Evaluation of the use of debt by South African retail firms and the relationship between debt and profitability in these firms

A research report submitted by

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Abstract

This study investigates whether the retail sector responded to the reduction of interest rates in the period 2010 to 2020 by increasing debt utilisation and whether the increased debt utilisation had a positive impact on profitability. The year 2020 was given notable attention as interest rates were at their record low in an effort to stimulate the South African economy. Measures of debt utilisation included the short-term debt ratio, the long-term debt ratio, and the total debt ratio, while profitability was measured through return on assets and return on equity. A total of 57 JSE listed retail firms were used in the study. Panel regression was used to test the relationship between debt utilisation and profitability. The findings indicate that there was an upward trend in debt utilisation over the years with a steeper increase in 2020. Positive financial leverage was only realised up to 2017 and in 2019. Although interest rates were at their all-time low in 2020, retail firms could not take advantage of this as Covid 19 impacted the benefits of cheaper debt negatively. The findings further show that there was a negative relationship between debt utilisation and profitability and that this relationship was consistent for all indicators of debt and profitability. The year 2020 worsened this relationship. These findings imply that the reduction of interest rates may lead to increases in debt utilisation, but the potential benefit of the increased debt may be eroded in adverse economic environments.

Keywords: debt utilisation, expansionary monetary policy, gross domestic product, interest rates, profitability, retail firms

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Table of Contents

List Of Tables

List of figures

Declaration

I declare that this research report is my original work and that all sources have been accurately reported and acknowledged. It is submitted for the degree of Master of Commerce to the University of Witwatersrand, Johannesburg. This research has not been submitted for any degree or examination at this or any other university.

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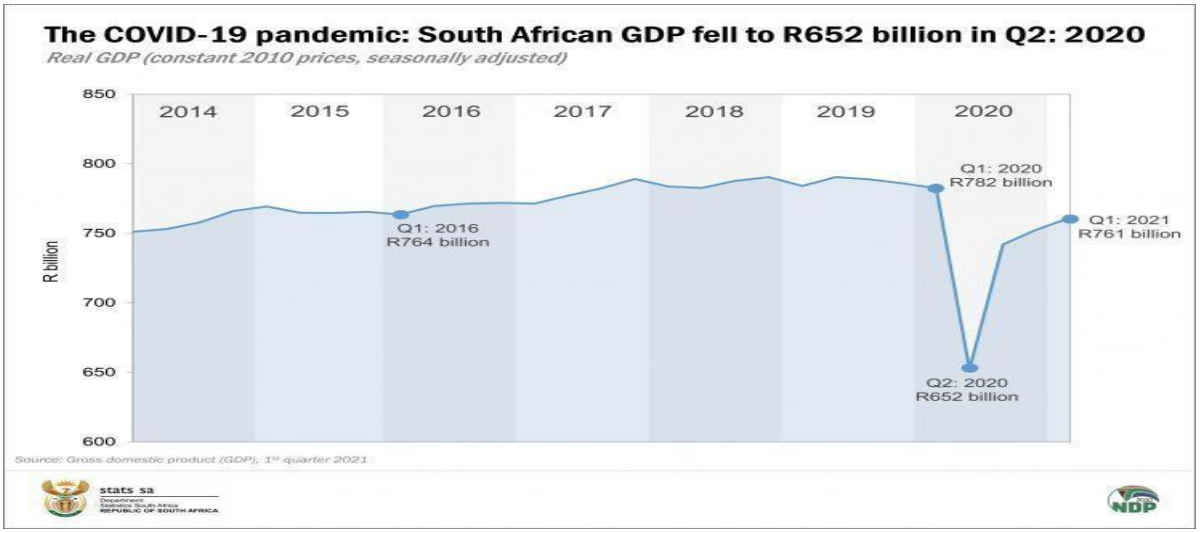
1. INTRODUCTION

1.1. Background of the study

Most companies usually use debt in their operations intending to generate profits that are higher than the cost of debt they pay to their lenders (Easterwood & Kadapakkam, 1980). The usage of debt however increases the overall risk of the company through the increase of financial risk (Easterwood & Kadapakkam, 1980). It can therefore be said that debt can work for the company or against it depending on how effectively it is utilised (Murugesu, 2013). The Monetary Policy Committee as a component of the Reserve Bank is mandated to decide on and implement the appropriate monetary policies in response to economic conditions (SARB, 2021). Monetary policies include controlling the money supply and the adjustment of interest rates (SARB, 2021). The country's Gross Domestic Product (GDP) serves as a primary indicator of the country's economic state (StatsSA, 2020). GDP measures the total value of goods and services produced within the boundaries of a country (StatsSA, 2020). Over the years, the tertiary sector has overtaken the primary sector in being the biggest contributor to the GDP of South Africa (StatsSA, 2020). Over the past years, the tertiary sector has managed to grow faster than the total GDP of South Africa due to changing environment and the evident advancements. The retail firms are also part of the tertiary sector thus it is critical that it reacts to any economic policies that are implemented.

The Monetary policy committee reduced the interest rate in 2020 to its record low to counter the effects of Covid 19 on GDP. An example of this is illustrated in Figure 1 below. This Figure shows an economic downturn in the form of a 14.3% decrease in GDP in the second quarter of 2020.

Figure 1: Effects of Covid 19 on GDP



Source: StatsSA-*P0441 - Gross Domestic Product (GDP)-4th Quarter 2020*.

One of the significant contributors in the tertiary sector is the retail sector. The retail sector solely contributed 16.2% to the GDP of South Africa in the fourth quarter of 2020 (StatsSA, 2020). This significant contribution shows the importance of this sectorto the economy of the country even during difficult times. The only other sector that contributed significantly to the GDP in 2020 is the manufacturing sector that contributed 13% (StatsSA, 2020). The remaining percentage was shared amongst the other sectors of the economy. In times of economic downturn, the reserve bank implements expansionary monetary policies that include the reduction in interest rates (SARB, 2021). The reduced interest rate makes debt to be a very attractive source of financing as there are lower cash outflows in the form of interest payments (SARB, 2021).

The use of debt as part of capital structure research has been researched widely with specific mention to the theories developed by researchers such as Modigliani and Miller (Modigliani & Miller, 1958). It has also been found that there is an inverse relationship between interest rates and GDP (Hatane Semuel, 2015). This implies that GDP increases when interest rates are reduced and vice versa. It is almost impossible to argue with the logical deduction that the decrease in interest rates is an incentive for firms to utilise more debt as the reduction of interest rates is usually a result of poor economic conditions (Vy, 2016). As directors have a fiduciary duty that involves acting in the company's best interest, whether they use these funds to better the company is a critical question to ask. The use of debt can potentially increase the profitability of

firms in general if they embark on profitable projects (Vy, 2016).

Although the use of debt may be encouraged, it is important to monitor debt usage as the benefits may not be worth the costs related to its risks (Easterwood & Kadapakkam, 1980). Given the significance of the retail sector to the economy of South Africa, it is important to understand the extent to which debt is used by these firms and whether it is used profitably. Understanding the relationship between the use of debt and the profitability of retail firms will indicate whether debt can be used to stimulate the economy during periods of economic downturn. To the researcher's knowledge, there is not much research done in the retail sector of South Africa while significant research has been done in other countries in this regard.

1.2. Problem statement

The retail sector contributed nearly 20% of the GDP of South Africa in the last quarter of 2020 even under the economic challenges as a result of the Covid 19 pandemic (StatsSA, 2020). This is not surprising as the tertiary sector has become the most important sector over the years due to the changes in the economic structures of South Africa (StatsSA, 2020). This significant contribution is an indicator that the sector must be given attention as it can change the direction of the economic conditions of South Africa. The reduction of interest rates is a popular expansionary monetary policy to expand the economy once again as firms are incentivised to take advantage of the cheaper debt. Due to the significance of the retail sector in South Africa, it becomes important how much debt do firms in the retail sector utilise and whether this debt is utilised profitably. If the debt is utilised productively, this means that the profitability of the firms increases thus increasing their contribution to the overall GDP of the country. This would then provide guidance on whether the reduction of interest rate is an effective policy to implement to counter economic downturn.

1.3. Purpose of the study

The purpose of this research is to explore the extent to which retail firms utilise debt in their operations and the effects of debt on the profitability of these firms. The research uses the total debt ratio, long-term debt ratio, and short-term debt ratio as proxies for debt usage while return on assets and return on equity will be used as a proxy for profitability. The use of debt by these firms will be closely analysed to determine if interest rate reductions trigger the expansion of the economy.

1.4. Significance of the study

The study is significant for the Reserve Bank as it will inform the policies as to whether the reduction of interest will increase economic activity through increased use of debt by retail firms. Additionally, it is important to determine whether large sectors (such as the retail sector) in the economy are sensitive to economic policies so that they are targeted when economic policies are set. This will help quicken the economic recovery. The research is also relevant for executives of the firms as they will be able to determine whether the use of debt leads to the betterment of their firms by increasing profitability. Potential investors will also find the research helpful as their decision might be based on debt levels depending on the relationship between profitability and debt levels. The study will also inform the debt levels that are beneficial to retail firms in South Africa.

1.5. Research question

The research questions are:

1) How much debt was utilised by South African listed retail firms from 2010 to 2020?
2) Was there an increase in debt utilisation in the retail sector in 2020?
3) Is there an association between debt ratios and return on assets of South African retail firms?
4) Is there an association between debt ratios and return on equity of South African retail firms?
5) Did retail firms in South Africa realise positive financial leverage between 2010 and 2020?

1.6. Limitations, delimitations, and assumptions

This study will only focus on South African retail firms listed on the JSE. The findings of the study should therefore not be generalised to all firms in South Africa. Other variables such as management intentions and industry knowledge are difficult to measure, therefore these variables will not be taken into account in the study (Correia, Flynn, Uliana & Wormald, 2015). The study only focuses on the 11 years from 2010 to 2020.The models are run with and without the year 2020 as it is assumed that Covid 19 would have worsened the performance of retail companies during that year. The

researcher will assume that information obtained from databases and integrated reports is accurate.

1.7. Definition of terms

Table 1 below defines the key terms

Table 1: Definition of terms

Profitability	The extent to which a business yields profits or financial gain (Habib, Khan, & Wazir, 2016).
Leverage	The use of debt as a source of funding the assets of the business (Habib et al., 2016).
Debt ratio	Total debt as a ratio of total assets (Habib et al., 2016).
Monetary expansionary policy	The reduction of interest rates and the increase in money supply to stimulate the economy (SARB, 2021).
Reserve bank	South African Reserve Bank (SARB, 2021).
GDP	The total value of all goods and services produced within the boundaries of a Country (StatsSA, 2020).
Cost of debt	The prime lending interest rate of South Africa (SARB, 2021).
Fiduciary duty	The fiduciary duty of directors stipulates that a director will act in the best interests of the company and with the necessary care and skill (Simone, 2018).
JSE	Johannesburg Stock Exchange (JSE, 2021).

