



Capital structure and COVID-19: Lessons learned from an emerging market

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Orientation: Coronavirus disease 2019 (COVID-19) and the subsequent lockdown regulations restricted ongoing trade for most retail firms. Business strategies had to be adjusted to avoid a grand challenge of insolvency.

Research purpose: This paper provides previously unavailable empirical evidence of firm-level capital structure and determinants in relation to the COVID-19 pandemic for the firms in the retail sector in an emerging market.

Motivation for the study: Capital structure decisions, as influenced by the pandemic, provide novel value because such decisions are usually long-term, yet the volatile uncertainty of the pandemic negated the long-term cycle.

Research design, approach and method: A correlational design was followed to identify and interpret how retail firms reacted during the initial lockdown period. This was completed using a quantitative method, doing statistical analysis to describe and interpret possible relationships. The secondary data ranged from 2009 to 2021 for 11 South African listed retail firms was collected from EquityRT® and INET BFA. Data were analysed using descriptive statistics and panel data analysis by Eviews 12 software.

Main findings: The pandemic, measured using a dummy variable, was found to have a significant effect on capital structure together with risk, profitability, size and age. Liquidity, tangibility and growth were insignificant. Overall, capital structure proxied by the debt-equity ratio was reduced timeously without exhibiting dependence on short-term funds.

Practical/managerial implications: The retail firms exhibited exemplary capital structure decision-making behaviour during the COVID-19 pandemic.

Contribution/value-add: The empirical evidence of the effect of the COVID-19 pandemic on the capital structures and its determinants of retail firms in South Africa is the contribution of this study. Based on the findings, two conflicting capital structure theories (pecking order and trade-off theories) were part of the decision-making process, creating the cautious behaviour for these retail firms.

Keywords: COVID-19; pandemic; capital structure; determinants; panel data analysis.

Introduction

The coronavirus disease 2019 (COVID-19) pandemic gripped the world in early 2020. Countries implemented various national and regional shutdowns and limited the movement of people in order to reduce the spread of the COVID-19 virus. South Africa implemented a national lockdown at level 5, starting on 26 March 2020. This impacted the retail sector with limited retail allowed during the lockdown period. Level 5 restrictions were initially for 3 weeks and were subsequently extended, whereafter the lockdown restrictions were relaxed in a stepwise fashion where the lockdown levels were lowered, yet still creating trading uncertainty at the time. Table 1 indicates the lockdown levels and the restrictions on the retail industry, including the restrictions on manufacturing and trade. Lockdown levels were adjusted as the COVID-19 infection rates increased or decreased, creating volatile trading uncertainty. All restrictions related to COVID-19 were lifted on 23 June 2022 (McCain 2023).

The impact of the lockdown restrictions on the retail industry was vast with firms having to act quickly to adapt. Importantly, for the retail industry, a level 5 lockdown meant that only essential goods were allowed to be sold (Ecim et al. 2020). Additionally, many retail businesses shut down completely during the level 5 lockdown period. Consumers were also moving towards buying online, which meant less spending in the actual shops. Other consequences of the pandemic and lockdown measures included COVID-19 regulations such as surface and hand sanitation as well

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TABLE 1: Lockdown regulations on retail, manufacturing and trade.

Date levels were imposed	Lockdown level	Restrictions at each level for retail, manufacturing and trade
26 March 2020	Level 5	Limited manufacturing of retail products, limited retail trade.
01 May 2020	Level 4	Manufacturing of retail products permitted to limited employment levels. More relaxed than level 5; retail trade restrictions are relaxed.
01 June 2020	Level 3	Employment levels of retail products manufacturing increased to 100%. Retail trade restrictions relaxed from level 4.
18 August 2020	Level 2	All manufacturing and retail trade permitted.
21 September 2020	Level 1	All manufacturing and retail trade permitted.
29 December 2020	Adjusted level 3	No influence on retail manufacture or trade, except for alcohol production and sales limits.
01 March 2021	Adjusted level 1	No influence on retail manufacture or trade, except for alcohol production and sales limits.
31 May 2021	Adjusted level 2	No influence on retail manufacture or trade, except for alcohol production and sales limits.
16 June 2021	Adjusted level 3	No influence on retail manufacture or trade, except for alcohol production and sales limits.
28 June 2021	Adjusted level 4	No influence on retail manufacture or trade, except for alcohol production and sales limits.
26 July 2021	Adjusted level 3	None
13 September 2021	Adjusted level 2	None
01 October 2021	Adjusted level 1	None
05 April 2022	National State of Disaster ends	End of National State of Disaster, mask mandates to remain.
23 June 2022	-	End of mask mandate and 50% capacity of indoors and outdoors gatherings.

