the above examination, this study seeks to achieve the objectives herein stated below.

1.2 Study objectives and research questions

The objectives of this current study are to:

- Examine the effect of a global financial crisis period on the link between capital structure decisions and firm performance.
- Examine the effect of the after global financial crisis period on the link between capital structure decisions and firm performance.
- Examine if the effect of the global financial crisis matters on the link between capital structure decisions and firm performance.

In pursuit of the objectives stated herein, the study seeks to answer the following research questions:

- Is there a link between capital structure decisions and firm performance during a financial crisis period?
- Is there a link between capital structure decisions and firm performance after a financial crisis period?
- Does the financial crisis period matter on the link between capital structure decisions and firm performance?

1.3 Limitations in prior studies

While several studies have extensively examined the relationship between capital structure and firm performance, evidence in prior studies show that limited research focus on developing and emerging economies and that less consideration has been given on investigating this relationship during a crisis period (Khodavandloo, et al., 2017). A review of prior studies that included a crisis period also show that the majority of the existing studies focused mainly on the direct link between capital structure and

firm performance for the period either before, during or after a crisis period without conditioning or controlling this linkage on the period type to examine if the crisis itself had an impact on the link between capital structure and firm performance (for example, Khodavandloo et al., 2017).

1.4 Study motivation (justification or significance)

The limitations identified in prior studies show that many studies that considered a crisis period on the link between capital structure and firm performance focus on the direct relationship between capital structure and firm performance either before, during and after a crisis period without controlling for the effect of the crisis itself on that relationship. However, this study motivated by the likely changes to the capital structure of firms as explained in the background to the study, seeks to fill in the gap in prior studies, especially in emerging and developing countries by controlling for the effect of the crisis period on the link between capital structure and firm performance. In addition, due to conceived or perceived changes in capital structure preceding, during and post a crisis period, this study conducts an analysis on the effect of capital structure on firm performance by splitting capital structure components into total debt, long term debt and short-term debt, consistent with Abhor (2005). The motivation for this is that the current study will be in a position to provide results that are more informative to decision and policy makers as they will be able to determine the components that are crucial in decision making or directing policy during and after crisis periods. The dearth of studies that examine the impact of the crisis period on the link between capital structure and firm performance in Africa especially and the mixed results shown in prior studies provides this study with an opportunity to inform investors about the impact of a crisis period on the link between capital structure and firm performance particularly in South Africa as the capital structure of firms could be affected by the financial systems and the institutional environment as well (Jensen and Meckling, 1976).

1.5 Structure of the study

The rest of the study is organised as follows: Section 2 provides a review of the capital structure theories and a review of literature on the relationship between capital structure and firm performance. Thereafter, section 3 provides an explanation of the method used in this study while section 4 presents the discussion of results. Lastly, section 5 provides the conclusion, limitations, and recommendations for future research.

2. Literature review

2.1 Introduction

This section provides a review of previous studies that examined the relationship between capital structure and firm performance. In addition, this section provides a background on the theoretical framework that outlines the foundations of capital structure choices made by firms and how those choices are presumed to impact firm performance. The section commences by proving a theoretical background using the trade off and perking order theory as theoretical filters that are used in this study to examine the link between capital structure decisions and firm performance. Thereafter, the section provides a discussion on the findings in prior studies that investigated the relationship between capital structure and firm performance during and after a crisis period. As alluded to above, the next sub section therefore, presents the theoretical background that provides the keystones of capital structure choices.

2.2 Theories of capital structure

2.2.1 Theoretical background

The foundation of corporate capital structure studies is based on the theorem that was initiated by Modigliani and Miller (1958). In their study, Modigliani, and Miller (1958) emphasised that the capital structure of firms can be financed in many various ways, ranging from equity only, debt only or a mix of debt and equity. Albeit their emphasis as alluded to above, Modigliani and Miller (1958) stated that the market value of a firm is correctly calculated as the present value of its future earnings and its underlying assets and that it is independent of how the firm's assets are financed. However, the Modigliani and Miller (1958) theorem is based on the assumptions of perfect capital markets. Based on the assumptions of perfect market conditions where there are no taxes, no information asymmetry, no transaction costs and no bankruptcy costs, Modigliani, and Miller (1958) argued that the capital structure is irrelevant to the firm value. The above opinion is based on the premise that in the calculation of the weighted cost of capital (WACC) (which is a mixture of cost of equity and relatively lower cost of debt), cheaper debt will have more weight when companies tend to use financial leverage (Kalash, 2021). However, the use of cheaper debt which in turn leads to higher financial leverage, means that the risk of equity and in turn the cost of equity increases in the process. Despite the consequential increase in the cost of equity because of increase in equity risk, Modigliani and Miller (1958)'s theory assumes that WACC remains constant because the increase in the cost of equity will offset the beneficial effects of low-cost debt on WACC. As a result of the above assertion, Modigliani and Miller (1958) argued that capital structure decisions do not have an impact on firm value.

In stating the above, Modigliani and Miller (1958) set the debate in motion and paved the way for the development of alternative theories that were also aimed at explaining the capital structure behaviours. The subsections below discuss two of the alternative theories that were pursued in prior

studies to explain capital structure decisions by companies. The choice of the two theories is based on the objectives of this study that is, utilising the trade-off theory and perking order theories as theoretical filters that can be used to explain how capital structure behaviours affect firm performance during and after a global financial crisis period using South Africa as a location of the study.

2.2.2 Trade off theory

The trade-off theory fits into the literature on corporate capital structure that was initiated and developed by Modigliani and Miller (1958 and 1963). The trade-off theory was proposed by Kraus and Litzenberger (1973) after the Modigliani and Miller (1963) theorem was criticised for not considering financial distress which increases as more financial leverage is used. That criticism led Kraus and Litzenberger (1973) to introduce the tax advantage of debt and cost of bankruptcy into the framework, which in turn confirmed the existence of an optimal capital structure in the trade-off theory. The trade-off theory assumes that companies can achieve an optimal level of financial leverage by weighing the marginal benefits and marginal costs of debt (Kalash, 2021). The benefits of debt, in this instance, arise from the interest tax shield (that is, tax benefits of interest deductibility) and the decline in agency costs of free cash flows that arise from the conflict of interest between shareholders and managers while the cost of debt arise from bankruptcy costs and the agency costs of debt arising from the conflict of interest between equity holders and debt holders (Kalash, 2021). Owing to the interest tax shield that is provided by using debt, Fama and French (2002) argued further and stated that the tax advantages of debt push companies to use more debt in their capital structure. Fama and French (2002)'s viewpoints are consistent with the argument put forward by Modigliani and Miller (1963) and Graham (2002) who stated that the use of debt decreases the tax expense because interest payments on debt are tax deductible through the reduction in taxable income in the statement of comprehensive income.

In addition, Kalash (2021) on one hand, stated that higher leverage mitigates the conflict of interest between managers and shareholders that arise when managers purchase low return investments in pursuit of their own interest at the expense of shareholders. Kalash (2021)'s assertion is also consistent with Jensen and Meckling (1976) and Jensen (1986) who stated that the servicing of debt decreases the excess free cash flows and reduces the possibility that managers might waste the firm's resources on low return investments projects.

On the other hand, Kalash (2021) stated that high leverage may aggravate the agency costs of debt that arise due to conflict of interest between shareholders and debtholders. This is especially so when companies engage in risky investments at the expense of debtholders, which in turn, would force debtholders to require higher interest rates in order to be compensated for bearing additional risk (Jensen and Meckling, 1976, Gitman and Zutter, 2012). Besides that, Myers (1977) and Berk et al., (2012) argue that companies that have high and risky debt pass up profitable investments because the

benefits of those investments will to a large extent accrue to the debtholders. In a similar vein, Bradley et al., (2012) argued that high gearing increases financial distress risk as well as the direct and indirect costs of bankruptcy.