Retail sector	A sector where the buyer acquires goods and services for final consumption (MBN, 2021)
Observation	This is the ROE, ROA, STDA, LTDA, SIZE, SGSALES, and Asset growth as recorded for each year
Positive gearing	When the returns from debt utilisation are more than the cost of debt (Gunarathna, 2016).
Negative gearing	When the returns from debt utilisation are less than the cost of debt (Gunarathna, 2016).

2. LITERATURE REVIEW

2.1. Introduction

This section reviews previous literature which explores the relationship between debt and the returns of retail companies. The overall usage of debt in the retail sector and whether this usage is driven by interest rates will be explored. This will allow an indirect connection to be drawn between the reduction of interest rates and increasing returns and therefore increasing GDP. The theories around the usage of debt will be explored as many researchers have considered whether the theories hold (Ahmeti, 2015). Understanding the aforementioned will allow a conclusion to be drawn as to whether the expansionary monetary policy in the form of a reduction in interest rates can be used successfully in South Africa with reference to the retail sector.

2.2. The retail industry in South Africa.

The retail sector is a very significant sector in South Africa given its notable contribution to the GDP of the country. The sector contributes almost 20% to the GDP in the last quarter of 2020 (StatsSA, 2020). In addition, it must be noted that this sector contributed 1,3 percentage points to the 6,3% of GDP growth of the last quarter of 2020. This is the second highest contributing industry after the manufacturing industry that contributed 2,4 percentage points. The other industries made the other percentage points in smaller proportions. It must be noted that this was the time when the effects of Covid 19 were at their peak. Prior to that year, the retail sector contributed 0.6 percentage points in the growth rate of the 2019 GDP (StatsSA, 2020). This further proves the importance of this sector in South Africa. The Covid 19 pandemic however had a big impact on this sector. The number of employed persons decreased by 660000 in the third quarter of 2021 (StatsSA, 2021). The retail sector accounted for 309000 of the population that lost their jobs (StatsSA, 2021) which is almost 50% of the decrease. In addition to its importance to the GDP of South Africa, the retail sector employed more than 20% of the labour force by the last quarter of 2020 (StatsSA, 2020). The industry was the second largest employer after community and social services which employed 23,6% of the labour force (StatsSA, 2020). The industry employed almost 20% of the employed population in South Africa in the last quarter of 2021 (StatsSA, 2021). This shows the importance of this industry in the economy of South Africa.

2.3. Debt usage in the retail sector

Most retail firms rely on organic growth rather than mergers and acquisitions for their growth, therefore funding becomes a very important discussion in this industry (Goodacre, 2003). According to Turkson, Aggrey-Fynn & Sarkey (2012), non-financial firms like retail firms are highly leveraged because they generally use short-term borrowings. This means that these firms can convert the debt into profit relatively quickly given that they will need to repay the funds in the short term. Gatchev, Spindt, and Tarhan (2009) concluded that

firms with imperfect information use more debt to finance their assets with equity used as a last resort. It has also been found that the cost of being overleveraged is far much higher than the cost of not taking advantage of the benefits of debt (Binsbergen, Graham, & Yang, 2014). The implication of this is that firms must not utilise excessive debt as the sought benefits will be eliminated by other costs such as those relating to bankruptcy.

The usage of debt comes with a tax benefit because interest is deductible when calculating tax (Kraus, Alan, & Litzenberger, 1973). It may seem favourable to use only debt as a source of financing as it grants a tax benefit, this is not the case as higher financial risk may lead to liquidation. Wamser (2014) however argues that thin capitalisation rules aim at reducing the tax benefit by limiting the deductibility of interest expenses. Other benefits of using debt include effective management of operations by those responsible for the management role (Jensen, 1986). This means that management becomes more careful when third-party funds are utilised in the business as compared to only utilising funds of shareholders.

The usage of debt however comes with its risks as it results in an increase in business risk as a result of an increase in financial risk. Scott (1976) argued that the consequence of negligence in the usage of debt is financial distress as the entity may not be generating sufficient returns to compensate lenders. The debt levels of firms could also be the cause of conflicts between management and other investors as their interest is exposed to more risks such as liquidation should the entity be unable to repay the debts (Binsbergen et al., 2014). Research shows that firms that rely on debt offered by private agreements have lower levels of long-term debt outstanding (Easterwood & Kadapakkam, 1980). This means that retail firms that utilise private debt are more incentivized to repay their outstanding debt earlier than those that use

listed debt instruments. This could be because of the lack of follow-up from the government and poor management of funds.

Goodacre (2003) concluded that most retail firms use debt in the form of operating leases instead of the traditional debt arrangements. This type of financing seemed to be more preferred as it was found that it is 3.3 times higher than the traditional usage of debt. This type of financing was used in the retail sector to take advantage of off-balance-sheet financing. The IASB however countered this type of financing by introducing IFRS 16 which requires firms to recognize a lease liability and a corresponding right of use asset (IASB, 2019). Bronars and Deere (1991) concluded that other than increasing corporate returns, debt may be issued to reduce the monopoly in control by the shareholders of the company. The interest of lenders limits the rights of the shareholders to some extent. Almeida and Philipphon (2007) found that financial distress is more likely to occur in recessionary times thus debt should be utilised with more caution.

2.4 Positive financial leverage

The benefits of monetary policies in the form of reduction of interest can only be realised if firms use the cheaper debt profitably. It is expected that debt is used profitably when directors do not seek to serve their self-interests but those of shareholders (Nyorekwa, 2018). The benefits of debt can be maximised when the cost of the debt is lower than the returns generated from that debt either in the short or long term. The return on equity is generally expected to be higher with more debt partly due to the tax benefit that is inherent in debt (Gunarathna, 2016). The costs associated with debt may exceed the benefits if the debt is used beyond optimal levels which offsets the impact of monetary policies (Gunarathna, 2016). Positive financial leverage is therefore realised when the cost of debt is lower than the returns realised from the utilisation of the debt. The profitable utilisation of debt by significant economic sectors is therefore critical to the effectiveness of monetary policies, especially during periods of economic contraction. Balancing the possibility of higher shareholder return and costs of financial distress is important in deciding on the level of leverage the firm should reach to realise the benefits of using debt (Mishra, 2019).

Leverage has a positive effect on firm investment levels (Dang, 2011). This implies that the firms should utilise debt such that it allows them to generate excess returns that they can reinvest to enhance their productivity. A multiplier effect must kick in such

that the further investment multiplies within the firm and therefore the economy of the country. This means that leveraged investments should be used profitably to produce multiplied returns (Argawal, Ma, Park, & Zheng, 2022). This approach to debt usage is sustainable because the debt does not become a financial burden to the firm but it becomes a way of financing profitable operations that will lead to more investment capital for the firm. Graham (2001) found that some tax shields may not be utilised at all, or the utilisation is delayed due to variations in profitability, this reduces the possibility of positive financial leverage. When this happens, the effectiveness of expansionary monetary

policy is reduced as the benefits of debt are not maximised. Pindado and Rodrigues (2005) also found that the benefits of debt eventually outweigh its costs when the momentum of the economy is maintained. This implies that positive financial leverage may be realised in the longer term.

Results of the analysis of the financial leverage of the South African retail sector are discussed in section 4.2.

2.5. Debt and returns

We have established the importance of the profitable utilisation of debt by firms for the effectiveness of expansionary monetary policies. It is therefore critical to consider whether there is precedence for this relationship. We will therefore now consider whether the debt is used profitably to enable the economic policy to be effective.

The clear and logical reason for the utilization of debt is the expectation that the funds will be re-invested to projects that will yield returns that are higher than the cost of the debt utilised (Murugesu, 2013). This implies a null hypothesis that debt increases returns and the alternate hypothesis stating the opposite. The tax shield reduces the tax payable thus it is expected that debt utilisation increases profits. Graham (2002) agreed with this logic as he concluded that the tax benefits of debt range from 4.3% to 9.7% of the total value of firms. Graham (2001) however found that the tax benefits range between 8% to 10% of firm value while this could be increased to 15% if the firms use the debt even more profitably over time. When a firm takes out debt, its commitment to repay the debt is independent of whether the debt is used profitably or not within that firm (Adair, Adaskou, & Mcmillan, 2015). There have been different conclusions on the relationship between debt usage and profitability. It was found that the reason for the difference in the conclusions is due to many reasons such as

differences in variables, sample sizes, and methodologies (Habib et al., 2016). Some researchers show that expected returns of companies are positively related to the debt-to-equity ratio when beta and firm size are controlled for in the model that is used (Habib et al., 2016).

South African research has shown that debt usage has a negative impact on the profitability of relatively smaller firms that operated in the manufacturing sector (Olufunso, Herbst, & Roberts-Lambard, 2009). The research further concluded that the reduction of interest rates could outweigh the negative impact as a result of the cheaper cost of financing (Olufunso et al., 2009). In contrast, research has also shown that there is a positive and significant relationship between leverage and firm performance of South African firms (Fosu, 2013). This study consisted of 257 South African firms for 12 years up until 2009. Another study confirmed that leverage is positively associated with cash flow and profitability of firms (Moyo, Brummer, & Wolmarans, 2013). Research has shown that profitability negatively affects debt usage (Lemma & Negash, 2011). This implies that profitable firms are more likely to source funding internally in the form of retained earnings. In the same research paper, it was concluded that South African firms utilise more debt than the other Sub-Saharan countries (Lemma & Negash, 2011). Ramjee and Gwatidzo (2012) concluded that there is a negative relationship between leverage and profitability and taxes. Custódio, Ferreira, and Laureano (2013) concluded that most firms use short-term debt instead of long-term debt which has led to liquidity issues for these firms. The liquidity issues might be fuelled by lower profits over time.

Habib et al. (2016) concluded that return on assets if used as a proxy for profitability is significantly and negatively related to long-term, short-term debt, and total debt ratios. The companies used in the study are all Pakistan non-financial companies. Thestudy used financials for the ten years ranging from 2003 to 2012. Akhtar, Khan, Shahid,and Ahmad (2016) implied agreement when they concluded that there is a positive relationship between debt usage and firm value which is driven by sustainable profitability. Cole and Sokolyk (2018) concluded that corporate debt registered in the name of the company is positively related to revenues and takes longer to be repaid. It was concluded that most non-financial firms in Nigeria use short-term debt instead of long-term debt (Ganiyu, Adelopo, Rodionova, & Samuel, 2019). This research concluded that there is a significant relationship between debt usage and profitability in all the cases where it existed (Ganiyu et al., 2019). This study included 115 firms as

part of the panel and focused on data for 10 years.

A study conducted in the context of Amman confirmed this significant negative relationship between debt usage and profitability in 2012 (Shubita & Alsawalhah, 2012). This conclusion was reached after multiple regression and correlation analysis were done. The research used 39 companies that are not in financial services while retail companies dominated the sample. Mishra (2019) found that there is a negative relationship between debt and firm performance in developed countries. This negative relationship shows that firms are using debt beyond the target levels thus increasing agency costs to offset the tax shield (Mishra, 2019). Adair et al. (2015) concluded that the relationship between corporate debt and profitability follows the one that is implied in the pecking order theory. This implies that debt is not particularly the source of funding with the maximum benefits as it is not ranked first in the pecking order.