Source: Adapted from South African Department of Health, n.d., *COVID-19 risk adjusted strategy*, viewed 17 August 2021, from <https://sacoronavirus.co.za/COVID-19-risk-adjusted-strategy>

as social distancing in the workplace, which meant additional expenditure. On a business survival level, the most prevalent concerns and actions were towards the liquidity (LIQ) of a firm (OECD 2020), which only reflected a short-term response.

Financing is critical for the value creation and financial sustainability of a company (DeAngelo 2022; Mokhova & Zirecker 2014). Yet, long-term consequences were highlighted by Goodell (2020), who claims that the way firms structure their financing, using equity or leverage (LEV), is at a critical point given the influence of the COVID-19 pandemic. This is because of debt financing likely to be disrupted by a drastic macro-economic shock (Huang, Gao & Chen 2020). The operation disruption caused by the pandemic is expected to tighten financial flexibility and increase the cost of capital (Goodell 2020). Companies will therefore attempt to increase their debt levels to mitigate reduced liquidity. Additionally, it is expected to be more rapidly during a time of crisis (Vo, Mazur & Thai 2022). However, companies that were already financially constrained before the pandemic will have difficulty to secure more debt during the pandemic (Moyo & Markou 2022), facing liquidation risk, which was the case in the previous 2008 financial crisis (Campello, Graham & Harvey 2010; Hossain 2021).

Capital structure and changes in the equity and leverage ratios are even more critical for the retail sector, which was severely impacted by the national lockdown. Customers have

had to change their habits, and thereto, the long-term effects of changed consumer behaviour are still to be seen, which, in turn, has a domino effect on capital structure and the ways a retail company may fund its activities (Opute et al. 2020).

The various effects of the COVID-19 pandemic on capital structure could not be investigated previously because of the lack of available data. However, now, after the 2021 annual financial reports have been published, data are available for the effects to be investigated. This then prompts the following research question: What was the immediate impact of the COVID-19 pandemic on capital structure of retail firms? This investigation, within an emerging market context, will be supported by providing the common determinants of capital structure, as informed by the existing, comprehensive body of knowledge.

Notwithstanding these knowledge bases, the findings of this article provide a novel contribution of capital structure during a pandemic, which is under-theorised, at this point. It provides novelty value on the reaction of a retail sector in response to the pandemic when profit-constraining lockdown measures had been implemented. Fresh insights include the use of a dummy variable, as a proxy to distinguish between the pre-pandemic and the 'during-pandemic'-period, which then showed significance, when the panel data analysis indicated that the pandemic impacted the capital structure. Other significant determinants were profitability (PROF), business risk (RISK), size and age. The comparison of the pre- and during COVID-19 descriptive statistics showed that the retail firms reacted quickly and re-adjusted their capital structure, suggesting proactive management and sound decision making while heeding warnings highlighted by the likes of the OECD (2020), Huang and Ye (2021) and Goodell (2020) and other capital market advisories.

The results are indicative of the resilience of an emerging market's (South Africa: [SA]) retail sector and provide a level of comfort to investors regarding the responsiveness of the retail industry during a grand challenge such as the pandemic. Emerging economies may use these findings as a guide to capital structure decision-making during times of crises.

Capital structure

The seminal work of Modigliani and Miller (1958) sparked the debate on the importance of capital structure; the authors initially suggested that different combinations of debt and equity will be irrelevant to the value of a company. This notion was criticised because of the perfect-market condition assumptions of the authors. Later, Modigliani and Miller (1963) accepted that the inclusion of debt in the capital structure will lead to enhanced value creation for a firm. This is because of the tax deductibility of the interest associated with debt.

The debate continued and two opposing capital structure theories were proposed namely the pecking order theory (initially by Donalson 1962, expanded by Myers & Mailuf in

1984) and the static trade-off theory of Kraus and Litzenberg (1973). More theories emerged such as the agency theory by Jensen and Meckling (1976) and market timing theory by Baker and Wurgler (2002). Interestingly, the static trade-off theory was extended to a dynamic version (Strebulaev 2007) as companies can deviate from their target capital structure. Once there is a deviation, companies will only adjust to their target capital structure if the perceived benefit of readjustment outweighs the cost. Despite the development of the different theories, the pecking order and the trade-off theories are still viewed as the most prominent theories (Culata & Gunarshih 2012; DeAngelo 2022). Myers (1984) rightfully referred to these contradictory theories not being fully able to explain actual financing decisions of companies as the *capital structure puzzle*.

