

The Nexus Between Debt Structure and Firm Financial Sustainability in Malaysia: A Pandemic Perspective

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ABSTRACT

This paper presents an evaluation of capital structure against the backdrop of Malaysian corporate sustainability by examining the link between capital structure and firm financial sustainability. The study employed 500 firm-years data in the main market of Bursa Malaysia from 2018 to 2022 and analyzed the results using multivariate regression analyses. The debt ratio does not support firms' financial sustainability could be due to the companies' borrowings do not generating sufficient profit to cover its costs for pre- and during Covid-19 periods. During Covid-19 period shows that the debt ratio is negatively correlated with higher magnitude to the firms' financial sustainability, mainly due to higher companies' debts distress during the pandemic period. Similarly, both short-term and long-term debts do not bring firms' financial sustainability. On the other hand, this study found that a bigger firm size improved the firm's financial sustainability. These findings help the corporate managers to do capital structure decision and policymakers to formulate incentives to promote sustainable capital structure among Malaysian corporations.

Keywords: Capital Structure, Corporate Sustainability, Firm Financial Sustainability, Malaysian Companies, Bursa Malaysia, Covid-19 Pandemic.

INTRODUCTION

Corporate debt structure is an important source of financing for companies, which plays a significant role in the sustainable growth of Chinese corporations (Li et al., 2019). Corporate sustainability is the ability of the firms to have effective management to fulfill its customers and stakeholders for a time period (Hossain, 2022). Corporate sustainability is in line with one of the United Nations's 17 sustainable development goals (SDGs), Goal 8 : Sustainable Economic Growth (United Nations, 2024). Conceptually, corporate sustainability is linked to the triple bottom line, namely profit, people, and the planet, and a function of corporate sustainability is financial sustainability (Gleißner, et al., 2022). Financial sustainability refers to how the firms arrange its financial to achieve the financial successes in both short and long term (Kong, et al., 2023). Wu, et al. (2023) further suggest financial sustainability is the capacity of firms making profit and optimum capital investment value creation after accounted for its long- and short-term obligations.

Debt financing can be secured through loans, bonds, or alternative debt instruments which allow businesses to access external funds. Debt financing can assist corporations to gain success and at the same time it can bring negative impacts on firms by promoting corporation failure; the usage of debts increases the financial distress risks (Zainudin et al., 2017). The scale of either debt or equity funding carries diverse risks and implications for returns (Yazdanfar & Öhman, 2015). Kong, et al. (2023) further suggest the capital structure is an important predictor of the firm's financial sustainability. Hence, it becomes crucial for companies to have wise decision making to determine the optimal financial structure to achieve financial sustainability, especially within the diverse and competitive market of Malaysia.

Campello (2006) suggests that firms are motivated to take on debt and boost production to acquire a competitive advantage over their industry rivals. The authors also stated that debt financing could either deter or assist a company's ability to compete. Yazdanfar and Öhman (2015) discovered that a significant debt ratio increases both the operational expenses for an organization and the risk of potential loss of managerial control over the business. On the same notion, Huang and Ye (2021) found that companies with significant leverage may face financial distress due to the pandemic.

Several studies were conducted outside Malaysia have pertaining to debt financing before the Covid-19 period. Ahmed and Siddiqui (2019) investigate the impact of debt financing towards firm achievements of 70 textile companies in Pakistan from 2010 to 2015. In the same year, Jones and Edwin (2019) studied the impact of debt financing on performance of listed consumer goods companies in the Nigerian Stock Exchange (NSE) from 2006-2017. Similarly, Magoro and Abeywardhana (2017) investigate the influence of credit financing towards the financial stability of listed companies in the wholesale and retail sectors of South Africa from 2011-2015. Yazdanfar and Öhman (2015) studied the impact of trade credit and debt affecting the achievements of small and medium-sized enterprises (SMEs) across retail trade, wholesale, metal, health care, and construction sectors based on Swedish data from 2009 to 2012. Anshu & Narendra (2015) conducted research focusing on the financial leverage and firm value among 145 manufacturing sector companies listed in Mahila, India. Besides that, Muchugia (2013) investigates how debt financing affected forty-three Kenyan commercial banks' profitability between 2008 and 2012.