Therefore, owing to the arguments in prior studies, leverage is expected to have a negative effect on firm performance under conditions where there are high agency costs of debt and bankruptcy risk whereas a positive effect is expected in the presents of high tax benefits of debt and high agency costs of free cash flow (Kalash, 2021). The argument of a negative effect of debt in prior studies is expected in a crisis period as the risk of bankruptcy is expected to increase with any surges in the debt load (Khodavandloo et al., 2017) and the shortage of capital in a crisis period in turn also makes debt more expensive (Schulz, 2017). Furthermore, it is highly likely that the costs of debt will exceed its benefits because the probability of financial distress increased during the financial crisis (Khodavandloo et al., 2017). Owing to the above, Khodavandloo et al., (2017) stated that firms will adjust their debt levels during the crisis period.

Nonetheless, the trade-off theory maintains the argument that there are advantages to debt financing based on the assumption that there is a trade-off between the cost of debt and the benefits of debt because the optimal level of gearing will be achieved by balancing the benefits from interest payments and the costs of issuing debt (Khodavandloo et al., 2017). In that view, it is argued that the debt-tax shield will help to minimise the expected tax bills and maximise the after tax cashflows (Modigliani and Miller, 1958). As a result, the trade-off theory posits a positive relationship between capital structure and firm performance.

2.2.3 Perking order theory

The perking order theory that was introduced by Myers and Majluf (1984) is based on the argument that asymmetric information creates a hierarchy of costs in the use of external financing. Owing to this view, the perking order theory hypothesizes a negative relationship between capital structure and firm performance on the basis that a firm prioritises its funding sources from internal to external and debt to equity. The notion surrounding this theory is that internal funding requires less transaction and issuance costs relative to the debt or equity financing. As a result of that, the perking order theory suggests that a company should follow a particular financing hierarchy where internal funding, in the form of retained earnings, is the first choice of financing, and if internal financing is inadequate, then the company should prefer using debt to equity (Ayaz et al., 2020; Kalash, 2021). Therefore, due to the hierarchical costs involved in the use of external financing, the perking order theory postulates that debt should be preferred to equity and that equity financing should be considered as the last resort because of the higher asymmetric information costs that are linked to the issuance of ordinary shares (Kalash, 2021). In support of why debt is preferred to equity after the exhaustion of internal sources of financing,

Myers (1984) argued that since managers have more information about the company's future opportunities compared to external investors, information asymmetry has the effect of increasing the cost of external financing, that is, the cost of debt and to a greater extent the cost of relatively high-risk equity. Therefore, unlike the trade-off theory, the perking order theory suggests that there is no optimal capital structure but rather a preferred hierarchy of financing (Myers, 1984; Kalash, 2021). In addition, contrary to the trade-off theory, the other implications of the perking order theory are that profitable firms will use less debt and that firms will prefer financial slack (Hiller et al., 2014). This implies that profitable firms will use internally generated funds to finance their investments, hence, the reason why they are presumed to use less debt in their capital structure (Schulz, 2017). However, this assumption should possibly hold under normal economic conditions, and fail to hold under crisis periods when firm profitability is lower, increasing at a decreasing rate or even negative. Therefore, given that it is highly likely that profitability declines and could possibly become negative during the crisis period, it follows that the need for external financing will increase since the internally generated funds will not be sufficient to support or cover the capital requirements (Schulz, 2017).

Following the assumption of the perking order theory that profitable firms prefer the use of internally generated funds, Fama and French (2002) argued that the more profitable the firm is, the lower the debt-to-equity ratio they should have. Owing to the above, it is expected that a negative relationship between debt-to-equity ratio and firm performance should prevail. The abovementioned hypothesis prompted some researchers to investigate the existence of negative relationship between leverage and firm performance and found that a negative relationship exists (see for example, Fama and French, 1998, Zeitun and Tian, 2007, Akeem et al., 2014 and Gabrijelcic et al., 2017).

However, the current argument could be, does the negative relationship still hold under crisis periods? Under crisis periods, the hypothesised view could be that since the firm's profitability declines, the relationship between leverage and firm performance should be positive as firms will seek alternative sources of financing instead of internally generated funds (Schulz, 2017).

Overall, the theoretical discourse above shows that both the trade-off and perking order theoretical approaches support the idea that leverage affects firm value in various ways. Owing to this notion, a review of related literature shows that several studies have to date been conducted across the globe to probe the link between capital structure decisions and firm performance. In addition, a review of extant studies on the link between capital structure and firm performance cover different business cycles with some studies investigating this association under normal economic conditions while others did the same under various crisis periods or a combination of before, during and after a crisis period. The current study's objective is to examine the impact of the global financial crisis on the link between capital structure and firm performance. Therefore, this study covers the period during and after a crisis, to be precise, it covers the period during and after the global financial crisis of 2007 to 2009. In pursuit of

the study's objectives, the subsequent sub sections provide a synopsis of the empirical evidence in the extant studies that explored the impact of a global financial crisis on the firm's capital structure. Thereafter, the subsequent sub section presents a discussion on the findings in prior studies on the impact of the global financial crisis on the link between capital structure choices and firm performance.

2.3 Empirical studies on the effect of the global financial crisis on capital structure

Although the main objective of this study is to examine the effect of the global financial crisis on the link between capital structure and firm performance, it is necessary to first of all provide a synopsis of the empirical evidence on how the global financial crisis influences the capital structure choices made by firms. A review of the findings in prior studies on the relationship between capital structure and firm performance show mixed results. For example, there are studies that used the trade off and perking order theories as theoretical filters to examine the relationship between leverage and firm performance and produced conflicting results. For instance, while the trade-off theory assumes that there is a positive relationship between leverage and firm performance, hence, suggesting that the higher the leverage ratio the higher the profit, there are some studies that found a negative link between leverage and profitability (see for example, Rajan and Zingales, 1995). Conversely, there are also other studies that found a positive relationship between profitability and firm performance (Lemmon and Zender, 2010). In addition to using the profitability ratios, other studies used the market to book ratio as a measure of stock performance and found a negative relationship between market to book ratio and leverage (Sinan, 2010) while others found that a positive relationship exists (Lemmon and Zender, 2010).

Due to the conflicting results in prior studies, it could be argued that capital structure theories may not be consistent since financial and economic conditions are dynamic and not static, that is, they change all time (Harrison and Widjaja, 2013). Owing to the dynamic nature of the financial and economic conditions, this implies that the direction of the association between leverage and firm performance ought to change as financial and economic conditions change. Consistent with that viewpoint, evidence in prior studies suggests that capital structure choices made under normal financial and economic conditions are different to those that are made during a crisis period.

Bhamra et al., (2011) for example, show that firms become more conservative in their capital structure policy if they know that there is going to be a possibility of an economic crisis. Through a survey method that was aimed at establishing the real effects of financial constraints during a crisis period, Campello et al. (2010) also found that constrained firms would use internally generated funds and put more effort in getting credit from the banks in anticipation of restricted access to credit in the future.

As discussed in the introduction of this study, many studies, on the basis of theory, argued that a crisis period affects the capital structure of firms in many ways. For example, there is a strand of studies

argued that lenders and borrowers become hesitant to lock-in capital in long-term investments during a crisis period because of the increase in uncertainty or risk and a decline in expected returns (Gurkaynak and Wright, 2012; Dick, Schmelling and Schrimpf, 2013). Consequently, lenders with weakened balance sheets may toughen their lending margins and increase their term premium even more (Gurkaynak et al., 2013) while firms that are unable to commit to an aggregate maturity structure may as well be tempted to reduce their debt maturity and leverage as uncertainty or risk increases and business prospects become more uncertain (Demirguc-Kunt et al., 2015). This implies that high volatility during a crisis period may force firms to shorten the maturity of their debt obligations (Brunnermeier and Oehmke, 2013). In addition, Brunnermeier and Oehmke (2013) suggested that firms that value financial flexibility during a crisis period will be less likely to enter into long-term debt contracts with covenants, hence, leading to a decline in the demand for long-term debt. This suggests that during periods of economic crisis, issuance of new long-term debt will decline and that any new debt issues will have to have shorter maturities during volatile economic conditions (Brunnermeier and Oehmke, 2013).

Overall, the arguments above suggest that crises lead to a change in the maturity composition of debt in the capital structure for the firm. Owing to this view, it therefore becomes inevitable to examine how the effect of the global financial crisis of 2007 to 2009 affected the link between capital structure and firm performance in South Africa. Furthermore, the presumed changes in the capital structure (that is long term versus short term) makes is necessary to examine the link between debt and firm performance by splitting total debt into its components, that is, long term and short-term debt in order to examine the significance of the relationship between Total debt, long term or short-term debt and firm performance separately due to the supposed changes in capital structure during a crisis period.