Both the prominent theories suggest that capital structure consists of equity and debt as a financing combination but contradict each other in the way debt and equity should be used (Tazvivinga, Mouton & Pelcher 2021). According to the trade-off theory, the capital structure financing mix is established through a balancing act of the tax shield of increased debt and is weighted against the increased cost of financial distress. The pecking order theory suggests that financial managers should rather follow a prescribed order of options when financing is needed. The order of financing, according to the pecking order theory, is retained earnings, debt and lastly equity, which should be resorted to when all other options have been exhausted. In the first of its kind for capital structure determinants, a systematic review by Kumar, Colombage and Rao (2017), the authors investigated literature from 1972 to 2013 mainly in the Emerald and EBSCO databases, amongst others. At the time, only two articles were dedicated to the retail sector globally, indicating a clear gap in the academic literature for the retail sector.

Capital structure studies within emerging markets, specifically SA, are limited. Ramjee and Gwatdzo (2012) and Moyo, Wolmarans and Brummer (2013) both investigated the speed of adjustment, which informed on how quickly firms return to the target capital structure ratio after deviating from it. Both of these studies did not investigate capital structure determinants nor specifically the crises. Moyo et al. (2013) included retail, manufacturing and mining. De Vries and Erasmus (2010) investigated determinants of capital structure. Their sample was on industrial firms only, ranging from 1995 to 2008, thus excluding the financial crisis. Size and tangibility (TANG) were identified as the most important factors influencing capital structure. The methodology included a multiple regression, which excluded a panel data analysis. This means that differences between firms were automatically excluded, and the analysis was limited to time series data.

A study including the effects of the financial crisis on capital structure determinants (Mouton & Smith 2016) included the top 40 firms listed on the Johannesburg Securities Exchange (JSE); therefore, retail was included, however, not addressed specifically. A panel data analysis revealed incremental of the financial crisis, having risk and tangibility as significant

determinants during and post-financial crisis. Tazvivinga et al. (2021) did a study on capital structure determinants on the retail sector in SA, which is a leading industry in Africa. A panel data analysis revealed size, firm age (AGE), profitability, growth (GROW) opportunities and tangibility as significant determinants of capital structure for the retailing industry. However, the effects of both the financial crisis and pandemic were excluded from the sample size, which was from 2009 to 2018. The summary of previous SA literature in capital structure shows that capital structure enquiries are lacking in the retail sector with the inclusion of crises.

In order to establish support for one or the other of opposing capital structure theories, the effect of the determinants of the capital structure on the financing mix needs to be established. In the literature review study of capital structure, the most accepted determinants over 40 years were identified by Kumar et al. (2017). Based on the authors' findings, profitability, tangibility, liquidity, business risk, growth, size and age were selected as capital structure determinants for this study. While noting these established principles, it is the effect of the pandemic that is the focal point of this study; therefore, the theory support discussion will revolve on the expected crisis dynamics (Almeida 2021).

During a crisis such as the pandemic, it is expected for companies to experience increased business risk because of economic contraction (Mohammad & Khan 2021) causing a decline in profitability, growth and liquidity. It is also expected for older, bigger companies with more assets to raise debt easier, to support liquidity management and increase cash holdings (Almeida 2021; Bajaj, Kashiramka & Singh 2021; Kumar et al. 2017).

The retail companies in question are all listed on the Johannesburg Stock Exchange (JSE) and therefore by default have easier access to these benefits, as opposed to unlisted and smaller firms. To contextualise the findings, the general theoretical expectations for the contending theories are summarised in Table 2.

Global macro-economic change

The changing macro-economic conditions in which companies operate influence their capital structure (Auret, Chipeta & Krishna 2013; Kumar et al. 2017; Piaw & Jais 2014). The worldwide COVID-19 pandemic has posed major macro-economic pressure on companies because of the restriction or halting of trade because of lockdown conditions. The impact of the restrictions has a possible negative effect on profitability, one of the major determinants of the capital structure of a firm. The capital structure is therefore bound to change because of the restrictions on liquidity during the pandemic, with firms being forced to stop or limit trading (Huang & Ye 2021). Firms are expected to increase their debt in order to manage possible liquidity constraints and increase cash holdings.

TABLE 2: The theoretical expectations.

Determinant	Expected impact on capital structure	Theory supported
Business risk	Positive	N/A
	Negative	Trade-off
Profitability	Positive	Trade off
	Negative	Pecking order
Growth	Positive	Pecking order
	Negative	Trade off
Liquidity	Positive	Trade off
	Negative	Pecking order
Tangibility	Positive	Trade off & Pecking order
	Negative	N/A
Age	Positive	Trade off
	Negative	Pecking order
Size	Positive	Trade off
	Negative	Pecking order

Source: Adapted from Kumar, S., Colombage, S. & Rao, P., 2017, 'Research on capital structure determinants: A review and future directions', *International Journal of Managerial Finance* 13(2), 106–132. <https://doi.org/10.1108/IJMF-09-2014-0135>

N/A, not applicable.