There are a few studies conducted in Malaysia related to debt financing. Hasan et al. (2021) examined how debt financing impacting the profitability of listed twenty-three manufacturing companies in Bursa Malaysia from 2010 to 2018. Tan et al. (2021) studied the connection between the performance of listed firms in Bursa Malaysia and their property industry debt level from 2015 to 2019. Ramli et al. (2020) investigates the influence of the Securities Commission of Malaysia's 2013 revised Shariah-approved screening method on debt levels and firm performance within the 2000-2014 period. Ramli's study focuses on consistently identified Shariah-approved firms across sectors including construction, industrial, consumer, plantation, real estate, technology, trading, and service. On the same notion, Zaidi et al. (2019) research the effects of debt financing towards 99 listed consumer product firms in Malaysia from 2001 to 2015. Ramli et al. (2019) investigates the impact of financial leverage towards profitability of Malaysian and Indonesian companies from 1990 to 2010. Hashim and Hassan (2017) studied the influence of capital structure on the financial performance of listed thirty-six construction companies between 2011 and 2015. Similarly, Mohammad et al. (2019) investigates the impact of capital structure affects the profitability of listed construction companies within the same timeframe. Zainudin et al. (2017) research the ideal debt threshold for Malaysian Real Estate Investment Trusts (MREITs) by analyzing financial data from all sixteen MREITs publicly traded in Bursa Malaysia from 2005 to 2014. Varian et al. (2015) examined the associations between capital structure and listed oil and gas firms' performance in Malaysian from 2003 to 2013.

The studies conducted in overseas and Malaysia were in the context of debt financing and capital structure undertaken in the period before Covid-19 pandemic. Based on the literature above, there are few studies looking into the relationship between capital structure and firm financial performance during Covid-19 period. Hence, it is timely for this paper to examine whether there is any change in the relationship between capital structure and firm financial sustainability during Covid-19 period adding towards the current literature. Adopting Kong, et al. (2023)'s research approach by using return on equity (ROE) to measure financial sustainability, whereby an increase in ROE means the companies are going to be more financial sustainable, and a decrease in ROE represents the firms going to be less financial sustainable.

This study contributes to the literature in the following ways; firstly, previous Malaysian studies were conducted based on a particular or few selected industries, including manufacturing, oil and gas, REITs and shariah-approved firms. Our study focuses on the top 100 non-financial listed firms in terms of market capitalization. Secondly, our study highlights whether a pandemic of Covid-19 brings any changes to the relationship between capital structure and financial sustainability.

This paper will first provide a literature review of past studies, followed by the development of hypotheses. The next section describes the research methodology, results, and discussion of findings before concluding the paper.

LITERATURE REVIEW

Debt ratio

Etim (2022) suggests that debt ratio is conducive to firm value of 16 consumer goods firm in Nigeria from 2013 to 2019. A Malaysian study by Ayaz et al. (2021) discovered that debt ratio brings positive impact to firm performance. Rahman et al. (2019) conducted their research in Bangladesh shows similar results as Ayaz et al. (2021)'s study. Similarly, Dalci (2018) discovered that the tax shield has the potential to enhance the positive influence of leverage on the profitability for China manufacturing firms. Likewise, Farah et al. (2016)'s study revealed that debt ratio is positively related to firm performance in Pakistan from 2006 to 2014. Toy et al. (2014) found a favourable association between debt ratio and profitability in the USA and Japan. Uchenna et al. (2012) debt ratio is positive contribution to the profitability of beer brewery companies in the world leading companies from 2000 to 2011. Saeedi et al. (2011) discovered that Iranian firms with higher debt ratio associated with higher profitability.

In contrast, some studies have revealed that there is a negative relationship between the debt ratio and firm performance. Nguyen and Nguyen (2020) discovered that the detrimental influence of debt ratio on firm performance especially in state-owned enterprises in Vietnam. Similarly, Pandey and Sahu (2019) found that debts bring an adverse effect on the performance of manufacturing firms in India. Further, Habib et al. (2016) found a significant adverse association between debt ratio and company profitability in Pakistan. On the same notion, Yazdanfar and Öhman (2015) discovered that debt ratio brings detrimental effects on firm performance for Swedish companies. Another study conducted by Chinaemerem & Anthony (2012) revealed that the debt ratio had an adverse effect on firm performance in Nigerian. Salim and Yadav (2012) also discovered that the debt ratio is negatively related to the company's performance in Malaysia.