Kebewar (2013) focused on the French retail sector where an unbalanced panel of 2235 unlisted companies were analysed from 1999 to 2006. This research shows that the negative relationship is not only linear but a degree of concavity exists (Kebewar, 2013). This implies that other non-linear relationships between the two variables were observed. In contradiction to other researchers, Murugesu (2013) argued that there was no relationship between debt and profitability whatsoever. Murugesu's research was focused on companies listed on the Colombo Stock Exchange for the five (5) years from 2008 to 2012. The reliability of this research could however be easily criticised as only a sample of eleven companies was used which may be seen as toolittle given that the period of interest is only five (5) years.

Yegon, Cheruiyot, Sang, Kirui and Rotich (2014) found that a dual relationship exists between profitability and debt as a negative relationship was proven for long-term debt while a positive one was shown for short-term debt. This research was done in the context of the Kenyan banking sector by using companies that were listed on the Kenyan Exchange for the years 2004-2012. Yegon et al. (2014) further argues that there is no direct relationship between total debt and profitability because short and long-term debt may have characteristics that may set off each other when compared to profitability. Other research found that the relationship between debt and profitability is non-monotonic Muscettola and Naccarato (2016). This implies that the relationship is almost haphazard and is less likely to be estimated with accuracy.

Gill, Bigger, and Mathur (2011) concluded that there is a positive relationship between

both long-term and short-term debt. Gill et al. (2011) studied firms in the USA although the study was an extension of Abor (2005). Extensive research was also done in the textile retail sector in Pakistan and it confirmed the dual relationship between debt and profitability (Amjed, 2007). The overall findings show that the relationship between debt and profitability depends on the duration of the debt, thus it depends on whether itis short- term or long-term. It may seem that management is not utilising the long-term debt in a conducive manner to cover all the costs of the debt. This may also be caused by debt being used for projects that it was not initially taken out for. For example, instead of being invested in the business, it could be used to pay other existing lenders. Dalci (2018) concluded that the relationship between debt and profitability is U-shaped. This research attributed the positive side to tax benefits and the negative side to the costs of financial distress (Dalci, 2018). Byoun, Moore, and Xu (2008) concluded that debt-free firms pay high and sustainable dividends as there is no cost of debt to be paid. This implies that debt-free firms are relatively more profitable.

The relationship between debt utilisation and profitability is clearly affected by the cost of debt in a particular country. In 2020, South Africa was in the top five (5) of the lowest real interest rates in Africa with a rate of 2,1% (IMF, 2020). Countries such as Nigeria, Malawi, and Kenya had real rates of 5.37%, 12.72% and 6.48% respectively. Given these rates, one would expect South African companies to get more benefit from debt as the related cost is lower. However, this is not the case as previous researchers have shown a negative relationship between debt and profitability. The differences in interest rates could be one of the possible reasons for the differences in the findings summarised in Table 2 below. However, it cannot be erased that different countries face different economic conditions that dictate the performance of the companies in those countries. The fact that the below findings relate to different sectors may also be contributing to the different findings as per the table below.

Table 2 below summarises some of the prior contradicting findings on the relationship between debt and profitability.

Table 2: Findings of other researchers

Author(s)	**Finding**	**Country**	**Sector**	**Sample size**
Olufunso et al. (2009)	There is a negative relationship between debt and profitability.	South Africa	Manufacturing	130
Habib et al. (2016) Obert and Olawale (2010)	There is a negative relationship between long-term debt and profitability while this relationship is positive for short-term debt.	Pakistan	Non-financial companies	115
Kebewar (2013)	The negative relationship between debt and profitability is not linear but concave.	France	Retail	2235

Murugesu (2013)	There is no conclusive relationship between debt and profitability.	Colombia	Retail and Leisure	11
Amjed (2007)	There is a positive relationship between short-term debt and profitability while no significant relationship exists for long-term debt.	Pakistan	Textile	100
Vy (2016)	A positive relationship between debt and profitability exists as the debt is reinvested profitably by management in honour of their fiduciary duty.	Vietnam	All sectors except financial firms	200

Shubita and Alsawalhah (2012)	There is a significantly negative relationship between debt and profitability.	Jordan	Industrial	39
Gill et al. (2011)	There is a positive relationship between both short-term and long-term debt.	USA	Listed firms	272
Lemma and Negash (2011)	Firm profitability negatively affects capital structure.	South Africa	Listed firms	152
Ramjee and Gwatidzo (2012); Alarussi and Alhaderi (2018)	There is a negative relationship between leverage and profitability.	South Africa	Listed firms	178
Moyo et al. (2013)	Leverage increases with profitability and cash flow.	South Africa	Retail, Manufacturing, and Mining firms	96

Muscettola and Naccarato (2016)	The relationship between debt and profitability is not monotonic.	Italy	Retail	7370 (longitudinal sample)

2.6. Debt and Interest rates

Barry, Mann, Mihov, and Rodriguez (2008) found that companies tend to acquire more debt when they believe interest rates are more advantageous than before. In times of economic downturn, the reserve bank is mandated to implement expansionary monetary policies which include reduction of interest rates to boost the economy. This policy can only work if it leads to more consumption of debt by firms and individuals. Barry et al. (2008) found that "consistent with recent survey evidence, we find that companies issue more debt, more debt relative to investment spending, and more debt compared to equity when interest rates are low relative to historical rates". This study used more than 14000 issues of corporate debt observed during the period 1970-2001. This research further showed that the positive relationship between debt consumption and interest rates holds even when controlling for more variables that are known to be driving the increase in leverage such as expansion projects. Research has further shown that management time debt issuance to periods of economic downturn where interest rates are reduced to stimulate the economy (Graham & Harvey, 2001). This is further in line with the increase in business risk during unfavourable economic conditions.

2.7. Interest rates and exchange rates

The relationship between interest rates and exchange rates has been widely researched and common ground is usually reached when these two variables are of research interest. It was concluded that the relationship between interest rates and exchange rates depends on the economic shock that is applied at a point in time (Sanchez, 2008). That paper further found that the relationship between the two variables is positive for contractionary shocks and

negative for expansionary shocks. It was found that higher interest rates are positively linked to stronger currencies for a given economy (Engel, 2016). This implies that exchange rates respond positively to the increase of interest rates of a given economy. The positive reaction of exchange rates to an increase in interest rates dates back to 1979 when markets started being more integrated across the world (Hardouvelis, 1988). This research dealt with the US market and shows that the positive relationship is generally accepted in various economic circumstances. The above findings are true even for the South African economy during the year of 2020. To combat the effects of the pandemic, the reserve bank reduced the interest rates to record lows during that year. The rand weakened against the dollar during that year and eventually started strengthening when the interest rates were steadily increased as the economy improved later towards the end of 2020.

2.8. Theories Involving debt

The different theories involving debt have gained popularity over time with many researchers trying to prove whether these theories are valid or not. Debt is a popular research topic as it is an element of the capital structure of the companies.

2.8.1 Trade-off theory

Shubita and Alsawalhah (2012) argued that it is important for firms to keep their optimal structure in mind even when the benefits of utilsing debt can still be realised. This implies that a target capital structure exists and needs to be determined for eachfirm. Coleman, Cotei, and Farhat (2016) concluded that the extent of usage of the debtis determined by factors such as firm size, growth prospects, and experience of thosethat manage the companies. The trade-off theory established that companies should have a target leverage ratio that maximizes the debt benefit while minimizing the costof bankruptcy (Nengjiu & Robert, 2005). Kim and Sorensen (1986) however found that firms with higher debt ratios tend to have higher insider ownership. This implies that agency costs are reduced when owners are part of the management team. It must however be noted that the separation of ownership and management is encouraged in recent business practices. It remains to be found whether directors are more likely to strike the optimal debt level when they have a direct or family interest in the company.

2.8.2 Pecking Order theory

The pecking theory states that firms follow a certain preferred order when it comes to

financing the activities of the firm. The theory stresses that firms prefer to utilise internal funds before using external sources of funding (Myers, 1984). Further, the theory ranks debt before equity as it assumes that its information costs are lower than that of equity (Frank & Goyal, 2003). It was further concluded that African firms use internal sources of finances and mostly rely on short-term debt (Ojah & Gwatidzo, 2009). Wet and Gossel (2015) concluded that South African listed firms are most likely to follow the pecking order and the static trade-off theory. This research further concluded that of the listed firms, larger firms are most likely to follow the static trade- off theory while smaller firms follow the pecking order theory (Wet & Gossel, 2015). This could be attributed to the fact that listed and larger firms are more aggressive in their utilisation of debt as they can easily get access to other sources of funding should they be required to repay the debt at any point. Although these theories receive sufficient criticism, the findings of certain researchers are consistent with the pecking order theory (Chen & Chen, 2011). This research confirmed that entities prefer to exhaust internal funds before using external sources as they are cheaper.

The debate of whether entities follow the trade-off or the pecking order has not been abandoned. It was found that profitable and experienced firms follow the pecking order theory while firms that are relatively larger follow the trade-off theory (Caetano & Serrasqueiro, 2015). This paper uses the financial risk appetite of these firms to determine the theory which they are applying in their businesses. Other researchers found that the pecking order theory and the trade-off theory coexist as they are applied in different circumstances (Ghosh & Cai, 1999). These conflicting findings show that the usage may not necessarily be driven by the cost of debt but by the theories that are applied by the entities.

2.8.3 The Irrelevance theory

The irrelevance theory states that capital structure does not affect the value of the firm in any way (Modigliani & Miller, 1958). It can be said that the theory also implies that debt does not affect profitability as profitability drives the value of the firm, in the long run, should it be sustainable. However, this theory has been at the centre of criticism throughout the years and has led to more research being done throughout the years (Ganiyu et al., 2019). The criticism of the theory led to the founders making developments of the initial theory. Harford, Klasa, and Walcott (2009) however agreed with Modigliani and Miller (1958) by concluding that there is a target capital structure that firms target over time. This research also concluded that there are adjustments costs

towards the target capital structure of firms (Harford et al., 2009).

2.8.4 Application of debt theories

Latrous and Trabelsi (2013) concluded that family-owned companies incorporate less debt in their capital structure compared to other companies because they avoid exposing family investments to high risk. This behaviour implies that they do not believe in the irrelevance theory. Byoun and Xu (2013) found that some firms do not use any debt to create a reputation for themselves in the financial markets from the perspective of riskiness. These findings are against most capital structure theories that advocate for an optimal mix of debt and equity. ALTI (2006) found that firms utilise more debt once they have been listed on the various stock exchanges. This could be because listing gives the company access to a funding pool. It is not proven that the pecking order ranks the sources of finance in such a way that the stimulation of the economy is maximised, therefore the application of this theory may hinder the achievement of the goals of the expansionary monetary policy that is implemented at a point in time (Cai, 1999).

A study concluded that the economic growth, inflation rates, and income levels of a country affect the capital structure (Lemma, 2012). This shows that the state of the economy of the country to some extent triggers management to change the capital structure of their firms. Research has shown that firms in developing countries in Africa do not always comply with their target capital structure (Lemma & Negash, 2014). This research further concluded that profitable firms deviate more often from their target capital structure as compared to the less profitable firms in developing economies (Lemma & Negash, 2014). Rungani and Fatoki (2010) also concluded that profitability negatively affects capital structure. Ezeoha and Botha (2012) concluded that South African firms have target debt levels and these levels change frequently to meet certain targets. Baker and Wurgler (2002) concluded that the market timing theory has a persistent effect on the capital structure of firms due to the need to maximise the capital that is sourced.