2.4 Empirical studies on the effect of the GFC on the link between capital structure and firm performance.

2.4.1 Review of literature and hypotheses development.

The discussion in the previous section has shown that a crisis period results in a change in the maturity composition of debt in the capital structure of the firm. According to Demirguc-Kunt et al. (2015, p.6), the maturity composition of debt is important in that it "*determines the extent to which assets are financed by liabilities that expose the firm to rollover risks*". The argument in the study by Demirguc-Kent et al. (2015) is consistent with Milbradt and Oehmke, (2014) who stated that the decrease in the maturity of debt during a crisis period shifts rollover risks to firms and away from the lenders, and that the refinancing risks may have a negative impact on long-term productive investments and firm growth. Owing to this view, this sub sections provides a review of the findings in prior studies that examined the effect of the financial crisis on the link between capital structure and firm performance. The review

of related literature and development of the hypotheses for this study follows related studies that used the total debt ratio and its split into long term debt to total assets and short-term debt to total assets as measures of financial leverage and after controlling for certain firm specific variables.

2.4.1.1 Debt and firm performance

Several prior studies have examined the relationship between leverage and firm performance and produced inconsistent results. While some studies found a negative impact of leverage on firm performance, other studies confirmed a positive, mixed and no relationship (Kalash, 2021). The examples of contrasting findings in existing studies vary by location (that is, country of study) and period considered. For example, In India, Dawar (2014) found that both long term and short-term debt had a negative relationship with firm performance. In Ghana, Addae et al., (2013) found a positive relationship between short term debt and profitability but a negative relationship between profitability and both long term debt and total debt. On the other hand, Abor (2005) found a negative relationship between profitability and long-term debt but a positive relationship between profitability and both total debt and short-term debt.

Owing to the inconsistencies in the findings in prior studies, a review of prior studies on the link between capital structure and firm performance starts with a review on the studies that found a negative link followed by the positive and lastly by those that found no link or insignificant relationship between leverage and firm performance.

As alluded to earlier, several studies have been conducted in different countries and found a negative relationship between leverage and firm performance. For example, a negative relationship between leverage and profitability was also found in studies that were conducted in Sweden (Yazdanfar and Ohman, 2015), Romania (Nenu et al., 2018), Turkey (Karadeniz et al., 2016; Isık, 2017; Kalash, 2019; Kucukbay and Guler, 2020), UK (Fosu et al., 2016), France (Gharsalli, 2019). Furthermore, in Pakistan, Samo and Murad, (2019) examined the effect of debt to equity on the return on equity and found an inverse relationship between debt to equity and return on equity. Consistent with the other studies that found a negative effect of leverage of firm profitability, Kwasawneh and Dasouqi (2017) also examined the effect of debt financing on firm profitability in Jordan and found that a negative relationship was also present. In Vietnam, Le and Phan (2017) and Pham and Nguyen (2020) found a negative relationship between capital structure and firm performance. Still in Vietnam, Nguyen and Nguyen (2020) examined the relationship between capital structure and firm performance using panel data for state owned and none stated owned firms and found that capital structure had a negative impact on firm performance. However, their study also showed that the effect was much stronger for state owned firms than the none state owned firms. In Ethiopia, Admassu (2016) examined the impact of capital structure choices on the firm's financial performance using seven-year data of the manufacturing

firms operating in the Tigray region and found that all the elementary ratios of leverage, that is, total debt, long term debt and short-term debt ratios had a significant negative relationship with ROA and ROE proxies of firm performance. Similarly, using data obtained from 174 nonfinancial Swedish firms, Gansuwan and Onel (2012) investigated the impact of capital structure on firm's performance and found a significant negative relationship between capital structure and firm performance. In Nigeria, Onaolapo and Kajola, (2010) examined data gathered from 30 nonfinancial companies across 15 industry sectors over the 2001 to 2007 period and found that capital structure (debt ratio) had a significant negative effect on both ROA and ROE as proxies of firm performance.

The findings in the above-mentioned studies are also consistent with the earlier studies that show that high financial leverage lower firm performance (see for example, Jensen and Meckling, 1976, Myers, 1977, Bradley et al., 1984, Myers, 1984). In addition, there are also a host of other studies that found a negative relationship between capital structure and firm performance under normal business cycles (see for example, Bistrova et al., 2011; Jiraporn et al., 2012).

Apart from the above findings which were conducted under normal economic conditions, there are other studies that investigated the impact of leverage on firm performance before, during and after a crisis period and found a negative relationship between leverage and firm performance. Zeitun and Tian (2007) for example, examined the impact of capital structure on firm performance using panel data of Jordanian firms for the 1989 to 2003 period and found that capital structure had a significant negative effect on both the accounting and market-based measures of firm performance. In addition, Zeitun and Tian (2007) split total debt into its components and found that short term debt had a positive relationship with Tobin's Q, which is a market measure of firm performance. Furthermore, Zeitun and Tian (2007) found that the gulf crisis of 1990 to 1991 had a positive impact on the Jordanian firm performance.
In another study, Zeitun and Saleh, (2015) used a sample drawn from the Gulf Corporation Council countries and found a negative relationship between leverage and profitability before and after the 2008 financial crisis period. In Slovenia, Grabrijelcic et al., (2017) examined the effects of financial leverage and foreign financing on firm performance using a large panel data of Slovenian firms and found that financial leverage had a significant negative impact on firm performance even after controlling for reserve causality between the two variables. Furthermore, their study revealed that the negative effect, although weaker, persisted into the crisis period. However, their study also revealed that firms that had foreign debt performed much better than the firms that had domestic debt financing (Grabrijelcic et al., 2017). However, after controlling for foreign financing, Grabrijelcic et al., (2017) revealed that the positive and statistically significant influence of foreign financing on firm performance in the pre-crisis period was driven more by privately owned firms while a negative impact during the same period was found for state owned firms. Contrary to the above, Grabrijelcic et al., (2017) found that financial leverage had no impact on firm performance for both types of ownership during the crisis period.

In Malaysia, Khodavandloo et al., (2017) examined the impact of capital structure on firm performance for the period before, during and after the 2007 to 2009 global financial crisis using several proxies of firm performance. In their study, Khodavandloo et al., (2017) found that capital structure had a strong inverse impact on firm performance as proxied by ROA in each period studied. Furthermore, their study showed that the negative relationship was strongest during the financial crisis period for all the proxies of firm performance they considered in their study (Khodavandloo et al., 2017). However, their study found no relationship between capital structure and firm performance for the period before financial crisis when they used Return on Equity (ROE) and Earnings per share (EPS) as proxies for firm performance. Similarly, Khodavandloo et al., (2017) also found no relationship between capital structure and firm performance after the financial crisis period when they used gross profit margin (GPM) and EPS as proxies for firm performance. Overall, their study showed that capital structure had a negative impact on firm performance during a financial crisis period for all the proxies of firm performance.

Contrary to the negative link between capital structure and firm performance that was shown in the studies discussed above, there are also other studies that found a positive association between capital structure and firm performance. In the United States of America (USA) for example, Berger and Di Patti (2006) conducted a study on commercial banks for the 1990 to 1995 period and found that debt had a positive impact on firm performance. In Turkey, Caba (2017) used a sample of firms drawn from the manufacturing firms and found that leverage had a positive impact on firm performance. In a similar vein, in Indonesia, Chandra et al., (2019) used data collected from a population of firms listed on Compass Index 100 and found that capital structure had a positive impact on firm profitability but had no effect on stock returns. In Germany, Abdullah and Tursoy (2021) examined the relationship between capital structure and firm performance under IFRS adoption and found a positive significant relationship between the two variables albeit that the relationship was being weakened by the IFRS adoption. In another study conducted in Indonesia, Ngatno et al., (2021) found that short term debt had a positive relationship with firm performance while long term debt had an insignificant negative relationship with firm performance. In the USA, Gill et al., (2011) conducted a study using total debt to total assets, long term debt to total assets and short-term debt to total assets as proxies of capital structure to examine the effect of capital structure on firm profitability based on the data on manufacturing and service industries. Their study found a positive link between (i) short term debt to total assets and firm profitability in both the service industry and manufacturing industries, (ii) long term debt to total assets and firm profitability in the manufacturing industry albeit an insignificant relationship in the service industry, (iii) total debt to total assets and firm profitability in both the manufacturing and service industries (Gill et al., 2011). In Palestine, Abu-Rub (2012) investigated the effect of capital structure on firm performance and found that capital structure had a positive impact on

the both the accounting and market measures of firm performance used in their study. In addition to the studies discussed above, there are also other several other prior studies that found a positive relationship between capital structure and firm performance (see for example, Al-Ajmi et al., 2009; Kaur and Rao, 2009; Nunkoo and Boateng, 2010; Zhang, 2010).