Short-term debt

Guin (2011) highlighting a short-term debt should align with short-term liabilities. Hasan et al. (2021) discovered that short-term debt gives no positive impact on firm performance towards Malaysian manufacturing firm. Similarly, Nazir et al. (2021) found that short-term debts bring no positive impact on Pakistan firm performance. In contrast, Hussein (2020) discover a positive relationship between short-term debts and corporation performance in Egypt. On the other hand, Magoro and Abeywardhana (2017) also found there is a negative relationship between short-term borrowings and corporate performance in retail and wholesale sectors of South Africa companies. On the same notion, Bui (2017) revealed that short-term have a detrimental influence on ROE of England's listed oil and gas companies. Hasan et al. (2014) discovered an inverse relationship between short term debt and firm performance as Bangladesh has underdeveloped equity and debts markets, higher debt costs and stringent covenants associated with debt usage.

In contrast, Ibhagui and Olokoyo (2018) suggests that higher short-run debt in Nigerian listed firms boost their market performance and found that the positive relationship is influenced by firm size, often favouring smaller businesses. Shah and Shah (2017) also discovered that short-term debt is positively related to Pakistan firm performance as short-term financing does not affect profitability when adjusted for risk. The study by Gunawan and Daulay (2016) revealed that short-term debt brings positive impact towards firm performance as measure by ROE of 756 non-financial sector corporations in Indonesia. Similarly, Muchugia (2013) found that a favourable association between short-run debt and firm performance in Kenya and further discovered that Kenyan companies heavily rely on short-term debt due to challenges in obtaining extended financing from banks. Olokoyo (2013) discovered a favourable association between short-term financing and firm performance in Nigeria.

Long-term debt

Guin (2011) pointed out that long-run liabilities should be used to finance long-term debt in accordance with the matching principle of finance. Hasan et al. (2021) revealed that companies with high long-term debt will experience adverse effects on their performance in Malaysia. Similarly, Nazir et al. (2021) have revealed that long-run debt lowering firm performance due to agency issues associated with high-debt policy. Mamaro and

Legotlo (2020) suggest that long-run debt to assets impedes the financial performance of retail companies and leads most firms to prefer cost-effective internal financing over long-term debt due to the associated repayment obligations. A country specific investigation conducted in South Africa by Magoro and Abeywardhana (2017) discovered that high debt companies encountered diminished profits. On the same notion, Bui (2017) revealed that long-term debt gives insignificant impact on 18 oil and gas companies in England from 2009 to 2014. Gunawan and Daulay (2016) also discovered that long-term debt negatively affects the company's performance despite having a fixed cost of debt and predetermined maturity. The study by Habib et al. (2016) provides evidence of long-run debt reduced firm's profitability for non-financial firms in Pakistan. Hasan et al. (2014) found that companies with higher long-term debt experience have an adverse effect on company performance. A Kenya study also discovered long run debts negatively affecting commercial banks' performance (Muchugia, 2013).

The Covid-19 pandemic

The coronavirus pandemic, or COVID-19 pandemic, was initially discovered in Wuhan, China, in December 2019. Between January 25, 2020, and February 26, 2020, Malaysia experienced the first wave of this pandemic (Zamri, 2021). The emergence of the pandemic caused a tremendous economic impact over the world in the form of economic downturn. On 18 March 2020, Malaysia imposed Movement Control Orders (MCO) with the aim of curbing the spread of the pandemic (Nor et al., 2020). Herng et al (2022) highlights that categorization of Movement Control Order (MCO) into stages 1 to 3, termed as: 1] enhanced MCO, 2] Conditional Movement Control Order (CMCO), and 3] Recovery Movement Control Order (RMCO), which was implemented from March 18, 2020, until March 29, 2021. Post March 29, 2021, movement restrictions were reclassified into National Recovery Plan categories 1 to 4. The MCO officially end on 31 December 2021. As a result of MCO, most of the Malaysian listed companies have been affected by the capital structure changes.