Over the past 30 years, there were major grand challenge macroeconomic events that had a significant impact on companies' capital structures of which the 2007/2008 financial crisis is the most recent one. Others are the Argentinian crisis that began in 2001, the 1997 Asian crisis and the 1994 Mexican crisis (De Wet 2020). It is important to note that these crises were all financial crises, whereas the COVID-19 pandemic is unique. It is different from previous crises as the pandemic is a health crisis of global proportions that grips the entire world with the globalised effect of socio-economic impacts, trade restrictions and value chain disruptions felt universally and across every sector. In this specific way, it is not similar to a financial crisis although the macro-economic conditions for all firms changed globally.

It is already accepted that no universal capital structure theory should be expected for all companies (Myers 2001), and literature predicts that the capital structure of companies should change during the COVID-19 period. Therefore, to inform the impact of the COVID-19 pandemic on the capital structures of SA retail firms, it is necessary also to establish which capital structure theory is followed in this industry amidst a pandemic. This investigation may be used as guidance to other retail firms to successfully navigate through such a volatile period.

Limited research is available on the effect of the pandemic on capital structure, and hence this study has relevance. Globally, Huang and Ye (2021) and Almeida (2021) found that firms expanded their leverage to bridge the liquidity problems that they faced during the pandemic. This move was risky for firms that were already highly leveraged before the pandemic, as they faced the risk of becoming insolvent because of the high cost of debt and constraints posed by the pandemic. The capital structure studies completed in SA were discussed in the previous section, and it was noted that there is a lack of literature for retail firms, capital structure and pandemics. The holistic effect of pandemic in SA pertaining to capital structure has not yet been researched and it is this gap to which this study provides a response.

Research methods and design

The methodology followed was quantitative in nature, using secondary data in a panel regression model. This methodology is consistent with other studies in capital structure (Moradi & Paulet 2019; Thiele & Wendt 2017). The internationally recognised INET BFA and EquityRT® databases for secondary data were used to collect the data for the South African firms in the retail sector from 2009 until 2021. The sample period includes pre-pandemic and during-pandemic years. The authors acknowledge the global financial crisis of 2007/2008. However, as it can be argued as to when the effects of the financial crisis were apparent, for the purpose of this study, 2009 will be considered as post-financial crisis. The years 2020 and 2021 are considered as the beginning of COVID-19 and will encapsulate the immediate effect of COVID-19 on retail company's capital structure.

The population consists of 15 firms in the retail sector. Judgement sampling was applied, and firms that were not listed during the sample period were excluded. Four firms were excluded, resulting in a sample size of 11 companies. Ethical clearance was obtained with clearance code, SAREC20210510/06.

A panel regression model was used to capture the heterogeneity in the sample as well as the uniqueness of each company (Brooks 2014). The model is also appropriate as it captures cross-sectional and time-series data well, expanding the number of observations to 143. The statistical software EViews 12 was used to run the panel regression models. The equation below shows the regression equation with the variables chosen based on previous literature:

$$LEV_{it} = \alpha_1 + \beta_1 LIQ_{it} + \beta_2 PROF_{it} + \beta_3 RISK_{it} + \beta_4 SIZ_{it} + \beta_5 TAN_{it} + \beta_6 AGE_{it} + \beta_7 GROW_{it} + \beta_8 COVID_DUM_{it} + \epsilon_{it} \quad [Eqn 1]$$

Leverage, the dependent variable, was the debt-to-equity (DE) ratio used as a proxy for capital structure. Firm-specific factors (independent variables) influencing capital structure are liquidity, profitability, business risk, firm size (SIZ), tangibility, firm age and growth. Liquidity was calculated as current assets divided by current liabilities. Profitability was included as the return of assets (ROA) ratio – (earnings before interest and tax [EBIT] divided by Total assets). Business risk was proxied by the standard deviation of ROA. Firm size was proxied by the natural logarithm of market capitalisation. Market capitalisation as proxy for size is not often used in capital structure studies; however, Cevheroglu-Acar (2018) mentions it as suitable when market conditions need to be considered. The size of a firm relates to the ease and availability of information in the market (Cevheroglu-Acar 2018), and in this case, the market was influenced by the macro-economic changes because of COVID-19. Therefore, market capitalisation as a measurement was deemed necessary to control for the change in the equity element of capital structure.

Tangibility was calculated as the fixed assets divided by total assets. Firm age was proxied using the natural logarithm of the number of years listed on the JSE. Firm growth was proxied by the natural logarithm of sales. The inclusion of these determinants and the proxies are recognised and used in studies by Moradi and Paulet (2019), Kieschnick and Moussawi (2018), Kumar et al. (2017), Thiele and Wendt (2017), Thippayana (2014), Moyo et al. (2013) and De Vries and Erasmus (2012).