Aside from the studies that found either a positive or negative link between capital structure and firm performance, there are also other studies that found no significant link between leverage and firm performance. In Egypt, for instance, Ebaid (2009) examined the effect of capital structure choices on firm performance and found that capital structure had a weak to no relationship with firm performance. However, despite the inconclusive findings in prior studies and irrespective of the period under consideration this study posits that:

H_{1a}: There is a negative relationship between total debt and firm performance.
H_{1b}: There is a negative relationship between long term debt and firm performance.
H_{1c}: There is a negative relationship between short term and firm performance.

2.4.1.2 Size and firm performance

Prior studies show that firm size plays an important role in determining the link between capital structure and firm performance (Olusola et al., 2022). For example, Saona and San Martin (2018) used the case of firms in Latin America to examine the effect of firm size on the link between leverage and capital structure and found that both country level and firm size play an important role. In addition, Margaritis and Psillaki (2010) argued that larger and more profitable firms are usually managed well and tend to be more efficient. Consistent with the above viewpoints, Chandra et al., (2019) opined that large firms can generate greater profits compared to small companies suggesting that large companies are in a better position to take advantage of economies of scale and become more efficient, which in turn, will eventually increase the firm's profit.

Therefore, owing to the presumed importance of firm size on the link between leverage and firm performance, extant studies used size as a control variable in their investigation of the link between capital structure and firm performance and found contrasting results. In Nigeria for example, Ibhagui and Olokoyo (2018) used panel data for the period 2003 to 2007 to examine if the definitive link between capital structure and firm performance is contingent or dependant on firm size and found that the negative effect of leverage on firm performance was significant for small firms albeit that the negative effect diminishes or declines as the firm grows and eventually disappears when the firm grows beyond or past an estimated threshold level. In the same study, Ibhagui and Olokoyo (2018) also found that the condition continued to hold irrespective of the debt ratios used in their study. Overall, Ibhagui

and Olokoyo (2018)'s study found that the impact of leverage on firm performance tended to be positive when the firm size was considerably large. Similarly, in an earlier study, Jaisinghani and Kanjilal (2017) examined the impact of capital structure on firm performance using data on listed manufacturing firms in India and found that the performance of firms with a size greater than a specific threshold was positively influenced by raising the debt ratio. In Ghana, Abor (2005) and Abor and Biekpe (2009) found a positive relationship between firm size and profitability. Similarly, Nguyen and Ramachandran (2006) examined the determinants influencing capital structure of small and medium enterprises (SMEs) in Vietnam and found that firm size is positively linked to firm profitability. Furthermore, there are also various other studies that found a positive relationship between firm size and firm performance (see for example, Michaelas et al., 1999; Sogorb-Mira, 2005; Antoniou et al., 2008; Al-Ajmi et al., 2009; Bevan and Danbolt, 2000; Crnigoj and Mramor, 2009; Pathak, 2010; Zhang, 2010; Sheikh and Wang, 2011; 2013; Dawar, 2014; Isik, 2017).

Conversely, there are also various other studies that found a negative relationship between firm size and profitability. In Thailand, Vithessonthi and Tongurai (2015) examined the effect of firm size on the relationship between leverage and firm performance and found a negative effect for large firms and a positive effect for small firms. Similarly, In Greece, Dimitropoulos et al., (2020) found that firm size had a negative effect on the link between leverage and firm performance. Similarly, there are also numerous other studies that found that firm size has a negative effect on the link between capital structure choices and firm performance (see for example, Titman and Wessels, 1988; Hall et al., 2004; Chakraborty, 2010).

Nevertheless, there are also other studies that controlled for firm size in their examination of the link between leverage and firm performance and found that firm size does not have an influence on the link between the two variables. For example, Chandra et al., (2019) found that firm size had no significant effect on the link between capital structure and firm performance in Indonesia. Similarly, Deesomsak et al., (2004) used data obtained from four countries in the Asian Pacific region, namely Thailand, Malaysia, Australia and Singapore and found an insignificant relationship for both Malaysia and Singapore before the crisis, and Singapore for the combined period. However, Deesomsak et al., (2004) show a positive relationship post the East Asian financial crisis of 1997 for all the countries considered.

Notwithstanding the contradicting results in prior studies and irrespective of the period under consideration, this study hypothesises that:

H_2: There is a positive relationship between firm size and firm performance.

2.4.1.3 Liquidity and firm performance

Arguments in prior studies also state that liquid assets increase the firms' capacity to obtain debt finances because liquid assets could be sold without a significant loss of their value (Al-Najjar, 2011). Similarly, Ozkan (2001) opined that firms with higher liquidity ratios might be able to support a relatively higher debt ratio as they stand a better chance of being able to meet their short-term obligations when they fall due. Empirically, Goddard et al., (2005) conducted a study based on France, Belgium, Italy, Spain and the United Kingdom to examine the determinants of profitability between 1993 and 2001using firms in the manufacturing and service sectors and found that firms with more liquidity tended to be more profitable. In India, Chakrabarti and Chakrabarti (2019) examined firm-specific and macro-economic variables on 18 Indian non-insurance firms and found a positive relationship between liquidity and profitability. In Australia, Ahmed and Bhuyan (2020) examined the relationship between capital structure and firm performance using firms listed under the service sector for the period 2009 to 2019 and found a positive relationship between liquidity and firm performance. Similar studies that found a positive relationship between liquidity and firm performance include those by Bradley et al., (1984); and Kaur and Rao (2009).

Despite the findings of a positive relationship as discussed above, there are also other studies that show a negative relationship between liquidity and firm performance. Examples of such studies are Mazur (2007), Pathak (2010), Sheikh and Wang (2011) and Alom (2013).

Therefore, irrespective of contrasting results in prior studies and the period under consideration, this study hypothesises that:

H_3: There is a positive relationship between liquidity and firm performance.

2.4.1.4 Tangibility and firm performance

There are also other studies that examined the effect of tangibility (which is the proportion of fixed assets over total assets) on the relationship between leverage and firm performance. Arguments in prior studies show that firms will always assume high debt in order to finance long term productive assets (Zeitun and Saleh, 2015). As a result of the above, tangibility is assumed to have a positive impact on capital structure and a negative effect on profitability (Zeitun and Saleh, 2015). Consistent with Zeitun and Saleh, (2015), Srivastava (2017) and Ullah et al., (2017) found a negative link between tangibility and firm performance and concluded that the assets of the company are dominated by tangible assets, and that management will take on debt to have more tangible assets if the firm lacks these investments and wishes to acquire them. Similarly, Gharaibeh and Bani Khaled (2020) examined data collected on firms listed under the service sector in Jordan between 2014 and 2018 and found that tangible assets had a significant negative relationship with profitability. In the same vein, Chadha and Sharma (2015)

examined the impact of capital structure on firm performance based on 422 manufacturing firms listed on Bombay stock exchange in India and found that tangibility had a negative effect on firm performance. In addition, there are numerous other studies that also confirmed a negative relationship between tangibility and firm performance (see for example, Nguyen and Ramachandran, 2006; Al-Ajmi et al., 2009; Karadeniz et al., 2009; Crnigoj and Mramor, 2009; Sheikh and Wang, 2011).