The MCO had caused some companies to fail to sustain their business operations since most of the business activities were ceased from operation (Shah et al., 2020). Thus, these companies turned into additional debts as their main sources of financing their business activities for sustainable growth (International Monetary Foundation, 2020). Lee et al. (2021) discovered that the correlation between the gold price and the exchange rate has shifted to a positive direction during the COVID-19 pandemic. Khai et al. (2020) asserts that Covid-19 pandemic has a detrimental effect on the economy have resulted in a significant decline in business volume and liquidity issues for many companies, particularly SMEs. Omar et al. (2020) highlights that a company's amassed financial resources prove highly effective for maintaining business sustainability during a recession, but other assets and competencies enable companies to respond to emerging business opportunities. Khatib and Nour (2021) found that COVID-19 has impacted every aspect of the firm.

Hypotheses Development

Debt ratio and firm performance

Studies conducted in the Swedish indicated that a negative relationship between debt ratio and firm performance (Yazdanfar & Öhman, 2015). Similarly, A Nigerian study conducted by Chinaemerem & Anthony (2012) discovered that debt ratio has an adverse effect on the ROE. The findings of the studies are in line with Nguyen and Nguyen (2020), which revealed a significant negative correlation between debt ratio and firm's performance in the context of Vietnam. These results lead us to hypothesize increase in debt ratio will reduce the firm's performance.

H1(a): There is a negative relationship between debt ratio and firm financial sustainability.

H1(b): There is a negative relationship between debt ratio and firm financial sustainability before and during Covid-19 period.

Short-term debt and firm Performance

Magoro and Abeywardhana (2017) highlight that short-term debt has adversely affected the financial performance among the South Africa companies. Similarly, Hasan et al. (2021) found out a short-term debt is

negatively related with ROE among Malaysia companies. A Vietnam study revealed negative results between short-term debts and firm performance (Shubita and Alsawallah, 2012). On the same notion, two studies found similar negative relationship between the two variables in Bangladesh and England (Hasan et al., 2014 & Bui, 2017)., which lead to the second hypotheses are as follows:

H2(a): There is a negative relationship between short-term debt and firm financial sustainability.

H2(b): There is a negative relationship between short-term debt and firm financial sustainability before and during Covid-19 period.

Long-term debt and firm performance

Nazir et al. (2021) revealed that increased debt in emerging markets lead to reduction in company profitability. Similarly, Hasan et al. (2014), Gunawan & Daulay (2016) and Magoro & Abeywardhana (2017) found similar results. A Malaysia study revealed that long-term debt is adverse effect the ROE (Hasan et al., 2021). Another study conducted in England revealed that firms characterized by a higher magnitude of long-term debt tend to exhibit diminished performance in terms of return on equity (Bui, 2017). Collectively, higher level of long-term debts decreases the company performance, which leads to the third hypotheses:

H3(a): There is a negative relationship between long-term debt and firm financial sustainability.

H3(b): There is a negative relationship between long-term debt and firm financial sustainability before and during Covid-19 period.

METHODOLOGY

Sample selection

This study conducted quantitative research based on the population of the main market of public listed companies in Malaysia from 2018 to 2022, consisting of 500 firm-years. At the time of data collection, 2023 financial information are not available for many companies, hence data collection is collected until year 2022. This research study complied all the all variables involved from the Orbis database, and annual reports derived from Bursa Malaysia website. The study employed purposive sampling method with the basis of top 100 non-financial firms by market capitalization listed on the main market of Bursa Malaysia from 2018 to 2022. The sample selection is depicted in Table 1.

Table 1: Sample selection by industries

Consumer products & services	14
Industrial products & services	13
Property	27
Transportation & logistics	5
Technology	4
Energy	5
Construction	7
Plantation	10
Utilities	8
Health care	2
Financial services	1
Telecommunications & media	4
Final sample firms per year	100
Total firm-year observations for 2018 to 2022	500

Variable measurements

Table 2 depicts the operational definitions of dependent, independent and control variables.