Ramjee and Gwatidzo (2012) concluded that South African firms adjust relatively fast towards the optimal capital structure. Ntuli, Mlilo and Gwatidzo (2016) concluded that except for tangible assets and age, the importance of other determinants of capital structure does not vary with the level of leverage. Ojah and Gwatidzo (2009) found that the level of leverage in African firms is similar to that of other emerging economies like

Mexico; Thailand; Brazil; South Korea; and Turkey. Chipeta (2016) concluded that profitability is the most significant predictor of capital structure in emerging economies in Africa. Byoun (2008) concluded that most firms adjust their capital structure when companies have more than the targeted debt as that is an indicator of too much financial risk. The financial risk is more evident in recessionary economic conditions as companies are less likely to meet their debt commitments (Byoun, 2008). Pindado, Rodrigues, and Torre (2005) concluded that firms adjust their capital structure during the recession with higher speed in the shorter term.

2.9 The need for Expansionary Policies

The economic state of countries needs to be monitored and managed using economic policies such as adjustment of interest rates. The Economy of South Africa was struggling with downgrades even before the Covid 19 pandemic started. Periods like the year 2020 required economic policies to be implemented. The South African reserve bank (SARB) responded to the pandemic by reducing the REPO rate four times within the early stages of the outbreak of the pandemic (IMF, 2020). This was a way to reduce the impact of the pandemic on the economy. The impact of the pandemic on the economy is clear in Figure 1 as shown by the sharp decline in GDP. The lockdowns as a result of the pandemic started in March 2020 which is the second quarter of the year. With no policy intervention, the economy may collapse. The effect of Covid on the retail sector was fuelled by the closure of industries like restaurants, alcohol and cigarettes during the strict lockdown. These are very big contributors in this industry. The economy of South Africa lost significant foreign investments during that year as a result of lockdown (IMF, 2020).

3. METHODOLOGY

3.1. Purpose

The purpose of this study is to investigate the relationship between debt utilisation and the profitability of South African listed retail firms and determine whether this relationship enables the reduction of interest rates to drive economic growth. Debt utilisation was represented by debt ratios while profitability was represented by return on assets and return on equity. A quantitative statistical approach was used to answer the research questions. "*Quantitative research is the process of analysing, collecting, interpreting, and writing the results of the study while responding to relational questions of variables*" (Williams, 2007, p. 65).

3.2. Research questions

The research questions are:

1) Did South African listed retail firms utilise significant debt between 2010 and 2020?
2) Was there an increase in debt utilisation in the retail sector in 2020?
3) Is there an association between debt ratios and return on assets of South African retail firms?
4) Is there an association between debt ratios and return on equity of South African retail firms?
5) Did retail firms in South Africa realise positive financial leverage between 2010 and 2020?

3.3. Population and sample

At the time of the research (2021), there were 403 companies listed on the JSE. The population is all of the firms that are listed on the JSE that operate in the retail sector in South Africa. The first sampling criteria for inclusion in the sample is that the company must be listed on the JSE main board as this indicates their significant sizes. The second criteria is that the company must be selling final consumer goods or services. With the adjustments in Table 3 being made, a total sample of 57 companies was used in the research. The research is based on data over 11 years from 2010 to

2020. A total of 11 firms included in the sample listed within the period of interest while 2 firms delisted. If a firm delisted during the period of interest (or listed during the period of interest), its data was included until the year of delisting (or included from the year of listing), therefore the panel is unbalanced.

Table 3: Reconciliation of population and sample

Details	**Number of companies**
Total companies listed on the Main Board of the JSE	403
Adjustments:	
Financial services firms	(60)
Banks	(6)
Oil and gas	(11)
Construction and materials	(17)
Chemicals	(8)
Forestry	(7)
Support services	(53)
Real estate & trusts	(63)
Health care and pharmaceuticals	(10)
Telecommunications & media	(12)
Insurance	(10)
Technology	(13)
Industrials and mining	(64)
Unclassified	(3)
Non-trading companies	(9)
Sample size	57

Source: (JSE, 2021)

The 57 companies computed above are the ones that are chosen for the study. These are the companies that are in the retail sector of South Africa. This implies that these companies deal with the buying and selling of final products as defined.

3.4. Sources of data

The financial information was obtained from the IRESS database, EQUITYRT database, and Refinitiv Workspace. As integrated reports are a mandatory requirement for listed firms, other information was obtained from the reports. The data

was recorded and analysed on a Microsoft Excel spreadsheet. The regression was performed using Stata version 16 and SPSS version 27.

3.5. Model and data analysis

Panel regression models were used in the study depending on the various tests. Panel data always has two dimensions namely, a time series (as shown by *t*) and cross-sectional (as represented by *i*) (Hsiao, 2007). Panel data regression is advantageous in data analysis as it caters to both cross-sectional and time-series type data (Erica, 2019). Two sets of models were run in order to assess the impact of 2020 as the firms were affected by Covid 19 during that year. The models were therefore run for the periods 2010 – 2019 and 2010 – 2020.

3.5.1 Model and equations

The following models were tested:

1. $ROA_{it} = \alpha_{it} + \beta_i STDA_{it} + \beta_i Size_{it} + \beta_i SG_{it} + \beta_i GRTH_{it} + e_{i_t}$
2. $ROE_{it} = \alpha_{it} + \beta_i STDA_{it} + \beta_i Size_{it} + \beta_i SG_{it} + \beta_i GRTH_{it} + e_{i_t}$
3. $ROA_{it} = \alpha_{it} + \beta_i LTDA_{it} + \beta_i Size_{it} + \beta_i SG_{it} + \beta_i GRTH_{it} + e_{it}$
4. $ROE_{it} = \alpha_{it} + \beta_i LTDA_{it} + \beta_i Size_{it} + \beta_i SG_{it} + \beta_i GRTH_{it} + e_{it}$
5. $ROA_{it} = \alpha_{it} + \beta_i TDA_{it} + \beta_i Size_{it} + \beta_i SG_{it} + \beta_i GRTH_{it} + e_{it}$
6. $ROE_{it} = \alpha_{it} + \beta_i TDA_{it} + \beta_i Size_{it} + \beta_i SG_{it} + \beta_i GRTH_{it} + e_{it}$

Where:

α *represents the individual-specific effects that affect profitability*

i *represents cross-sections*

t *represents periods*

e *represents the error term*

β *represents the co-efficient of the independent variables*

Table 4 below defines the variables used in the model.

Table 4: Definition of model variables

Variable	Symbol	Formular	Definition	Precedent
Return on assets	ROA	Net income/total assets	It is a financial ratio that reflects how profitable an entity is taking into account its asset base (Correia et al., 2015).	Islam and Ullah (2020) Habib et al. (2016)
Return on equity	ROE	Net income/shareholder's equity	It is a measure of the profitability of an entity in relation to the shareholder's equity (Correia et al., 2015).	Islam and Ullah (2020) Olufunso et al. (2009) Habib et al. (2016)
Short term debt to assets	STDA	Short term liabilities/total assets	It is the short-term debt divided by the total assets of the firm (Habib et al., 2016).	Alarussi and Alhaderi (2018) Gill et al. (2011) Shubita and Alsawalhah (2012)
Long term debt to assets	LTDA	Long term debt/total assets	Shows the percentage of assets financed with debt not payable	Alarussi and Alhaderi (2018)

			within 12 months (Habib et al., 2016).	Shubita and Alsawalhah (2012)
Total debt to assets	TDA	Total debt/total assets	Shows the percentage of assets financed by debt (Habib et al., 2016).	Alarussi and Alhaderi (2018) Shubita and Alsawalhah (2012)
Size	size	Logarithm of revenue	It will be used as a control variable. Sales are used as they could be the driver of profitability.	Alarussi and Alhaderi (2018) Gill et al. (2011)
Sales growth	SG	Current sales-previous sales/previous sales	It shows the change in sales from one year to the next (Habib et al., 2016). It will be used as a control variable.	Shubita and Alsawalhah (2012) Gill et al. (2011)
Growth opportunities	GRTH	(Total assets of current year-Total assets of the previous year)/Total assetsof the previous year	It shows the change in total assets from one year to the other. It will be used as a control variable.	Yazdanfar (2019) Shubita and Alsawalhah (2012)

Descriptive statistics are analysed and interpreted to evaluate the extent to which the firms in the retail sector are leveraged. Descriptive statistics describe what the data looks like, how dispersed it is, how centralised it is and any correlation that may exist (Leedy & Ormrod, 2014). More specifically, the descriptive statistics of the debt ratios will be focused on to answer this research question.

3.6. Independent variables

The independent variables are the variables that are claimed to be influencing the dependent variable (Leedy & Ormrod, 2014). The independent variables that capture debt consumption are the short-term debt to assets (STDA), long-term debt to assets (LTDA), and total debt to assets (TDA) (Habib et al., 2016). The model seeks to isolate the impact of these variables on return on assets and return on equity.

3.7. Dependent variables

The dependent variable is the profitability of the firms. In addition, profitability is represented by return on assets and return on equity in the model as done by prior researchers. Olufunso et al. (2009) used return on equity as the dependent variable while other research used return on assets (Habib et al., 2016). The widely used formula for return on equity is profit after tax divided by equity while that of return on assets is profit before tax divided by total assets, thus showing that there is a direct relationship between profitability and these measures.

3.8. Control variables

"*It is frequently argued that the real reason one finds (or does not find) certain effects is due to ignoring the effects of certain variables in one's model specification which are correlated with the included explanatory variables*" (Hsiao, 2007, p. 4). This statement emphasises the importance of control variables. Researchers should attempt to control for all influential factors when studying cause and effect relationships except for those whose possible effects are the focus of the investigation (Leedy & Ormrod, 2014). This is an attempt to ensure that whatever residual effects are a result of only the independent variables although this is almost impossible to attain. Larger firms are more likely to achieve economies of scale thus a positive relationship exists between firm size and profitability (Azhar & Ahmed, 2019). Firm size helps to explain variations in company returns (Drew, 2003). There is also a positive relationship between growth opportunities and profitability (Bazofti, Morad, Selehi & Karan, 2017). Growth has a

positive impact on firm profitability in the medium term (Janga & KwangminPark, 2011). In this study, the control variables are size, growth opportunities, and sales growth (Habib et al., 2016).

3.9. Validity and reliability

This research followed a similar approach as Abor (2005) in the investigation of the same relationship. The approach has also been used in other research to determine the relationship between debt and profitability (Habib et al., 2016). The models used have been adapted from these studies. To establish the validity of the models, several tests were done to test for multicollinearity and heteroscedasticity. Multicollinearity occurs when there is a linear relationship among two or more independent variables (Gujarati & Porter, 2009). Multicollinearity is evident when there is dependence or correlation in the predictors (Thompson, Kim, Aloe, & Becker, 2017). One diagnostic of multicollinearity is the Variance Inflation Factor (VIF) (Thompson et al., 2017). This factor shows how an independent variable is inflated by the presence of multicollinearity amongst variables. Multicollinearity was similarly measured using the VIF. Multicollinearity was also assessed using the correlation matrix as presented in Table 5 below.