However, there is a strand of prior studies that found that tangibility has a positive effect on firm performance. These studies used the theory of financial distress to hypothesise a positive relationship between tangibility and firm performance. On the basis of the theory of financial distress, prior studies argued that a firm that has a high proportion of tangible assets will use more debt than a firm that has a high proportion of intangible assets because the firm with a high proportion of tangible assets will have lower costs of financial distress if bankruptcy occurs whereas a firm with a high proportion of intangible assets is likely to lose more value if financial distress occurs (Nguyen and Ramachandran, 2006). Jensen and Meckling (1976) in their study used the agency costs of debt and argued that a firm may shift to riskier investments after issuing debt and transfer wealth from debt holders to shareholders to take advantage of the option nature of equity.

Furthermore, Jensen and Meckling (1976) argued that the firm with a high proportion of tangible assets can as well use its tangible assets as collateral and reduce the lender's risk of suffering from the agency costs of debt. In a similar vein, Rajan and Zingales (1995) opined that many tangible assets increase the guarantee for the lender and that a positive leverage is a good indicator of tangibility. In addition, Rajan and Zingales (1995) argued that firms that have a higher proportion of intangible assets will find it difficult to obtain external debt funding for its research and development projects. Similarly, there are also many other studies that found a positive relationship between tangibility and firm performance (see for example, Michaelas et al., 1999; Antoniou et al., 2008; Sogorb-Mira, 2005; Abor and Biekpe, 2009; Bevan and Danbolt, 2000; Frank and Goyal, 2009; Chakraborty, 2010; Nunkoo and Boateng, 2010; Pathak, 2010; Zhang, 2010; Cortez and Susanto, 2012; Arvanitis et al., 2012; Moosa et al., 2011).

Albeit the findings in prior studies and the period under consideration, this study posits that:
H_4: There is a positive relationship between tangibility and firm performance.

3. Research methodology

3.1 Sample selection, data sources, measurement of variables, and empirical models

3.1.1 Data sources and Sample selection procedure

The study uses secondary data to examine the effect of the global financial crisis on the relationship between capital structure and firm performance. Data for this study was obtained solely from the financial databases. Evidence in prior studies suggests that the use of financial databases ensures the accuracy and reliability of the data used in the study and that it minimises the probability of inaccurate findings. Therefore, for this current study, the secondary data from annual financial statements of non-financial listed firms was retrieved from the Bloomberg Terminals which are housed in the University of Cape Town's main library. In addition, since all data could be compiled from the Bloomberg terminals, therefore, no data was manually collected from the annual reports. Furthermore, the data set for the current study contains cross sectional dimensions (several firms) and longitudinal dimensions (several years, that is, 2007 to 2012). In that vein, a combination of cross sectional and longitudinal quantitative data allowed an examination of the constructs of this current study.

Specific accounts from the annual financial statements which are related to the capital structure and firm characteristics were the focus in the data collection and processing (Total debt, total noncurrent liabilities, total current liabilities, total assets, total current assets, net profit after tax and total tangible assets).

The final sample for this study was arrived at through sequential steps which are explained hereinafter. First, a population of all the firms that were listed on the JSE for the entire 2007 to 2012 period were considered for selection. Second, consistent with prior studies, all firms that were listed under the financial industry, that is, banks, insurance companies and properties (real estate) were excluded from the final sample (see for example, Onaolapo and Kajola, 2010; Gansuwan and Onel, 2012; Lee and Pham, 2017; Kharabsheh et al., 2017). The reason for omitting all the firms in the financial industry is due to their incomparable nature of capital structure characteristics and the different structure of the statement of financial position to nonfinancial firms. Third, all newly listed or delisted firms during the research period were excluded (see for example, Harrison, and Widjaja, 2013). Fourth, all firms with missing data (with regards profitability, leverage, size, liquidity, tangibility) were also excluded from the final sample. Based on the above criterion, Table 1 below shows a tabular presentation of the sample selection procedure that resulted in a final sample of 63 firms or 378 firm-years or observations.

Table 1: Sample selection

Total number of companies	136
Less:	
Financial companies excluded from the study	(47)
Companies with missing data	(26)
Total number of companies in the final sample	63

3.1.2 Data and Variables

The study uses balanced panel data to achieve its research objectives. The main advantages for using panel data are that it increases the degrees of freedom and reduces collinearity among the variables, which in turn improves the efficiency and consistency of the model (Hsiao, 2006; Antoniou et al., 2008). The variables selected for this study are based on similar prior empirical studies and the prediction of capital structure theories (see Section 2). The measurement of the variables is explained in the subsequent subsection.

3.1.3 Variables and measurements

This sub section presents the variables and their measurement. The dependent variable is firm performance, which is proxied by Return on Assets (ROA) while the independent variables which were selected based on prior empirical studies are a combination of capital structure variables (as proxies for leverage) and firm specific variables that were selected as control variables. The proxies of leverage used are total debt which is further split into long term debt and short-term debt, while the firm specific characteristics which are used as control variables are firm size, liquidity, tangibility. The measurement of the variables is presented in Table 2 below:

Table 2: Variables and measurements

Variable	Measurement	Formulae/Proxy
Profitability	ROA	Profit after tax/Total assets
Total debt	Debt	Total liabilities/Total Assets
Long term debt	LTD	Total noncurrent liabilities/Total assets
Short term debt	STD	Total current liabilities/Total assets
Size	Size	Natural logarithm of total assets
Liquidity	Liq	Total current assets/total current liabilities
Asset tangibility	Tang	Total tangible assets/Total assets
period	period	Crisis period coded 1, none- crisis period coded 0
ε_i	Error term	

3.2 Model specifications

This study uses the panel regression analysis to examine the effect of the global financial crisis on the link between capital structure choices and firm performance for the period during and after the global financial crisis of 2007 to 2009. Consistent with prior studies, this study specifies the following regression models:

During Crisis (2007 to 2009)

1. $ROA = \alpha + \beta_{1\,Debt} + \beta_{2size} + \beta_{3\,Liq} + \beta_{4Tang} + \varepsilon_i$
2. $ROA = \alpha + \beta_{1\,LTD} + \beta_{2\,STD} + \beta_{3size} + \beta_{4\,Liq} + \beta_{5Tang} + \varepsilon_i$

Post Crisis (2010 to 2012)

3. $ROA = \alpha + \beta_{1\,Debt} + \beta_{2size} + \beta_{3\,LIQ} + \beta_{4Tang} + \varepsilon_i$
4. $ROA = \alpha + \beta_{1\,LTD} + \beta_{2\,STD} + \beta_{3size} + \beta_{4\,Liq} + \beta_{5Tang} + \varepsilon_i$

Period Type (2007 to 2012) (Dummies_ financial crisis, 1, otherwise, 0)

5. $ROA = \alpha + \beta_{1Period\,type} + \beta_{2\,Debt} + \beta_{3size} + \beta_{4\,Liq} + \beta_{5Tang} + \beta_{6\,FinCrisis} + \varepsilon_i$
6. $ROA = \alpha + \beta_{1period\,type} + \beta_{2\,LTD} + \beta_{3\,STD} + \beta_{4size} + \beta_{5\,Liq} + \beta_{6Tang} + \beta_{7\,FinCrisis} + \varepsilon_i$

4. Results and discussion

4.1 Introduction

This section presents that analysis of results. The section starts by presenting a discussion based on the descriptive statistics followed by the discussion of the preliminary tests that were conducted before a discussion of the main findings of the study. Preliminary tests are conducted to test whether the assumptions of regression analysis are not violated and to provide guidance on the selection of the panel regression model that fits the dataset considered for this current study. Therefore, the section begins by presenting the descriptive statistics which provides a summary of the data used in the analysis. Thereafter, a further discussion is presented on the correlation between the variables considered for this study. This is thereafter followed by the preliminary tests for multicollinearity, normality, heteroscedasticity, model selection procedure and finally the analysis of the main results respectively.