Table 3: Operational definitions of variables

#	Variables	Definitions	Source(s)	Proxy
Dependent variable				
1	Return on equity (ROE)	Earnings after tax / shareholders' equity – (Kong, et al., 2023; Bui, 2017)	Orbis database	Financial sustainability
Independent variables				
2	Debt Ratio (DR)	Total liabilities / Total assets - (Kong, et al., 2023; Ahmed & Siddiqui, 2019)	Orbis database	Capital structure
3	Short-term debt (STD)	Short-term debt / (Total assets) - (Nazir et al., 2021; Ahmed & Siddiqui, 2019; Bui, 2017)	Orbis database	Capital structure
4	Long-term debt (LTD)	Long-term debt / (Total assets) - (Nazir et al., 2021; Ahmed & Siddiqui, 2019; Bui, 2017)	Orbis database	Capital structure
Control variable				
3	FSIZE (firm size)	The natural logarithm of total assets (Nazir et al., 2021; Ahmed & Siddiqui, 2019)	Orbis database	Control variable
Note(s): Data from annual reports are hand collected is for the industries where the company resides. Annual reports are downloaded from Bursa Malaysia's website				

Evaluation of data and analysis model

This study employed Pearson Correlation Coefficient, Wooldridge Test, Variance Inflation Factors and Modified Wald Statistics tests to detect the data variables correlation, autocorrelation, multicollinearity and heteroskedasticity, respectively. The Poolability F-test, Breusch-Pagan Lagrange Multiplier, and Hausman tests are conducted to determine whether pooled ordinary least squares [POLS], fixed effect model or random effect model is the most appropriate approach to analyze the data.

Model specification

This study used the fixed effect model to investigate the relationship between capital structure and financial sustainability. The following model is run with the "robust" and "cluster" command to address the problems of heteroscedasticity and autocorrelation in the data (see Section 5.2, Data tests, and selection of the estimated model below). To test all the hypotheses, the study used Model 1 under equation 1 where financial sustainability represented by ROE:

$$ROE_{it} = \beta_0 + \beta_1 DR_{it} + \beta_2 STD_{it} + \beta_3 LTD_{it} + \beta_4 FSIZE_{it} + \eta_i + \mu_{it} \quad [\text{Equation 1}]$$

Where:

ROE _{it}	= return on equity (financial sustainability)
DR _{it}	= debt ratio
STD _{it}	= short-term debt
LTD _{it}	= long-term debt
FSIZE _{it}	= firm size

Note(s): All other variables are defined in Table 2.

RESULTS AND DISCUSSION

Descriptive statistics and correlation matrix

Table 3: Descriptive statistics

Variable	Mean	Min	Max	Std Dev
Independent variables				
DR	0.4304	0.0200	0.8548	0.1749
STD	0.0597	0.0000	0.4431	0.0718
LTD	0.1637	0.0000	0.6171	0.1405
Control variable				
FSize (Ln of TA)	2.7429	2.4890	2.9148	0.0799
Dependent variables				
ROE	4.8442	-27.3709	32.5042	8.2582
ROA	2.9153	-17.3603	18.7168	4.9347
Tobin's Q	0.6752	0.0090	6.7070	0.8568

Note(s): ROA = Return on assets. Other variables, please refer to Table 2 for operational definitions

Table 3 depicts the descriptive statistics for the variables employed in this study. ROE as the criterion variable represented financial sustainability, where ROA was employed as a surrogate of financial sustainability for robustness check of the main results based on ROE. Tobin's Q was representing financial sustainability for additional analysis for this study. The mean of ROA, ROE and Tobin's Q have an average positive value of 2.9153, 4.8442 and 0.6752 respectively. The standard deviation of ROA, ROE and Tobin's Q were 4.9347, 8.2582 and 0.8568 respectively. The ROA value ranged from -17.3603 to 18.7168, while ROE ranged from -27.3709 to 32.5042. On the other hand, Tobin's Q ranged from 0.0090 to 6.7070.

The capital structure proxies by DR, STD, and LTD. The mean values for DR, STD and LTD were 0.4304, 0.0597 and 0.1637 respectively, with the standard deviation of 0.1749, 0.0718 and 0.1405 respectively. DR has minimum and maximum values of 0.0200 and 0.8548 respectively, while STD has minimum and maximum values 0.0000 to 0.4431 respectively. LTD have minimum and maximum values of 0.0000 to 0.6171 respectively. Firm size has a mean value of 2.7429 with a standard deviation of 0.0799. The firm size has minimum and maximum values 2.4890 to 2.9148 respectively.