Heteroscedasticity is evident when the standard errors of a variable monitored over a specific amount of time are not constant (Gujarati & Porter, 2009). The test that was used to determine whether there was heteroscedasticity is the Breusch-Pagan test (Williams, 2015). Where heteroskedasticity was found, robust estimators were used to predict the model. F probabilities were also computed to further determine the validity of the models.

4. ANALYSIS AND INTERPRETATION OF RESULTS.

4.1 Observations

This study used data of 57 retail firms as determined in part 3.3 of this report. The total number of data points was 546. The outlier test (as per part 4.3.1) resulted in 12 observations being removed from the data. After the elimination of outliers, a total of 534 observations were used for regressions where 2020 data was included. Where 2020 data was removed, 488 observations were used in the regressions.

The first and the second research question (per section 3.2) is answered by the descriptive statistics discussed in section 4.2 below. The third and the fourth research questions are answered by the models in 3.5.1. The fifth research question is answered by the discussion in section 4.3 below.

4.2 Debt utilisation in the retail sector

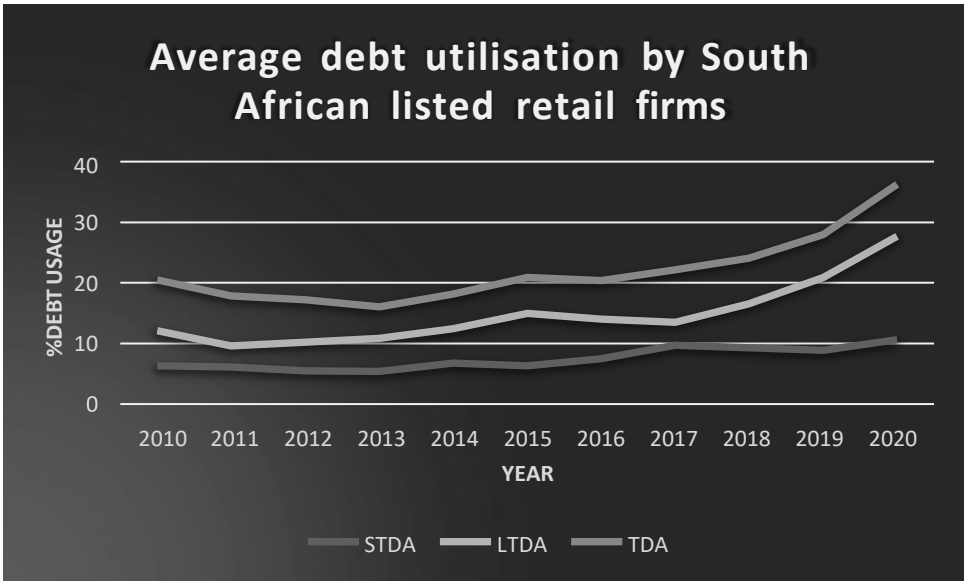
Figure 2 shows the average debt utilisation by south African firms within the time range 2010-2020 for each year. It is evident that there is an upward trend in debt utilisation by South African retail firms. This implies that debt has been a very important source of financing in the South African retail sector. The increase in debt utilisation is negatively related to the state of the South African economy as per the recent conditions. The overall average short-term debt, long-term debt, and total debt as a percentage of total assets is 9.22%,15.3%, and 23.6% respectively as presented in Appendix 1. The South African economy has dampened over recent years (StatsSA, 2020). The reserve bank has recently countered the dampening economy with expansionary monetary policy in the form of a reduction in interest rates (SARB, 2021). The reduction of interest rates could be an incentive for firms to utilise more debt as it may be seen as a relatively cheap source of finance.

The Covid 19 pandemic hit South Africa heavily from 2020. South African retail firms responded to this by increasing their debt utlisation as illustrated in Figure 2. The slope of the graphs is steeper in 2020**.** This could be due to the strict lockdown regulations that affected the ability of the retailers to trade thus leading to liquidity issues which were countered with debt usage. As can be seen in Figure 2, the long-term debt line is steeper than the short-term debt line thus implying that many of the retail firms resorted to long-term debt in 2020 instead of short-term debt. This could be a result of the inability to estimate how long the strict regulations will apply thus affecting their

ability to generate cash flows to repay short-term debt. The usage of debt however differs from entity to entity as shown by the standard deviations in Appendix 1. The overall standard deviation of short-term debt, long-term debt, and total debt is 12.2%,17%, and 19.8% respectively. This shows the variation in debt utilisation by the firms over time. It is clear that each form of debt is utilised differently by different firms in different periods. The attitude of management towards debt differs depending on their risk appetite as informed by the risk matrix of their respective companies.

The between standard deviation is 8.8%, 14.8%, 16.3% for short-term, long-term and total debt ratios respectively. This implies that even without the time dimension, the debt utilisation still differs amongst the firms but to a relatively lesser extent. The within standard deviation for short-term debt, long-term debt and total debt is 8.9%, 10.5% and 12.6% respectively. These percentages mean that a given retail firm varied their use of long-term debt slightly more than their use of short-term debt. These descriptive statistics can be found in Appendix 1.

Figure 2: Debt utilisation



4.3 Debt leverage in the retail sector

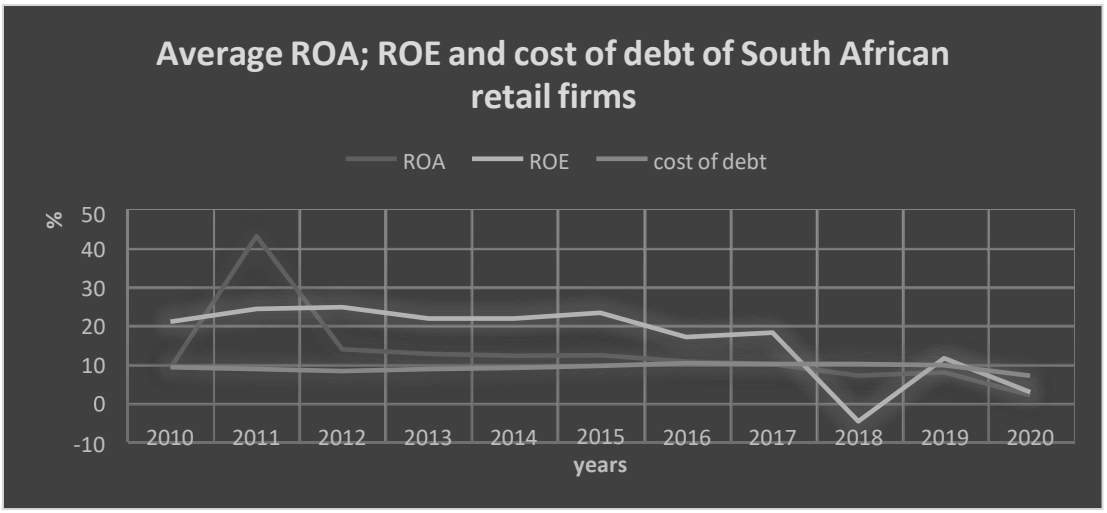
Figure 3 below depicts the average return on assets and return on equity which are measures of profitability, and the cost of debt in South Africa for the period 2010 to 2020. The cost of debt is the prime rate. This is a reasonable proxy as it is the reference rate when interest rates are determined for the public. It is evident that the cost of debt was lower than the average return on assets until 2017 which led to a slight upward trend in the average return on equity for that period. This implies that there was positive

debt leverage from 2010 until 2017. This is expected because these are the earlier years of the decade where the economy had not reached the through.

This, however, changed in 2018 as the return on assets worsened to below the cost of debt thus leading to a significant downward trend in the average return on equity. The significant fall in profitability from 2017 onwards can be linked to the recent economic downturn that the country has experienced. The economic turmoil started in 2017 when investor confidence dropped as a result of being downgraded by rating agencies due to economic instability (MyBroadBank, 2017). The consequences of the downgrade and economic turmoil are mostly felt in 2018. This is expected as economic events may not affect the economy immediately.

This implies that debt was not utilised profitably in 2018 as the benefits were less than the cost of the debt. The reserve bank reduced interest rates in 2019 to stimulate the economy. This proved effective as ROE rose above the cost of debt in that year. This is also supported by the steep increase in debt utilisation in that year as illustrated in Figure 2 above. The impact of the Covid 19 pandemic is clear as both the average return on assets and the average return on equity plummeted during the year 2020. Some firms had to shut down their branches thus affecting their ability to make any profits with the same level of leverage. There is a relatively steeper increase in debt utilisation in 2020 as seen in Figure 2. This raises an expectation of an inverse relationship between debt utilisation and profitability. This expectation was confirmed in the regression results in section 4.5. It can therefore be stated that the main reason for taking out more debt in 2020 was to maintain operations and not expansion.

Figure 3: Debt Leverage



4.4 Regression diagnostics tests

4.4.1 Outliers

An outlier is a data point that is not similar or consistent with the rest of the dataset (Ramaswamy, Rastogi, & Shin, 2000). Outliers need to be accounted for so that their impact on conclusions is eliminated or minimised (Dixon, 1953). Outliers need to be removed as they can pollute the results of the regression because of their influence (Hadi, 1992). The presence of outliers implies that some linear regression assumptions have been violated (API, 2021). Cooks' distances are used to measure the influence of data on the regression and whether the exclusion of the specific data would change the coefficients of the regression model (API, 2021). As a result, Cook's distances are used to identify outliers in a dataset (API, 2021). Cook's distances were therefore used to detect outliers in the dataset to remove their effect on the regression results. Data with a Cook's distance greater than the ratio of four (4) divided by the number of observations (nx) are outliers. Therefore, (4/nx) and be removed from the data set (Diaz-Garcia, 2004).

The total number of observations used is 546. When the 2020 data was Cook's distances resulted in a range of 0 - 847. Data points with a Cooks distance of more than (4/observations) were eliminated. The threshold was calculated as 0.007 (4/546) when 2020 observations were included. This increased to 0,008 (4/488) when 2020 values were excluded. The thresholds have common outliers as they are very close which led to 12 observations being excluded from the dataset as their Cook's distance was more than these values. The eliminated data points and their Cooks distances are included in Appendix 2. After the elimination of outliers, a total of 534 observations were used when 2020 data was included whereas 488 observations were used when 2020 data is excluded.

4.4.2 Multicollinearity test

Multicollinearity is evident when predictor values are correlated which results in low or no validity in a regression (Franke, 2010). Multicollinearity shows a high extent of autocorrelation in independent variables and can lead to incorrect outcomes in a regression (Kim, 2019). Correlation matrices and variance inflation factors can be used to detect multicollinearity (Mansfield & Helms, 1982). To test for multicollinearity, the correlation matrix (as shown in Table 5 below) was computed. With the exception of correlations between debt proxies, there are no significant correlations between other

independent variables as the coefficients are all less than 0.8. Therefore, it is concluded that multicollinearity does not significantly affect the accuracy of the model. The correlations between debt proxies are ignored as only one of them was used at a time in the model. However, the high correlation between long-term debt ratio and total debt ratio raises an expectation of similar regression results. This expectation is confirmed in section 4.5 of this research.