To determine the effect of the pandemic on the capital structures of the South African retail firms, there must be a clear distinction between pre-pandemic and during-pandemic data. The pandemic's proximate effect on the retail industry got underway on 26 March 2020 with the start of the national lockdown and subsequent trade restrictions. This watershed date is the distinction used to determine which data points will fall under the pre-pandemic sub-sample or not. A dummy variable (COVID_DUM) is included to indicate this distinction. A zero was allocated to pre-pandemic data and a one was allocated to the during-pandemic data points.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of Johannesburg School of Accounting Research Ethics Committee (SAREC) (No. SAREC20210510/06).

Results

This study is explicitly focused to determine the effect of the pandemic on capital structure; therefore, descriptive statistics are specifically presented as two subsets: 'pre-COVID-19' and 'during COVID-19' periods, which are presented in Tables 3 and 4, respectively.

Table 3 and Table 4 show the descriptive statistics of pre- and during-COVID-19 periods. This provides critical information with regard to the variables important to capital structure, including leverage, which is the proxy for capital structure. When the two sub-sets were compared, it became apparent that the percentage change in the mean for each determinant, which is reported in Table 5, must be highlighted to show the substantial changes that took place immediately within the pandemic. Leverage decreased by 86%, showing that firms

TABLE 3: Pre-coronavirus disease 2019 descriptive statistics (2009–2019).

Variables	LEV	LIQ	PROF	RISK	SIZ	TAN	AGE	GROW
Mean	4.2482	2.2831	17.5693	3.9940	4.3393	0.2675	1.4522	12.0576
Median	1.4600	1.5000	15.8900	3.0107	4.4552	0.2635	1.4472	10.4746
Maximum	312.6700	6.8200	46.8500	14.5200	5.5227	0.6194	1.8976	110.0767
Minimum	-15.1800	0.3200	-34.6600	0.0849	3.2179	0.0359	0.7782	-45.9762
Standard deviation	28.3413	1.5166	11.3453	3.1175	0.4792	0.1458	0.3022	18.9603
Skewness	10.7810	0.9949	-0.2586	1.4139	-0.2052	0.3735	-0.2425	2.2124
Kurtosis	117.8504	2.9732	6.0599	4.6389	2.7223	2.3278	2.0484	13.9215
Jarque-Bera	68846.6700	19.9670	48.5546	53.8549	1.2383	5.0907	5.7516	700.0722
Probability	0.0000***	0.0001***	0.0000***	0.0000***	0.5384	0.0784	0.0564	0.0000***
Sum	514.0300	276.2600	2125.8900	483.2731	525.0517	32.3619	175.7221	1458.9650
Sum sq. dev.	96387.55	275.9992	15445.8000	1166.2350	27.5574	2.5516	10.9608	43139.0300
Observations	121	121	121	121	121	121	121	121

LEV, Leverage; LIQ, liquidity; PROF, profitability; RISK, business risk; SIZ, firm size; TAN, tangibility; AGE, firm age; GROW, growth; sq. dev., sum of squares deviation.

***, 99% confidence level.

TABLE 4: During coronavirus disease 2019 descriptive statistics (2020–2021).

Variables	LEV	LIQ	PROF	RISK	SIZ	TAN	AGE	GROW
Mean	0.6018	1.6773	9.4727	6.8774	4.2686	0.2198	1.5610	5.3698
Median	1.5300	1.2750	9.0600	4.5023	4.4000	0.2100	1.5441	4.1397
Maximum	4.3600	3.8900	29.7600	13.8837	5.1331	0.4728	1.9085	36.5471
Minimum	-21.7300	0.7900	-10.6500	2.2572	3.1497	0.0517	1.2304	-9.4783
Standard deviation	5.2491	0.8640	10.2619	4.3077	0.4991	0.1129	0.2354	10.3840
Skewness	-3.7202	1.1680	-0.2319	0.6757	-0.6626	0.7268	0.0859	1.3336
Kurtosis	16.4050	3.3298	2.7956	1.7859	2.7769	3.1039	1.6495	5.1734
Jarque-Bera	215.4639	5.1015	0.2355	3.0250	1.6554	1.9466	1.6990	10.8518
Probability	0.0000***	0.0780	0.8889	0.2204	0.4371	0.3778	0.4276	0.0044**
Sum	13.24000	36.9000	208.4000	151.3031	93.9100	4.8355	34.3422	118.1355
Sum sq. dev.	578.6235	15.6780	2211.4290	389.6740	5.2318	0.2676	1.1632	2264.3870
Observations	22	22	22	22	22	22	22	22

LEV, Leverage; LIQ, liquidity; PROF, profitability; RISK, business risk; SIZ, firm size; TAN, tangibility; AGE, firm age; GROW, growth; sq. dev., sum of squares deviation.