4.2 Descriptive statistics and correlation matrix

As stated earlier this sub section presents the summary statistics for the variables considered for this current study. Table below 3 below presents the summary of the variables considered in panels. The Panels are labelled A to C in order to present the summary based on the match the objectives of the start which split the entire period into during, after crisis and entire period. Panel A presents the descriptive statistics based on the during the crisis period while Panel B and present the summary statistics for the after-crisis period and the combined period respectively. A discussion of the summary statistics for each of the panels is provided below Table 3 below:

Table 3: Summary statistics

VARIABLES	N	mean	sd	min	max
Panel A (2007-2012)					
ROA	378	10.41	10.07	-82.68	47.32
ST_Debt	378	0.0594	0.0576	0	0.332
LT_Debt	378	17.93	15.45	0	65.33
Debt	378	0.181	0.158	0	0.748
Size	378	9.116	1.396	4.777	12.19
Tangibility	378	0.881	0.148	0.302	1
Liquidity	378	0.13	0.0962	-0.734	0.466
Panel B (2007-2009)					
ROA	189	11.44	11.87	-82.68	47.32
ST_Debt	189	0.065	0.0636	0	0.332
LT_Debt	189	17.77	15.31	0	65.15
Debt	189	0.181	0.158	0	0.748
Size	189	8.962	1.424	4.777	12.04
Tangibility	189	0.876	0.152	0.302	1
Liquidity	189	0.135	0.107	-0.734	0.466
Panel C (2010-2012)					
ROA	189	9.383	7.77	-32.28	33.89
ST_Debt	189	0.0538	0.0504	0	0.274
LT_Debt	189	18.1	15.63	0	65.33
Debt	189	0.18	0.157	0	0.653
Size	189	9.271	1.354	5.203	12.19
Tangibility	189	0.886	0.145	0.331	1
Liquidity	189	0.124	0.0838	-0.137	0.4

A glance at the summary statistics provided in Table 3 under the Panel A (that is, combined period) show that ROA had an average of 10.41, and with a minimum of negative 82.6 and a maximum of 47.32. Furthermore, the summary statistics for the same period show that ROA had standard deviation of 10.07. This shows that there was 10.07 in the volatility of ROA over the combined period. Furthermore, Panel A shows that Total debt, long term debt and short-term debt had a minimum of zero and a maximum of 0.748, 65.33 and 0.332 respectively over the combined period. In addition, the results under Panel A show that the means for Total debt, long term debt and short-term debt for the combined period were 0.181, 17.93 and 0.0594 respectively. This shows that most of the leverage on average was in the form of long-term debt relative to short term debt. Similarly, a glance at the volatility of the proxies of leverage shows that the fluctuation in total debt over the combined period was caused more long-term debt than short term debt. This is shown by the higher standard deviation of long-term

debt relative to the short-term debt. The results in Table 3 under Panel A show the standard deviations for total debt, long term debt and short-term debt were 0.158, 15.45 and 0.0576 respectively and this confirms that long term debt experienced high volatility over the combined period relative to short term debt.

Furthermore, the results show that size, tangibility, and liquidity had minimum values of 4.777, 0.302 and -0.734 respectively and maximum values of 12.19, 1 and 0.466 in the same order. The means for the same variables are 9.116, 0.881 and 0.13 respectively. The standard deviations figures for size, tangibility and liquidity during the crisis were 1.396, 0.148 and 0.0962 respectively. This shows that the size variable was more volatile over the entire period than the tangibility and liquidity variables control variables considered for this study.

Under the Panel B (that is, during the crisis period), the results show that ROA had an average of 11.44, and with a minimum of negative 82.6 and a maximum of 47.32. Furthermore, the results under Panel B show that ROA had standard deviation of 11.87. This shows that ROA fluctuated more during the crisis period relative to the combined period. Furthermore, Panel B shows that Total debt, long term debt and short-term debt had a minimum of zero and a maximum of 0.748, 65.33 and 0.332 respectively over the crisis period. In addition, the results under Panel A show that the means for Total debt, long term debt and short-term debt for the crisis period were 0.181, 17.77 and 0.065 respectively. This shows that most of the leverage during the crisis period was on average in the form of long-term debt relative to short term debt. Similarly, a view at the volatility of the proxies of leverage shows that the fluctuation in total debt during the crisis period was caused more long-term debt than short term debt. The results in Table 3 under Panel B show that long term debt has the highest standard deviation of long-term debt relative to total debt and short-term debt. The standard deviations for total debt, long term debt and short-term debt during the crisis period were 0.0636, 15.31 and 0.158 respectively and similar to the combined period, the results under Panel B also confirm that there was too much volatility in long term debt during the crisis period relative to the other proxies of capital structure during the crisis period.

Furthermore, the results show that size, tangibility, and liquidity had minimum values of 4.777, 0.302 and -0.734 respectively and maximum values of 12.04, 1 and 0.466 following the same order. The means for the same variables respectively are 8.962, 0.876 and 0.135 while the standard deviations figures were 1.424, 0.152 and 0.107 respectively. Consistent with the combined period, the results under Panel B show that the size variable was also more volatile during the crisis period than the control variables considered for this study.

As for Panel C, that is the after-crisis period, the results show that ROA had an average of 9.383, and with a minimum of negative 32.28 and a maximum of 33.89. Furthermore, the summary statistics show that ROA had standard deviation of 7.77. This shows that the volatility in ROA after the crisis period was lower than the crisis and the combined periods. This also confirms that the volatility in ROA

observed in the combined period was caused more by the volatility caused by the impact of the crisis period on capital structure dynamics and consequently on firm performance. The results in Panel C also shows that Total debt, long term debt and short-term debt had a minimum of zero and a maximum of 0.653, 65.33 and 0.274 respectively after the crisis period. In addition, the results under Panel A show that the means for Total debt, long term debt and short-term debt for the crisis period were 0.18, 18.1 and 0.0538 respectively. Similar to the crisis and combined period, the results in Panel C show that most of the leverage on average was in the form of long-term debt. From a volatility perspective, the results in panel C also show that the standard deviations for total debt, long term debt and short-term debt were 0.157, 15.63 and 0.0504 respectively. This also shows that volatility in the proxies of leverage was highest for long term debt variable after the crisis period. Furthermore, a comparison of the three panels shows that volatility in the proxies of leverage was consistently high for the long-term debt for all panels and also that the after-crisis period had the highest fluctuation in long term debt relative to the crisis and the combined period.

Furthermore, the results show that size, tangibility and liquidity had minimum values of 5.203, 0.331 and -0.137 and maximum values of 12.19, 1 and 0.4 respectively. The means for the same variables are 9.271, 0.886 and 0.124 respectively while the standard deviations figures for size, tangibility and liquidity during the crisis were 1.354, 0.145 and 0.0838 respectively. Overall, the results under Panel C shows that the size variable was more volatile after the crisis period than the other controls variables used in this study.

4.3 Preliminary tests

Several preliminary tests were performed before conducting the panel regression analysis to the data set. The first conducted was the test for multicollinearity. Multicollinearity was tested using the Pairwise correlation matrix. The purpose of pairwise correlation test is to detect if there is a problem of multicollinearity problem in the dataset. The problem of multicollinearity occurs when there is a strong bivariate correlation among the variables in the model. According to Lewis-Back (1993) and Gujarati (1995), the maximum correlation which can be tolerated is when the coefficient of the pairwise correlation is below 0.8. Blow is Table 4, that presents the correlation matrix for the three period under consideration. The correlation matrix for each period is shown in a panel as can be seen in Table 4. The explanation of the contents of each Panel are discussed under table 4 below.

4.3.1 Test for Multicollinearity

As can be seen in Table 4, the contents of Panels A, B and C show that there are no coefficients of pairwise correlation which are larger than 0.8 except for total debt and long-term debt. This can be expected as total debt is mostly made up of long-term debt as can be seen from the descriptive statistics. Since all the other variables have pairwise correlation coefficients that are under 0.8, it can be concluded that multicollinearity problem does not exist in all the other variables except for total debt

and long-term debt. In addition to help us to detect multicollinearity, these correlation tables also provide preliminary description of the relationships among the variables. A glance Panels A, B and C shows that short term debt, long term debt, total debt, size and tangibility all have a negative correlation with ROA, whilst liquidity ratio has a positive correlation. The negative correlation of all the proxies debt, size and tangibility with firm performance is accordance with perking order theory while a positive correlation between liquidity and firm performance is consistent with the trade-off theory.