Table 5: Correlation matrix

	STDA	**TDA**	**LTDA**	**SIZE**	**SG**	**GRWTH**
STDA	1					
TDA	0.4589	1				
LTDA	-0.0309	0.8094	1			
SIZE	0.0220	0.1554	0.1103	1		
SG	-0.0208	-0.0558	-0.0474	0.0628	1	
GRWTH	0.0250	-0.0619	-0.0889	0.0850	0.0137	1

Shrestha (2020) concluded that the Variance Inflation Factor is one of the primary tests of multicollinearity. Multicollinearity can be seen as a disadvantage in a statistical regression as it makes other valuable variables redundant (Akinwande, Dikko, & Samson, 2015). Multicollinearity is evident when the variance inflation factor is higher than 10 (Kim, 2019). When the variance inflation factor is more than 10, one or more variables must be eliminated from the model (O'brien, 2007). The variance inflation factor was computed for all the variables as shown in Appendix 5. None of these values was more than 10 thus it is concluded that the problem of multicollinearity will not affect the regression results.

4.4.3 Breusch Pagan Lagrange Multiplier test

The Lagrange multiplier test is used to test if random effects or a standard OLS is appropriate to use in the model (Torres-Reyna, 2007). In other words, this test is used to determine whether a panel effect exists. The null hypothesis in this test is that there are no material differences between the companies used in the research (Torres-Reyna, 2007). Similarly, this test was performed in this research to determine whether the simple OLS regression or random effects is appropriate. The ROE model resulted in a chi-squared value of 18.54 and a probability of 0. This implies that there is evidence that suggests material differences amongst the entities thus we reject the

null hypothesis. Therefore, the random effects regression model is more appropriate. The ROA model resulted in a chi-squared value of 0 and a probability of 1. In this case, there is no evidence of significant differences amongst the companies thus a simple regression can be used (Torres-Reyna, 2007). The results of these tests are documented in Appendix 3.

4.4.4 Hausman test

To test whether random effects or fixed effects should be used, the Hausman test was conducted (Hausman, 1978). This test establishes whether the error terms are correlated with the regressors. If this test does not support the use of the random-effects model, the fixed effects model is used instead. The fixed effects controls for time-invariant characteristics of the companies that are used in the study. This is done to eliminate any biases that may arise in the predictions of the model. On the other hand, random effects assumes that there is no need to control for time-invariant characteristics (Torres-Reyna, 2007). The null hypothesis of the test is that the random effects is appropriate (Hausman, 1978). The fixed-effects model is used when the null hypothesis is rejected (Hausman, 1978). Depending on which model is chosen (per Table 6), the relevant panel data estimators were used to estimate the model. The estimators that will be chosen will be the one that is efficient and consistent given the model used. The statistical analysis was done using STATA version 16.1.

The results of the Hausman test are summarised in Table 5 below while detailed results can be found in Appendix 4.

Table 6: ROE Model determination

Debt proxies	ROE
STDA	Fixed effects
TDA	Fixed effects
LTDA	Fixed effects

4.4.5 Breusch-Pagan test

The test that was used to test for the presence of heteroskedasticity is the Breusch Pagan (Cribari-Neto & Zarkos, 1999). In substance, this determined whether the variance of the error term varies or not over time. It would be incorrect to apply the assumptions of OLS if heteroskedasticity is present (Daryanto, 2020). If the variance

was found to be not constant, the researcher used robust estimators. The results of the tests can be found in Appendix 3. The Breusch- Pagan test revealed a p-value of 0.00 for all the models. As the p-value is less than 5% the null hypothesis of homoskedasticity is rejected and it is concluded that there is heteroskedasticity. Given the presence of heteroskedasticity, robust standard errors were estimated as shown in the Tables in section 4.5.

4.5 Regression results

4.5.1 Model strength

Table 7 below shows the F probabilities and the correlation of determination of the equations used for the regressions. The F probability shows whether a group of variables are significant in estimating the dependent variable (Stephanie, 2007). The F probabilities are zero for all the equations. This implies that the variables in the model are significant in estimating the dependent variables.

The coefficient of determination shows the proportion of the variance in the dependent variable that is explained by the independent variable (Byjus, 2022). Table 7 below shows the coefficient of determination when each equation is used. The coefficients are greater than 50% which shows that majority of the variance in the dependent variables is a result of the independent variables in the model. The model is therefore justified.

Table 7: Model strength statistics

Model (3.5.1)	Prob > F	R - Squared
Model 1	0.00	65,44%
Model 2	0.00	56,78%
Model 3	0.00	52,58%
Model 4	0.00	51,79%
Model 5	0.00	60,89%
Model 6	0.00	69,76%

4.5.2 Short-term debt and return on equity.

Table 8 below shows the results of models 1 and 2. This table shows that short-term debt and return on equity are inversely associated as the coefficient is $b= -130.87$ $(p<0.01)$ when fixed effects robust estimators were used. This coefficient implies that when short-term debt increases, return on equity decreases. The associated p-value $(p<0.01)$ implies that short-term debt is a significant variable in explaining the variation of return on equity. Firm size is also a significant variable in explaining return on assets as shown by $p<0.01$.

There is an insignificant positive relationship between return on equity and sales growth as shown by the coefficient of 0.04. Return on equity is not too sensitive to sales growth as the coefficient of $b=0.04$ $(p>0.05)$ is relatively low. This could be due to factors such as operating expenses that offset the sales growth. This implies that

the hypothesis that sales growth is not a significant variable in predicting return on equity cannot be rejected. The growth of assets is not a significant variable in determining return on equity as shown by a p-value of 67.2 *(p>0.05)*. However, there is a positive relationship between return on equity and growth in assets as shown by the coefficient of 0.003. This could be because the benefits of investment in assets might take longer than the period of interest to be realised.

4.5.3 Short-term debt and return on assets

The second part of Table 8 below shows the relationship between short-term debt and return on assets. The results show that short-term debt is inversely associated with return on assets as shown by a coefficient of *b=-39.41 (p<0.01).* This implies that when short-term debt increases, the return on assets will decrease. It is evident that return on equity is more sensitive to short-term debt than the return on assets as per the different coefficients of short-term debt for the two dependent variables. These results could be attributed to management using debt to achieve short-term objectives instead of focusing on long-term goals. The p-value of 0.00 *(p<0.01)* implies that short-term debt is a significant variable in estimating the return on assets as it is less than 1%.

Firm size and return on assets are positively related as shown by the coefficient of 2.12. However, this variable is significant at the 10% level as the relevant p-value is 0.07 (p<0,1). The size of the firms is represented by the natural logarithm of sales thus the positive relationship is a logical expectation. Sales growth and return on assets are positively related and sales growth is not a significant variable in predicting return on assets as shown by a p-value of 0.78 *(p>0.05).* Return on assets is also positively related to the growth of total assets as shown by the coefficient of 0. 02. This implies that the return on assets is not as responsive to the growth of total assets where short-term debt is utilised. This could be a result of a time lag in realising the benefits of investment in capital assets.

Table 8: The results of equation 1 and equation 2

ROE and STDA: fixed effects				ROA and STDA: OLS			
ROE	**Coefficient**	**Robust standard error**	**p>t**	**ROA**	**Coefficient**	**Robust standard error**	**p>t**
STDA	-130.87	18.12	0.00	STDA	-39.41	9,39	0.00
SIZE	3.38	1.00	0.00	SIZE	2.12	1.19	0.07
Sales G	0.04	0.05	0.38	SG	0.44	0.16	0.78
Asset G	0.003	0.08	0.67	GRWTH	0.02	0.03	0.00
Sigma_u	28.71						
Sigma_e	45.45						
Rho	0.64						

4.5.4 The effect of 2020 on short-term debt and return on equity

Table 9 below shows the regression results of equation 2 without data for the year 2020. This year is excluded to determine the impact of the Covid-19 pandemic on the regression by comparing these results to the results in section 4.5.3. With theexclusion of 2020, there is still a negative association between profitability and short- term debt. The coefficient of short-term debt when the dependent variable is the returnon equity worsened from *b=-130 (p<0.01) to b=-148 (p<0.01).* This reduction implies that 2020 dampened the sensitivity of return on equity to short-term debt. Thereduction of the coefficient also implies that the utilisation of short-term debt in 2020 may have led to less dire consequences than in other years. This may be explained by the fact that interest rates were reduced to their all-time lows in 2020. Short-term debt is still a significant variable in the estimation of return on equity as the p-value is*(p<0.01)*. The exclusion of 2020 in the regression did not make a significant difference to the coefficients of firm size, and growth in assets. Sales growth however becomes a significant variable although the impact on ROE is negligible. The positive association between return on equity and these three variables is maintained.

4.5.5 The effect of 2020 on short-term debt and return on assets.

The right-hand side of Table 9 below shows the regression results of equation 1 where the return on assets and short-term debt are regressed when the year 2020 is

excluded. Similar to the relationship discussed in the previous section, the negative association between short-term debt and return on assets is maintained. The coefficient of short-term debt increased from -39.42 *(p<0.01)* to -34.17 *(p<0.05)* when the 2020 year is excluded. The increase of the coefficient implies that 2020 worsened the negative effects of short-term debt on return on assets. A positive relationship between return on assets and company size and growth in assets is maintained while sales growth shows a negative relationship. It is also noteworthy that asset growth remains a significant *(p<0.05)* determinant of return on assets while firm size is significant (*p<0.1*) and sales growth remains insignificant *(p>0.05).* This implies that there is evidence to support that the null hypothesis of an insignificant relationship should be rejected.

Table 9: Short-term debt and profitability excluding 2020

ROE and STDA: fixed effects					**ROA and STDA: OLS**			
ROE	Coefficient	Robust standard error	p>t	t	ROA	Coefficient	Robust standard error	p>t
STDA	-148.40	20.76	0.00	-7.15	STDA	-34.17	10.50	0.01
SIZE	3.88	1.14	0.01	3.4	SIZE	2.40	1.36	0.08
SG	0.01	0.05	0.05	0.32	SG	-0.67	0.02	0.73
GRWTH	0.04	0.06	0.53	0.62	GRWTH	0.02	0.01	0.00
Sigma_u	34.23							
Sigma_e	38.40							
Rho	0.45							

4.5.6 Long-term debt and return on equity

Table 10 below shows the results of models 3 and 4. This table shows the results of long-term debt and profitability. The first part of the table shows the results of equation 4 where the return on equity is the dependent variable with long-term debt being the independent variable of interest. The results show that there is an inverse relationship between return on equity and long-term debt as shown by a coefficient of -38.025 *(p<0.05).* The inability of long-term debt to positively correlate with returns related to equity could be because of the worsening economic conditions that led to the need of refinancing long-term debt with other long-term debt thus not being able to be utilised

directly within the operations of the firms. Firm size is positively related to return on equity as shown by the coefficient of 3.551. This implies that the two variables move in the same directions although the responsiveness to the dependent variable is relatively lower. Firm size is also a significant variable in predicting return on equity as shown by a p-value of *p<0.05.*

In this equation, sales growth is positively related to return on equity as the coefficient is 0.045. This variable is however not a significant variable in estimating the return on equity as the associated p-value is 0,35 *(p>0.05).* Asset growth is negatively related to return on equity as shown by the coefficient of -0.002*.* This variable is also not significant in estimating the return on equity as shown by a p-value of 0.97 *(p>0.05)*.