, 95% confidence level; *, 99% confidence level.

TABLE 5: Mean percentage change from pre-coronavirus disease 2019 to during coronavirus disease 2019.

Variables	LEV	LIQ	PROF	RISK	SIZ	TAN	AGE	GROW
% Change	-86	-27	-46	72	-2	-18	7	-55

LEV, Leverage; LIQ, liquidity; PROF, profitability; RISK, business risk; SIZ, firm size; TAN, tangibility; AGE, firm age; GROW, growth.

TABLE 6: Results of the diagnostic tests.

Effects test	Statistic	df	Chi-sq. statistic	Prob.
Cross-section F	7.6971	-10.124	-	0.0000***
Cross-section chi-square	69.0518	10	-	0.0000***
Test summary				
Cross-section random	-	-	21.5455	0.0058***

***, 99% confidence level.

df, degree of freedom; Prob, probability.

reduced their long-term liabilities during the COVID-19 period.

Profitability decreased by 47%, GROW by 55% and LIQ by 27% indicating the effect of the pandemic because of trading restrictions. Tangibility shows the least change with a decrease of 18%. This all indicated a downward trend of the variables during the COVID-19 period compared to pre-COVID-19. With such a major macro-economic event, it is understandable that RISK can and should increase. The South African retail sector's risk increased by 72% during the pandemic. Firm size decreased slightly, indicating a possible contraction in the market, and AGE increased as the firms are getting older. The significance of these variables was established through the regression analysis. The correlation matrix, as shown in the Table 1-A1, indicates low correlation between the variables. The highest correlation between the variables is between profitability and liquidity, with a correlation of 0.3864. This is an indication that multicollinearity does not exist between the variables.

The panel regression estimation process started with the pooled ordinary least squared (OLS) model, which rendered an adjusted R -squared of 0.1497. The sequential fixed effects model (FE), accommodating the heterogeneity of the sample, showed an adjusted R -squared of 0.4331 (see Table 2-A1 and Table 3-A1). The results of the likelihood test (Table 6) indicated that the FE is preferred over the pooled OLS, with the significant $p < 0.01$.

Following the acknowledgment of the accommodation of the cross sections in the sample, the random effects model (RE) was estimated and an adjusted R -squared of 0.2253 was documented (see Appendix 1). The diagnostic testing of the Hausman test, displayed in Table 6, was performed. The null hypothesis is that no correlation exists within the error term, which was rejected ($p < 0.05$), and the FE was determined as the overall preferred model. The final model FE, based on the diagnostic tests performed and is shown in Table 7.

The F -stat of the FE is significant ($p < 0.01$) with the model having a 43.31% explanatory value (R -squared). The results of the FE show profitability, risk, size, age and importantly the COVID-19 dummy, as significant on the 99% confidence level ($p < 0.01$). Interestingly, liquidity, growth and tangibility were insignificant for the South African retail sector, an emerging market. The discussion on the findings follows in the next section.

TABLE 7: Final model: Fixed effects model.

Variable	Coefficient	Probability
C	2.8366	0.6548
LIQ	0.2633	0.4415
PROF	-0.1896	0.0000***
RISK	-0.4030	0.0011***
SIZ	1.7324	0.0000***
TAN	-3.9865	0.2551
AGE	-4.2042	0.0117**
GROW	-0.0031	0.8119
COVID_DUM	2.3976	0.0007***
Adjusted R -squared	-	0.4331
F -statistic	-	7.0261
Prob (F -statistic)	-	0.0000***

Note: Bold indicates significance at the applicable confidence level.

LIQ, liquidity; PROF, profitability; RISK, business risk; SIZ, firm size; TAN, tangibility; AGE, firm age; GROW, growth; Prob, probability; COVID_DUM, COVID-19 dummy variable; C., coefficient.

***, 99% confidence level.

Discussion

The effect of COVID-19 had a significant effect on the capital structure of the SA retail sector. This is evident from the significant result of the COVID-19 dummy variable. This finding is supplemented by the findings of the descriptive statistics, where a decrease in the average profitability, growth, liquidity and tangibility was identified and an average increase in risk.

The descriptive statistics indicated an average decrease of 46% in profitability when pre-COVID-19 and during-COVID-19 periods are compared. Profitability was found to be a significant, at the 99% confidence level and a negative determinant of capital structure. This is in support of the pecking order theory.