Table 4: Correlation matrix

Panel A (2007 – 2012)

	ROA	ST_Debt	LT_Debt	Debt	Size	Liquidity	Tangibility
ROA	1						
ST_Debt	-0.130	1					
LT_Debt	-0.256	0.462	1				
Debt	-0.231	0.497	0.980	1			
Size	-0.166	0.076	0.194	0.183	1		
Liquidity	0.691	-0.103	-0.190	-0.178	-0.040	1	
Tangibility	-0.045	-0.117	-0.257	-0.243	-0.044	-0.012	1

Panel B (2007-2009)

	ROA	ST_Debt	LT_Debt	Debt	Size	Liquidity	Tangibility
ROA	1						
ST_Debt	-0.129	1					
LT_Debt	-0.256	0.451	1				
Debt	-0.217	0.504	0.968	1			
Size	-0.114	0.116	0.220	0.194	1		
Liquidity	0.752	-0.156	-0.281	-0.259	-0.020	1	
Tangibility	-0.056	-0.064	-0.217	-0.185	-0.045	-0.056	1

Panel C 2010-2012

	ROA	ST_Debt	LT_Debt	Debt	Size	Liquidity	Tangibility
ROA	1						
ST_Debt	-0.167	1					
LT_Debt	-0.272	0.492	1				
Debt	-0.268	0.500	0.993	1			
Size	-0.229	0.050	0.169	0.174	1		
Liquidity	0.577	-0.034	-0.079	-0.079	-0.052	1	
Tangibility	-0.022	-0.181	-0.299	-0.304	-0.051	0.051	1

4.3.2 The Variance Inflation factor (VIF): test for multicollinearity among independent variables

The VIF measures the strength of the correlation between the independent variables used in the regression analysis. Therefore, in order to test for the effect of multicollinearity amongst the independent variables the VIF test was conducted, and the results are shown in Table 5 below.

Table 5: Variance Inflation Factors (VIF) of the independent variable

	VIF					
Variable	M1	M2	M3	M4	M5	M6
Debt	1.16		1.14		1.14	
LT_Debt		1.46		1.44		1.43
ST_Debt		1.26		1.32		1.29
Liquidity	1.09	1.11	1.01	1.01	1.04	1.05
Tangibility	1.05	1.07	1.1	1.1	1.07	1.08
Size	1.04	1.05	1.03	1.03	1.05	1.05
FinCrisis					1.02	1.03
Mean VIF	1.08	1.19	1.07		1.06	1.15

Based on the results in Table 5 above, it can be envisaged that all VIFs are below 5 indicating that multicollinearity is not an issue in this study.

4.3.3 Normality test

Further tests were also conducted to detect whether the normality assumption is not being violated. To perform this test, the Jacques Bera test for normality was used and the results of this test are shown in Table 6 below.

Table 6: The Jacques Bera test for normality

Model	Jarque-Bera Chi2
M1	170000***
M2	180000***
M3	200000***
M4	200000***
M5	220000***
M6	240000***

*** p<0.01, ** p<0.05, * p<0.1

The results in Table 6 above show that the residuals for all models are not normally distributed.

4.3.4 Test for heteroskedasticity

The Breusch-Pegan test for heteroskedasticity was used and the results are shown in Table 7 below.

Table 7: Breusch-Pagan test for heteroskedasticity

Model	Breusch-Pagan Chi2
M1	19.91***
M2	21.27***
M3	0.05
M4	0
M5	64.02***
M6	60.52***

*** p<0.01, ** p<0.05, * p<0.1

As can be seen from Table 7 above, the results for M1, M2, M5 and M6 show overwhelming evidence that heteroskedasticity is present. Therefore, to mitigate this problem robust statistics have been employed to mitigate the effect of heteroskedasticity.

In addition, to the tests that were conducted to detect any violations of the regression assumptions assumption, the tests for model selection were also conducted and the results from those tests are discussed in the next sub section.

4.3.5 Panel Regressions: Model selection procedure

In addition to the above tests, the next preliminary test conducted was the Hausman Specification test. The purpose of the Hausman Specification test is to know whether the individual-specific effects (unobserved individual abilities, say α) are correlated or uncorrelated with certain variables across individual (i) and over time (t) (say Xit). If α and Xit are uncorrelated, then the estimations which RE model produce will be consistent and efficient compared to FE model (Hsiao, 2006). The Hausman Specification test is conducted with SAS and the results are shown in Table 8 below. The results show that all the Pr > m values are below the significance level of 0.05, indicating that the RE model would generate more consistent and efficient result than FE model.

Initially a Hausman $\chi 2$(1978) test will be used to check whether the fixed effects model is the most appropriate model using the following hypothesis test:

H_0: Random effects or Pooled OLS is suitable.

H_1: Fixed effects model is suitable.

If the Hausman's test indicates that the fixed effects model is not suitable, the Breusch-Pagan Lagrange Multiplier test is employed to check whether the random effects or Pooled OLS model is more suitable.

Table 8: Model selection

Model	Hausman Chi2	BP LM	Recommended Model
M1 2007-2009	1.90	0	Pooled OLS
M2 2007-2009	3.55	0	Pooled OLS
M3 2009-2012	6.86	0	Pooled OLS
M4 2009-2012	1.67	0	Pooled OLS
M5 2007-2012	2.15	0	Pooled OLS
M6 2007-2012	3.60	0	Pooled OLS

*** p<0.01, ** p<0.05, * p<0.1

From the tests above, the fixed effects model was found to be unsuitable, therefore, the Breusch-Pagan

Langrange Multiplier test was conducted to determine whether the random model or the pooled OLS model was appropriate. The results in Table 8 above show that the Pooled OLS model was preferred for all the models considered for this study. Hence, the next section therefore discusses the results from the main findings following the suggested models shown in Table 8 above.

4.4 Results on the effect of the GFC on the link between capital structure and firm performance.

This section presents the results of panel data regressions using data for the period 2007-2012 broken into two sub-periods 2007-2009 (to represent the period of during the global financial crisis), and 2010-2012 (to represent the period of after financial crisis). Table 9 presents full results obtained from running panel regressions in Stata. The columns numbered 1 to 6 represent the models that were run for analysis. The models run for this study are shown under the methodology section (therein also numbered 1 to 6). The results in Table 9 also show the observed coefficients and the level of significance of the relationship between the dependant variable and the independent variables is shown by means of stars. The coefficients and their signs for each variable represent the magnitude of influence of that variable on firm performance and its relationship with firm performance. Therefore, a higher coefficient indicates that that specific variable has a greater influence or impact on firm performance and vice versa. The positive or negative sign of the coefficient indicates whether the specific variable has a direct or inverse relationship with firm performance. The stars represent the level of significance of the relationship. For example, three stars represent significance at 1% while one and two stars represent significance levels at 10% and 5% respectively. Variables without stars were found to have no influence or impact on firm performance. Table 9 below represents a panel regression results for all the models followed by a discussion of those results below it.

Table 9: Regression results

VARIABLES	(M1†) 2007-2009	(M2†) 2007-2009	(M3‡) 2010-2012	(M4‡) 2010-2012	(M5†) 2007-2012	(M6†) 2007-2012
ST_Debt		2.398		-9.282		-1.815
		(8.849)		(9.893)		(6.932)
LT_Debt		-0.030		-0.104***		-0.080***
		(0.049)		(0.033)		(0.026)
Debt	-0.588		-11.571***		-6.830**	
	(5.749)		(2.943)		(3.171)	
Size	-0.824**	-0.782**	-0.955***	-0.970***	-0.845***	-0.813***
	(0.383)	(0.377)	(0.326)	(0.325)	(0.248)	(0.244)
Liquidity	82.793***	82.019***	51.605***	51.597***	69.534***	68.999***
	(10.612)	(11.134)	(5.207)	(5.199)	(9.282)	(9.427)
Tangibility	-1.519	-2.004	-6.965**	-7.106**	-4.510**	-4.953**
	(3.178)	(3.080)	(3.144)	(3.136)	(2.238)	(2.125)
FinCrisis					0.979	0.975
					(0.766)	(0.756)
Constant	9.045*	9.468*	20.085***	20.651***	13.808***	14.277***
	(5.247)	(5.290)	(4.264)	(4.286)	(3.513)	(3.511)
Observations	189	189	189	189	378	378
R-squared	0.576	0.577	0.425	0.430	0.511	0.515
Adjusted R-squared	0.567	0.565	0.412	0.414	0.505	0.507
F_test	21.24***	22***	33.99***	27.60***	23.30***	24.81***

†Robust standard errors in parentheses. ‡Standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

A glance at the results in Table 9 show some interesting and contrasting observations about the relationship between capital structure and firm performance for the periods during and after crisis and the combined period. For example, results in table 9 show that during the crisis period (refer to M1 and M2), all the proxies of capital structure, that is total debt, long term debt and short-term debt ratios have an insignificant relationship with firm performance, hence, suggesting that capital structure does not have an impact on firm performance during a crisis period. The findings of this study are consistent with the study of Ebaid (2009) who found that debt had no impact of firm performance. However, the findings of this study are contrary to the findings of the studies that found a positive relationship between leverage and firm performance (see for example, Zeitun and Tian, 2007) and those that found a negative relationship (see for example, Khodavandloo et al., 2017, Gabrijelcic et al., 2017) between leverage and firm performance during a crisis period.