4.5.7 Long-term debt and return on assets

The second part of Table 10 shows the results of equation 3 with long-term debt as the indicator for debt utilisation and return on assets as the dependent variable. The results show that there is a negative relationship between long-term debt and return on assets as the coefficient is -43.43 *(p<0.05).* This implies that although the long-term debt may be used to fund the assets, the retail firms are not able to use the debt to generate positive returns. The returns could have been minimised by the recent economic recession that South Africa has faced in the last decade. The cost of debt has shown a downward trend (as depicted in Figure 3) in recent years to combat the recession, thus it is highly unlikely that interest payment could have exceeded any profits that would have been realised because of deploying the debt. The cost of debt could only prove to be burdensome for the firms if their cost of debt was fixed instead of being variable. With the fixed cost of debt in an economic downturn, the benefits of debt are not realised when the reserve bank decreased reference rates.

There is a positive relationship between firm size and return on assets as the *B* coefficient is 2.42. Firm size is also a significant variable in predicting return on assets as the associated p-value is 0.06 but only at the 10% level of significance*.* The results show that there is a negative relationship between sales growth and return on assets as shown by the coefficient of -0.03. Sales growth is however not a significant variable in estimating the return on assets as the related p-value is 0.98 *(p>0.05)*. Return on assets is negatively related to growth in total assets as shown by the coefficient of -1.43. This could imply that assets grew at a faster rate than the profits of the firms

within the period of interest of the study. This is supported by the downward trend in return on assets as shown in Figure 2. Given the worsening economic condition in South Africa, this behaviour of return on assets would be expected.

Table 10: The results of equations 3 and 4

ROE and LTDA: fixed effects				**ROA and LTDA: OLS**			
ROE	**Coefficient**	**Robust standard error**	**p>t**	**ROA**	**Coefficient**	**Robust standard error**	**p>t**
LTDA	-38.025	13.87	0.01	LTDA	-43.43	11.47	0.02
SIZE	3.551	1.058	0.01	SIZE	2.42	1.30	0.06
SG	0.0455	0.05	0.35	SG	-0.03	0.01	0.98
GRWTH	-0.002	0.08	0.97	GRWTH	-1.43	0.09	0.99
Sigma_u	23.756						
Sigma_e	45.342						
Rho	0.936						

4.5.8 The effect of 2020 on long-term debt and return on equity

With the exclusion of 2020, the negative relationship between long-term debt and return on equity is maintained. However, the sensitivity of return on equity to long-term debt was dampened from -38 to -32 as shown by the *B* coefficients. Long-term debt is only a significant variable at a 10% level of significance. The dampening of the sensitivity of return on equity to a change in long-term debt implies that the use of long-term debt in 2020 led to worsened financial consequences. The results can also be interpreted by stating that the year of 2020 worsened the negative effects of using long-term debt. The exclusion of 2020 resulted in a positive coefficient between firm size, sales growth and growth in total assets which one would ordinarily expect. Firm size is however the only significant variable in estimating the return on equity as indicated by $p<0.01$.

4.5.9 The effect of 2020 on long-term debt and return on assets

The right-hand side of Table 11 below shows the regression results of equation 3 with the exclusion of 2020. The negative relationship between long-term debt and return on assets is maintained although it is dampened as shown by the coefficient changingfrom -43.43 to -28.15 *(p<0.05)*. This implies that the return on assets would have worsened where long-term debt is used during 2020. This could be linked to the inability of the firms to profitably use the assets in 2020 due to factors such as lockdowns due to Covid-19. However, the long-term debt remained a significant variable in estimating the return on assets to being insignificant as the related p-valueremained below 5% (p-value<0.05. The exclusion of 2020 resulted in the coefficient ofasset growth being positive which shows the abnormality that 2020 may have caused.This shows the ineffective use of assets in 2020.

Table 11: Regression results of equations 3 and 4 without 2020

ROE and LTDA: fixed effects				**ROA and LTDA: OLS**			
ROE	**Coefficient**	**Robust standard error**	**p>t**	**ROA**	**Coefficient**	**Robust standard error**	**p>t**
LTDA	-32.52	16.71	0.05	LTDA	-28.15	12.22	0.02
SIZE	3.92	1.21	0.00	SIZE	2.62	1.46	0.07
SG	0.02	0.06	0.72	SG	-0.01	0.02	0.70
GRWTH	0.07	0.07	0.28	GRWTH	1.28	0.01	0.86
Sigma_u	25.43						
Sigma_e	44.27						
Rho	0.46						

4.5.10 Total debt and return on equity

Table 12 shows the results of equation 6 with the total debt ratio as the indicator for debt utilisation by the retail firms. The first part of the table shows the results of the equation with return on equity as the dependent variable. The results show that there is a negative relationship between the total debt ratio and return on equity as the coefficient is -79.95 *(p<0.01).* This implies that return on equity is sensitive to a change

in the total debt ratio. However, the change is in the opposite direction as the coefficient is negative. The results further show that the total debt ratio is a significant variable in predicting return on equity as the associated p-value is *(p<0.01).* This implies that the cost of debt has clouded any gains that could have been realised by the firms as a result of utilising debt.

Return on equity is positively related to firm size and sales growth as shown by the coefficients of 4.59 and 0.02 respectively. The results however show that return on equity is not significantly related to a change in asset growth and sales growth as the related p-values are *p>0.05.*

4.5.11 Total debt and return on assets

The second part of Table 12 shows the results of equation 5 with return on assets as the dependent variable when ordinary least squares is used. The results show that the total debt ratio is negatively related to return on assets as indicated by the coefficient of -35.03 *(p<0.05).* The results further show a positive relationship between return on assets and firm size as shown by the coefficient of 2.7 as expected. There is however a negative relationship between sales growth and asset growth as indicated by the coefficients of -0.04 and -4.42 respectively. The results also imply that all these three variables are not significant *(p>0.05)* variables in predicting return on assets. This may be a result of operating expenses growing at a faster rate than sales thus reducing the return on assets.

Table 12: Regression results of equations 5 and 6

ROE and TDA: fixed effects				ROA and TDA: OLS			
ROE	**Coefficient**	**Robust standard error**	**p>t**	**ROA**	**Coefficient**	**Robust standard error**	**p>t**
TDA	-79.95	11.54	0.00	TDA	-35.03	11.69	0.03
SIZE	4.59	1.03	0.00	SIZE	2.70	1.38	0.05
SG	0.02	0.05	0.576	SG	-0.04	0.01	0.80
GRWTH	-0.04	0.08	0.767	GRWTH	-4.42	0.01	0.96
Sigma_u	34,45						
Sigma_e	24,76						
Rho	0.45						

4.5.12 The effect of 2020 on total debt and return on equity

Table 13 below shows the regression results of equation 6 with the exclusion of 2020 data. The exclusion of 2020 data from the regression increased the coefficient from -79 to -68 *(p<0.01).* This implies that the exclusion of 2020 dampened the negative effects of using debt in that year from a total debt utilisation perspective. This could be attributable to the fact that retail shops were affected by lockdowns but the buying power of consumers was reduced during the year of 2020. Total debt is a significant variable in estimating the return on equity as the related p-value is *(p<0.01).* All other variables remained positively related to return although to a lesser extent.

4.5.13 The effect of 2020 on total debt and return on assets

The negative relationship between return on assets and total debt utilisation is maintained as the coefficient increased from -35 to -34 *(p<0.05).* when the data relating to 2020 is excluded from the model. This is consistent with the effect of 2020 data as discussed in the previous section. A positive relationship between return on assets and sales growth and total assets growth prevails after the 2020 data is eliminated. This shows that the 2020 data had a significant effect on the model. In addition to total debt utilisation, firm size is a significant variable in estimating the return on assets but only at the 10% level of significance.

Table 13 below shows the results of equations 5 and 6 without 2020

ROE and TDA: fixed effects				**ROA and TDA: OLS**			
ROE	Coefficient	Robust standard error	p>t	ROA	Coefficient	Robust standard error	p>t
TDA	-67.88	13.74	0.00	TDA	-33.98	12.69	0.01
SIZE	5.17	1.18	0.00	SIZE	2.91	1.54	0.06
SG	0.00	0.05	0.94	SG	-0.01	0.02	0.59
GRWTH	0.08	0.06	0.22	GRWTH	-2.47	0.01	0.01
Sigma_u	22.43						
Sigma_e	49.64						
Rho	0.29						

5. CONCLUSION AND AREAS OF FURTHER RESEARCH.

5.1 Conclusion

The objective of this report was to investigate the effectiveness of expansionary monetary policy in the form of interest rates. This was done by investigating the utilisation of debt by firms in the retail sector (as one of the most significant contributors to GDP) and whether the debt is used profitably. The year 2020 is notable given the reduction of interest rates to counter the effects of the Covid-19 pandemic. The study was done by obtaining 11 years of data of JSE listed retail firms and using a panel regression analysis to investigate the relationship between debt utilisation and the profitability of the firms. Short-term debt ratio, long-term debt ratio and the total debt ratio are used were used as indicators of debt utilisation while ROA and ROE were used to indicate profitability.

The study finds that firms in the retail sector use significant amount of debt although not to a similar extent. These differences in debt utilisation are not surprising as the risk appetite of the firms might be different. There is an upward trend in the consumption of debt whether short-term or long term within the period 2010-2020. It is also worth noting that the economy has generally been deteriorating during this period although it was better in a few of the years. This shows the effectiveness of reduction of interest rates as an incentive for retail firms to utilise debt. It is further concluded that the rate of debt usage increased in 2020 as shown by average short- term, long-term, and total debt ratios of 10,61%, 27,66% and 36,25% respectively. The 2020 values show an increase from the overall average of short-term, long-term and short-term debt ratio is 9%, 15% and 23%. This is consistent with the responsiveness of thesector to economic policies as interest rates hit the floor during that year. This impliesthat such a critical sector is responsive to economic policies. The next question to be asked was whether this increased debt utilisation leads to profits for the firms thus thegeneral economic expansion.

Positive financial leverage was realised from 2010 until 2017 This implies that the investments that the debt was used for during this period were profitable. This however changed from 2018. This can reasonably be attributed to worsening economic conditions in South Africa over recent years (StatsSA, 2020). This negative financial leverage was observed although the cost of debt shows a downward trend in the cost

of debt. The downward trend in the cost of debt was a result of the reserve bank trying to counter the effects of the economic downturn. The lower consumer spending as a result of the economic downfall may have dropped the demand for retail products to levels that make it impossible to get any benefits from cheaper financing.