Importantly, average liquidity, measured by the current ratio, remained healthy with a ratio of 1.6773 during the pandemic period when compared to the rule of thumb of 2.0. This is an indication that the financial management in the retail sector overall was managed well, and short-term funds such as liquidity were not necessary to use during the COVID-19 period, proved by the insignificant finding of liquidity to capital structure. This insignificant and positive coefficient of liquidity with capital structure (leverage), also opposes the statement of Huang and Ye (2021), who warned of insolvency because of liquidity. Although the average liquidity decreased during COVID-19, the SA retail firms did well to avoid possibilities of insolvency, showing resilience during the COVID-19 pandemic. This is a clear indication of prudent behaviour of the South African retail companies who did not rely on liquidity to decrease the long-term debt.

Business risk was found significant at the 99% confidence level and negative. Thus, as risk increased, leverage decreased, *ceteris paribus*. The RISK coefficient of -0.403 indicated that as the business risk increased, the leverage will decrease. The descriptive statistics clearly indicate an increase in business risk during the COVID-19 period. The extent of the increased business risk is evident in the average

increase of 72% during the pandemic. This is attributable to uncertainty and reduced trading. This conclusion then indicates that leverage decreased, which, in turn, implies that the capital structure decisions were positioned to reduce debt and caution was exercised, within the uncharted territory of a grand challenge global pandemic.

Growth and tangibility were both found statistically insignificant with leverage, with the average growth decreased by 55% and average tangibility decreased by 18%. Normally, tangibility is used to secure additional debt, but as leverage was reduced because of the economic contraction, tangibility and growth should not and could not have a significant impact on capital structure.

Age was significant at the 99% confidence level with a negative coefficient. Kumar et al. (2017) found that developed American and European countries show such a relationship with leverage, whereas developing countries normally show a positive relationship. The average age increased, which then means that leverage decreases as firms grow older. Firms seem to reduce their leverage and continue to do so, as a strategic decision during the pre- and during-pandemic time. Profoundly, the South African retail companies' capital structure shows a similar relationship with that of developed markets, positioning the SA retail market as a leader in Africa, following the developed markets' trends.

Size was found to be statistically significant at the 99% confidence level with a positive coefficient. The average firm size decreased by 2%, showing a contraction in the market during the pandemic. The result for size is an indication of the prudent behaviour of the SA retail companies, by reducing debt in reaction to the decline in firm size. This finding is supported by the trade-off theory.

Linking the findings to the opposing capital structure theory predictions in Table 2, it is evident that the capital structure puzzle prevails for the SA-listed retail companies. The significant negative coefficient of business risk together with the positive coefficient of size support the trade-off theory. The significant negative coefficients of profitability and age support the pecking order predictions. Therefore, a mixture of financial flexibility supported by the pecking order theory, together with the balancing act of the trade-off theory, may usefully explain the capital structure strategy evident in the responsive re-alignment of decision-making of the listed SA retail companies as evident from the initial response during the pandemic (Table 5).

Conclusion

The global COVID-19 pandemic had far-reaching consequences for not only individuals but also the trading of companies. The international lockdown procedures were unprecedented on a global and local scale. The objective of this study was to investigate the immediate impact of COVID-19 on the capital structure of retail firms, an under-theorised area. The most common determinants of capital structure were

included in the quantitative analysis. Descriptive statistics and panel regression analysis were used, with the inclusion of 11 firms over the sample period of 2009–2021.

From a financial perspective, the short-term and immediate effect of the pandemic on the capital structure of the retail sector was surprising. The study theorises that firms had to rebalance and went into what seems to be an iterative strategic re-alignment. Although capital structure is normally a long-term decision, caution towards solvency during a pandemic, or crisis alike, is needed. This influences the capital structure of a firm, creating potential managerial problems should a firm have to tap into their capital structure to maintain solvency. From an investor's perspective, having knowledge of the general retail sector response to the pandemic, creates evidence that will assist in investment decision making.

To the authors' knowledge, at the point of writing, this study is the first of its kind in South Africa and contributes towards the COVID-19 literature. It is valuable to note that the retail sector reacted quickly to the lockdown measures and constraints it faced during this unprecedented time. The results indicated that, although the COVID-19 period had a significant impact on capital structure, the retail sector sustained itself, reacted with prudence and showed financial flexibility. The theoretical finding, where the companies draw from both the trade-off and pecking order theories, provides evidence that these capital structure theories are used jointly to work towards sustainable capital structure strategies.

Although there are many calculations for the proxy of size within capital structure research, such as the natural logarithm of the book value of total assets, the natural logarithm of sales and the natural logarithm of market capitalisation (Cevheroglu-Acar 2018; De Vries & Erasmus 2012; Vo et al. 2022), the decision to use the natural logarithm of market capitalisation in this instance is suitable and provides novel insights. Using the natural logarithm of market capitalisation as a proxy had a dual purpose. Not only did it serve as a proxy for size, but it is also an indication of the change in equity, as an element of capital structure, providing novel insights in the global pandemic period.