Contrary to the crisis period, the results for the combined and after crisis period show that only total debt (refer to M3 and M5) and long-term debt (refer to M4 and M6) proxies of capital structure have a significant negative relationship with firm performance while short term debt, similar to the during the crisis period, is insignificantly related to firm performance. The findings of a negative relationship between firm performance and both total debt and long-term debt are consistent with the findings in some of the prior studies that also found a negative relationship between firm performance and both total debt and long-term debt proxies of capital structure (see for example, Schulz, 2017; Khodavandloo et al., 2017). However, the findings of a negative relationship between firm performance and both total debt and long-term debt suggest that firms that use debt to finance their business activities and investments are less profitable, which is a finding that is consistent with assumptions of the perking order theory.

With respect to control variables, the results in Table 9 show that size has a negative relationship with firm performance for all the models considered for this study, that is, irrespective of whether it's a crisis period or not (refer to M1 and M2, M3, M4, M5 and M6). The finding of the negative relationship is consistent with the some of the prior studies that also found a negative relationship between size and firm performance (see for example, Titman and Wessels, 1988; Hall et al., 2004; Chakraborty, 2010; Vithessonthi and Tongurai, 2015; Dimitropoulos et al., 2020). However, the findings of this study contradict some of the findings in prior studies that found a positive relationship between size and firm performance (see for example, Michaelas et al., 1999; Sogorb-Mira, 2005; Antoniou et al., 2008; Al-Ajmi et al., 2009; Bevan and Danbolt, 2000; Crnigoj and Mramor, 2009; Pathak, 2010; Zhang, 2010; Sheikh and Wang, 2011; 2013; Dawar, 2014; Isik, 2017). The finding of a negative relationship between size and firm performance is also consistent with the assumptions of the perking order theory.

Furthermore, the results in Table 9, show that liquidity has a positive relationship with firm performance for all the models at 1% significance level (that is, for models M1 to M6). The finding of a positive relationship corroborates the findings in some of the prior studies (see for example, Al-Najjar, 2011; Ozkan, 2001; Goddard et al. 2005; Chakrabarti and Chakrabarti, 2019; Ahmed and Bhuyan 2020; Bradley et al., 1984; and Kaur and Rao, 2009) while also contradicting others that found a negative relationship between liquidity and firm performance (see for example, Mazur, 2007; Pathak, 2010; Sheikh and Wang; 2011; Alom, 2013).

Lastly, the results in Table 9 show that although tangibility is insignificantly related to firm performance during the crisis period, it is consistently negatively related to firm performance for both the after-crisis period and combined period (refer to M3, M4, M5 and M6). The results for the after the crisis period are consistent with some of the findings in prior studies that found a negative relationship between tangibility and firm performance (refer to, Nguyen and Ramachandran, 2006; Al-Ajmi et al., 2009; Karadeniz et al., 2009; Crnigoj and Mramor, 2009; Sheikh and Wang, 2011) and contrary to those that found a positive relationship between tangibility and firm performance (see for example, see for example, Michaelas et al., 1999; Antoniou et al., 2008; Sogorb-Mira, 2005; Abor and Biekpe, 2009; Bevan and Danbolt, 2000; Frank and Goyal, 2009; Chakraborty, 2010; Nunkoo and Boateng, 2010; Pathak, 2010; Zhang, 2010; Cortez and Susanto, 2012; Arvanitis et al., 2012; Moosa et al., 2011).

5. Conclusions, limitations, and recommendations

5.1. Conclusion

This section provides a conclusion, limitations, and recommendations for future research. This study used robust regressions to examine the relationship between capital structure and firm performance during, and after the 2007 to 2009 global financial crisis. The results were presented by splitting the entire period under consideration into the combined, during and after crisis period. The study also conducted the analysis by splitting leverage into total debt, long term debt and short-term debt given evidence in prior studies that firms may try to shorten their debt maturities during a crisis period or if they perceive that there is going to be a crisis. The split allowed this study to analyse the effect of leverage and its components on firm performance separately. Based on the results shown in Table 9, this study found that only size and liquidity had significant relationship with firm performance during the crisis period. Size had a negative relationship with firm performance during a crisis period whereas liquidity had a positive relationship during a crisis period. However, total debt (refer to M1 in Table 9), long term debt (refer to M2), short term debt (refer to M2), and tangibility (refer to M1 and M2), all had an insignificant relationship with firm performance during a crisis period.

However, the results in Table 9 show that total debt (refer to M3) and long-term debt (refer to M4) had a negative relationship with firm performance after the global financial crisis. This finding is consistent with the perking order theory. In addition, the findings in Table 9 show that size, tangibility, and liquidity also have a significant relationship with firm performance after the crisis period. Both size and tangibility have a negative relationship with firm performance while liquidity has a positive relationship with firm performance after the crisis period. These findings are also consistent with the perking order theory. Furthermore, the results show that short term debt has an insignificant relationship with firm performance in all three scenarios, that is, during, after and the combined period.

Furthermore, similar to the after-crisis period, the findings presented in Table 9 show that the results for the combined period, (refer to M5 and M6) reveal that total debt (refer to M5) and long-term debt (refer to M6) have a negative effect on firm performance. The only difference is that the coefficients are now smaller than after the after-crisis period. In addition, the results based on M5 and M6 show that size, tangibility and liquidity all have a significant relationship with form performance. Size and tangibility have a significant negative relationship with firm performance, with size and tangibility having a negative relationship at the 1% and 5% significance level respectively. This finding is also consistent with the perking order theory. Contrary to the above, the results shown in M5 and M6 show a positive relationship between liquidity and firm performance. These findings are similar to the after-crisis period.

Overall, the study shows that there is no link between firm performance and short-term debt for all the models considered for this study. Furthermore, the overall results also show that there is not link

between capital structure and firm performance during a crisis period while there is a negative relationship between both total debt and long-term debt and firm performance after a crisis and for the combined period.

5.2 Study limitations and directions for future research

This study focused on all the nonfinancial firms and excluded the firms listed in the financial industry for the reasons stated in the study. Furthermore, the study did not split the analysis by industry. The author acknowledges that the capital structures of firms is also influenced by the industries in which the company operates. For example, some industries are capital intensive while others are not, so that also suggests their capital structures could be different. Therefore, following that argument, a separate industry analysis could have been conducted to examine if the findings obtained from this study still hold if the tests are replicated to individual industries. In addition, the study used balanced panel regressions, which means it only considered the firms that survived over the entire period under consideration. This also means that all the newly listed and delisted firms were excluded from the sample. This could raise the issue of survivorship bias. However, there are many studies that also used balanced panel regressions in conducting their studies (for example, Khodavandloo et al., 2017). Therefore, future studies could as well try to examine unbalanced datasets and see if the results could be different. Furthermore, future studies could as well try to examine the impact of capital structure on firm performance based on firms that are listed under the financial sector. Furthermore, this study focused on firms listed on the JSE main board, future studies can as well focus on firms listed on the alternative exchange. In addition, future studies can as well conduct tests that compare large firms and small and medium size enterprises (SMEs) given their differences in capital structures and ability to raise money using external channels. In a similar vein, future studies can as well focus on SMEs separately since these firms are crucial in promoting economic growth and creating employment opportunities in most of the economies around the world.

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