The credit downgrades that were announced are likely to have added fuel to the fire that started in 2017. The year 2018 is when the effects of the downgrade are mostly felt in the sector as shown by a sharp fall in return on equity as illustrated in figure 3. This is expected as the retail sector is dependent on the buying power of consumers. When downgrades are announced, investor confidence reduces which leads to the rising of unemployment thus the decline in the buying power of consumers. In an economy where the buying power of consumers is reduced, the profitability of the retail sector is logically expected to decline.

The findings of this study imply that the reduction of interest rates is partly effective as significant sectors such as the retail sector respond to the policy by increasing debt utilisation. However, the debt is not utilised profitably as seen from the decreasing profitability indicators and negative coefficients. This implies that the reduction of interest rate does not lead to a significant contribution from the retail firms with regards to countering the economic downturn. Therefore, the increment of the money supply could be a better monetary policy response to an economic downturn instead of a reduction of interest rates in the context of the retail sector (Cesarano, 2007). However, the increase in the money supply must be analysed accurately as it can easily spark inflation. The equilibrium quantity needs to be determined before this is implemented.

This study finds that there is a negative relationship between debt utilisation and profitability. This finding is consistent across all the indicators of profitability (ROA and ROE) and all indicators of debt utilisation (STDA, LTDA, and TDA). In addition, the research found that return on equity is generally more sensitive to debt utilisation than the return on assets in this sector. These findings are consistent with those of Ramjee and Gwatidzo (2012) and Olufunso et al. (2009) to mention a few. However, other researchers such as Vy (2016) and Amjed (2007) have found positive relationships between leverage and profitability. The research findings further show that return on equity is typically more responsive to a change in debt utilisation than the return on

assets for most indicators of debt. The short-term debt ratio, long-term, and total debt ratio are significantly related to profitability. However, the significance differs with the debt indicator and the measure of profitability as shown by the different levels of significance. The recent economic downturn has led to an increase in debt utilisation in the retail sector with a steeper increase in 2020.

The impact of Covid 19 was evaluated by excluding the year 2020 in the regressions. The exclusion of 2020 dampened the negative relationship between profitability and leverage. This implies that this year worsened the negative relationship as expected given the events in that year. Many consumers of the sector lost their jobs thus there was a reduction in the demand for products offered by the sector. The impact of lockdowns during Covid 19 is the major cause of 2020 worsening the negative relationship as many retail companies had restricted trading times and some had to close down for long periods of time while others were permanently lost from the market. This particularly points to the fact that the utilisation of debt in 2020 may haveproven to be unbeneficial to firms in that particular year notwithstanding the low cost of debt. This is in line with the GDP trend of the country. This is also supported by thenegative debt leverage the sector experienced in 2020 as shown in Figure 3. The suggestion that return on equity is more responsive to debt did not change as a resultof the exclusion of 2020.

Executives in the retail sector can find this research helpful as the findings suggest that it is not beneficial to utilise debt during an economic downturn as the related costs exceed the related benefits. This is also influenced by the standard of living in South Africa as demand levels for retail products are likely to plummet during periods of economic downturn. The setters of economic policy are will also find it useful that the retail sector is responsive to the reduction of interest rates as firms increase debt utilisation. The negative relationship between debt and profitability as shown in this research might be crucial in determining which monetary policy to implement.

5.2 Areas of further research

This paper focused on the retail sector as part of the contributors to the GDP of South Africa. The study can be replicated for other sectors that contribute a significant portion of the GDP of South Africa such as the manufacturing sector. Where a positive relationship is found between profitability and debt utilisation, debt utilisation in that

sector must be more incentivised to realise the benefits of expansionary monetary policy in the form of a reduction in interest rates. The use of debt subsidies or concessions can also be introduced in those sectors. This will quicken the economic recovery. As it was found that using debt does not increase the profitability of retail firms, it can be investigated whether using equity in this industry is a better alternative, especially when economic recovery is a priority.

The study can also be expanded by investigating whether the benefits of debt are sensitive to the state of the economy. This study focused mostly on periods when the economy was performing poorly although the economic outlook improved during some periods between 2010 and 2020. A different time range can be selected where the economy was in expansion for the majority of the years. This study only focused on an 11-year period, the benefits of debt might be realised after 11 years, therefore the study could be replicated for a longer period. The research also found that return on equity is more sensitive to debt levels than the return on assets. The reasons behind this can also be studied in order to understand whether the firms can find ways to sustain their positive financial leverage. Such research will be beneficial in instances where interest rates are reduced to levels similar to the recent ones.

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7. Appendices

Appendix 1: Descriptive statistics
Table of average ROE, ROA, STDA, LTDA, TDA, and cost of debt for each respective year

Averages % by year						
Year	**STDA**	**LTDA**	**TDA**	**ROA**	**ROE**	**Cost of debt**
2010	6,32	12,14	20,47	9,34	21,28	9,5
2011	6,14	9,59	17,84	43,38	24,49	9
2012	5,41	10,16	17,17	14,10	24,99	8,5
2013	5,38	10,85	16,01	12,92	22,02	9
2014	6,73	12,39	18,17	12,38	22,02	9,25
2015	6,27	14,97	20,89	12,64	23,54	9,75
2016	7,42	14,04	20,33	10,87	17,26	10,5
2017	9,64	13,49	22,14	10,31	18,4	10,25
2018	9,22	16,56	24,05	7,23	-4,57	10,25
2019	8,81	20,89	27,98	8,05	11,71	10
2020	10,61	27,68	36,25	2,25	3,08	7,25

Variable		mean	Std dev.	min	max
ROE	overall	13.61	51.87	-97.77	92.02
	between		25.57	-80.58	51.80
	within		46.06	-80.41	110.76
ROA	overall	12.33	57.45	-114.7	1335
	between		18.14	-19.22	130.25
	within		54.24	-114.3	1217.08
STDA	overall	0.09	0.12	0	0.76
	between		0.08	0.06	0.43
	within		0.08	-0.02	0.58
LTDA	overall	0.15	0.17	-0.00	1.12
	between		0.15	0.00	0.75
	within		0.11	-0.25	0.79
TDA	overall	0.23	0.19	0	1.17
	between		0.16	0.02	0.78
	within		0.13	-0.16	0.79
SIZE	overall	8.75	2.15	2.55	13.55
	between		2.16	3.95	13.14
	within		0.41	6.24	10.65
SG	overall	10.56	41.60	-581.3	365.84
	between		12.94	-7.34	84.84
	within		39.34	-563.4	383.73
GRWTH	overall	-91.73	25.05	-58.51	443.23
	between		15.52	-116.9	95.36
	within		22.44	-46.98	116.20

Percentiles of variables								
		Percentiles						
		5	10	25	50	75	90	95
Weighted Average (Definition 1)	ROE%	-12	-1,1	7,51	16,43	27,25	40,22	50,32
	ROA%	-5,6	-0,4	4,49	8,77	15,17	20,57	31,54
	Z Score: ROE%	-0,5	-0,2	-0,12	0,05	0,26	0,51	0,71
	Z score: ROA%	-0,3	-0,2	-0,14	-0,06	0,05	0,14	0,33
	STDA (short term debt ratio)	0,00	0,00	0,01	0,06	0,11	0,22	0,30
	TDA (total debt ratio)	0,00	0,00	0,07	0,21	0,35	0,48	0,59
	LTDA (long term debt ratio)	0,00	0,00	0,00	0,12	0,25	0,37	0,46
	revenue(millions)	94	346	1918	7652	22809	101373	168260
	Size (ln of revenue)	4,54	5,85	7,56	8,94	10,03	11,53	12,03
	SG (sales growth %)	-17	-5,6	1,79	8,20	15,29	27,79	43,47
	GRTH (Total Assets growth %)	-11	-6,4	2,09	9,80	18,21	36,36	60,30

Appendix 2: Outliers that were excluded

Company	Year	ROE	ROA	STDA	LTDA	TDA	SIZE	SG	GRTHT	Cook's D	Threshold
7	2017	13,52	4,39	0,55	0,01	0.56	9,79	7,43	-37,45	0,009174	0,008197
12	2019	-80,56	-5,04	0,07	0,78	0,85	11,77	-26,49	-10,38	0,011767	0,008197
14	2010	9,5	2,91	0,28	0,34	0,62	4,30	54,33	109,75	0,012897	0,008197
19	2012	-3,69	-5,73	0,67	0,01	0.68	8,02	12,29	5,18	0,019901	0,008197
24	2019	-20,5	-7,34	0,045	0,76	0.80	9,48	-25,39	-19,54	0,021285	0,008197
27	2015	14,29	7,05	0,04	0,45	0,49	8,59	-581,30	-10,10	0,033725	0,008197
34	2016	14,55	4,38	0,67	0.03	0.70	3,82	0,18	10,24	0,059724	0,008197
38	2018	-285,36	-2,13	0,21	0,63	0,84	12,09	-3,77	-4,07	0,127355	0,008197
45	2018	-445,77	-5,72	0,41	0,24	0.65	9,77	-2,29	-2,65	0,483782	0,008197
49	2016	-571,88	-6,48	0,02	0,71	0,73	3,46	1,47	14,52	0,795823	0,008197
50	2013	-777,82	-16,13	0,67	0,04	0,71	8,16	14,82	20,74	1,900661	0,008197
57	2019	-12,6	-7,49	0,02	0,51	0,53	4,53	0,12	-58516	847,1268	0,008197

Appendix 3: Breusch Pagan Tests

1. Breusch Pagan Lagrange Multiplier Test

ROA Models			ROE Models		
	Var	sd		Var	sd
ROA	3369	58	ROE	2750	52
e	3351	56	e	2351	48
u	0	0	u	147	12
Chibar2 (01) = 0 Prob > chibar2 = 1			Chibar2 (01) = 19 Prob > chibar2 = 0		

2. Breusch Pagan test

Statistical test

Breusch-Pagan test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of Standard deviation

Debt indicator	Degrees of freedom	Chi2 value	p>chi2
Short term debt ratio (STDA)	5	2062.59	0.0000
Total debt to assets ratio (TDA)	5	1413.45	0.0000
Long term debt to assets (LTDA)	5	193.73	0.0000

Appendix 4: Detailed Hausman test results

Dependent variable	Given debt proxy	Chi2 value	p>chi2	Fixed or random effects?
ROE	STDA	11.33	0.01	Fixed effects
ROE	LTDA	13.89	0.00	Fixed effects
ROE	TDA	3.25	0.00	Fixed effects

For ROA, the Breusch-Pagan Lagrange Multiplier test shown that ordinary least squares regression is appropriate thus the Hausman test does not apply.

Appendix 5: Multicollinearity statistics

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-6.17	9.06		-0.68	0.49		
	STDA (short term debt ratio)	-44.15	30.38	-0.09	-1.45	0.15	0.34	2.92
	TDA	-114.29	32.20	-0.42	-3.55	0.00	0.12	8.67
	LTDA (long term debt ratio)	69.04	33.20	0.21	2.08	0.04	0.15	6.63
	Size (ln of revenue)	4.52	1.02	0.18	4.44	0.00	0.93	1.07
	SG (sales growth %)	0.030	0.051	0.02	0.59	0.55	0.99	1.01
	GRTH (Total Assets growth %)	0.00	0.01	0.02	0.05	0.96	0.98	1.02