The results of the mean percentage change of the determinants from pre-pandemic to during-pandemic were quite prominent. This warrants further research as to the changes of the determinants of other companies in different sectors, which could highlight the responsiveness of the other sectors towards capital structure during pandemic periods as well as the theoretical underpinnings of the capital structure decisions.

Although the decrease in profitability and growth can be seen as drastic, the effect on liquidity was less with an average decrease of 27%. Recent literature cautioned against the risk of insolvency because of the pandemic (Huang & Ye 2021; OECD 2020), but liquidity was found insignificant in relation to capital structure; therefore, the retail sector shows resilience and prudence in their capital structure decisions.

Displaying such cautious behaviour can serve as an example for other industries on how to deal with future pandemics and financial crises alike, providing important practical implications and confirmation of prudent decision-making during crises. This finding substantiates DeAngelo (2022), of the importance of these findings, and how it contributes towards the intuitive capital structure decision making. The capital structure decisions should be further researched using qualitative methods, to determine other strategic decisions and buffers within the retail sector. The results should inform on successful strategies and could be implemented in other emerging markets. Notwithstanding these under-studied areas, these results still provide immediate, and albeit bounded, information because of the limited timeframe of 2 years into the pandemic. A follow-up study will be required to determine the long-term effects of a global pandemic such as the COVID-19 pandemic. The retail firms exhibited exemplary capital structure decision-making behaviour during the COVID-19 pandemic.

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Authors' contributions

M.M. and L.P. were responsible for conceptualisation, analysis and writing.

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Data availability

The data that support the findings of this study are available from the corresponding author, M.M., upon reasonable request.

Disclaimer

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Appendix 1

TABLE 1-A1: Correlation matrix.

Variables	LEV	LIQ	PROF	RISK	SIZ	TAN	AGE	GROW
LEV	1.0000	-0.2332	-0.1588	-0.1531	0.2583	0.0767	0.0457	-0.0265
LIQ	-0.2332	1.0000	0.3864	-0.1259	-0.3145	-0.2316	-0.1353	-0.0355
PROF	-0.1588	0.3864	1.0000	-0.1763	0.0348	0.0843	0.0384	0.2351
RISK	-0.1531	-0.1259	-0.1763	1.0000	0.0759	-0.1109	0.0648	-0.2023
SIZ	0.2583	-0.3145	0.0348	0.0759	1.0000	0.0064	0.1925	0.2008
TAN	0.0767	-0.2316	0.0843	-0.1109	0.0064	1.0000	0.1229	0.0051
AGE	0.0457	-0.1353	0.0384	0.0648	0.1925	0.1229	1.0000	-0.0122
GROW	-0.0265	-0.0355	0.2351	-0.2023	0.2008	0.0051	-0.0122	1.0000

LEV, Leverage; LIQ, liquidity; PROF, profitability; RISK, business risk; SIZ, firm size; TAN, tangibility; AGE, firm age; GROW, growth.

TABLE 2-A1: Pooled OLS results.

Variable	Coefficient	Probability
LIQ	-0.2145	0.3118
PROF	-0.0298	0.2418
RISK	-0.2589	0.0010***
SIZ	0.8398	0.0010***
TAN	1.4108	0.4546
AGE	-0.2139	0.5967
GROW	-0.0162	0.2750
COVID_DUM	1.9294	0.0117**
C	-4.7046	0.0977*
Adjusted <i>R</i> -squared	-	0.1497
<i>F</i> -statistic	-	4.1254
Prob (<i>F</i> -statistic)	-	0.0002

LEV, Leverage; LIQ, liquidity; PROF, profitability; RISK, business risk; SIZ, firm size; TAN, tangibility; AGE, firm age; GROW, growth; Prob, probability; COVID_DUM, COVID-19 dummy variable; C., coefficient; OLS, ordinary least squared.

*, 90% confidence level; **, 95% confidence level; ***, 99% confidence level.

TABLE 3-A1: Random effects model results.

Variable	Coefficient	Probability
LIQ	0.0804	0.7592
PROF	-0.1103	0.0002***
RISK	-0.3779	0.0001***
SIZ	1.4338	0.0000***
TAN	0.5597	0.8198
AGE	-0.6701	0.3398
GROW	-0.0089	0.4798
COVID_DUM	2.0281	0.0022***
C	-7.8123	0.0377**
Adjusted <i>R</i> -squared	-	0.2253
<i>F</i> -statistic	-	6.1631
Prob (<i>F</i> -statistic)	-	0.0000***

LEV, Leverage; LIQ, liquidity; PROF, profitability; RISK, business risk; SIZ, firm size; TAN, tangibility; AGE, firm age; GROW, growth; Prob, probability; COVID_DUM, COVID-19 dummy variable; C., coefficient.

, 95% confidence level; *, 99% confidence level.