Table 4: Result of Pearson Correlation Coefficient Analysis

Variables	ROA	ROE	Tobin's Q	DR	STD	LTD	FSize
ROA	1.0000						
ROE	0.9479 (0.0000) ***	1.0000					
Tobin's Q	0.5868 (0.0000) ***	0.5255 (0.0000) ***	1.0000				
DR	-0.2759 (0.0000) ***	-0.1082 (0.0155) **	-0.2779 (0.0000) ***	1.0000			
STD	-0.1407 (0.0016) **	-0.1242 (0.0054) *	-0.1770 (0.0001) ***	0.1997 (0.0000) ***	1.0000		
LTD	-0.2077 (0.0000) ***	-0.0930 (0.0376) **	-0.2054 (0.0000) ***	0.7157 (0.0000) ***	-0.1158 (0.0095) ***	1.0000	
FSize	-0.0284 0.5259	0.0382 0.3944	-0.0957 (0.0323) ***	0.3571 (0.0000) ***	-0.0482 0.2820	0.4925 (0.0000) ***	1.0000

Note(s): ROA = Return on assets. Other variables, please refer to Table 2 for operational definitions. ***, **, * statistically significant at the <1%, <5%, <10% levels respectively; robust standard errors in parentheses

The results of correlations amongst the independent and control variables are relatively low. All values are well below 0.80, except for the correlation between ROE and ROA (0.9479). However, Gujarati & Porter (2009) suggested a correlation between two variables exceeding 0.80 could post a serious concern. In this case, Gujarati & Porter (2009)'s guideline of 0.80 is not relevant for correlation between ROE and ROA due both variables do same measurement of financial sustainability, which give rise to high correlation between themselves.

Data diagnostic tests and selection of estimation model

Table 5: Variance in Factor

	VIF	1/VIF
Independent Variable		
Debt ratio	2.46	0.4069
Short-term debt	1.22	0.8229
Long-term debt	2.71	0.3692
Control Variable		
Firm size	1.32	0.7574
Mean VIF	1.93	

Variance Inflation Factor (VIF) was used to test multicollinearity. Mehmetoglu and Jakobsen (2022) point out that if any variable has a VIF value greater than 5, there may be an issue with multicollinearity. The VIF for independent and control variable are well below the value of 5, which indicate there is no multicollinearity problem in the data.

Table 6: Modified Wald Statistics Test

Type of analysis	ROA	ROE	Tobin's Q
H0: $\sigma^2(i)$	σ^2 for all i	σ^2 for all i	σ^2 for all i
chi2 (100)	1.3e+05	1.2e+05	1.1e+07
Prob>chi2	0.0000	0.0000	0.0000

The result in Table 6, the probability for ROA, ROE and Tobin's Q are zero, which is below 5%, which indicates there are heteroscedasticity issues in the data.

Table 7: Wooldridge Test

Type of analysis	ROA	ROE	Tobin's Q
F (1,99)	0.457	0.622	13.941
Prob > F	0.5008	0.4323	0.0003

Table 7 depicts the p-value for ROA and ROE are 0.5008 and 0.4323, respectively, and both are greater than the 10% significance level, while Tobin's Q has a probability value of 0.0003 with statistically significant at the 5% level. Hence, there is no autocorrelation when the dependent variable are ROA and ROE, however, employed Tobin's Q as the dependent variable triggers the autocorrelation problem.

Table 8: Summary of Panel Data Analysis Model Selection Tests

ROA	ROE	Tobin's Q	Indicator
Breusch Pagan LM Test			
Reject the null hypothesis			Random effect model is preferred over pooled OLS model
	Reject the null hypothesis		Random effect model is preferred over pooled OLS model
		Reject the null hypothesis	Random effect model is preferred over pooled OLS model

Hausman Test			
Reject the null hypothesis			Fixed effect model is preferred over random effect model
	Reject the null hypothesis		Fixed effect model is preferred over random effect model
		Do not reject the null hypothesis	Random effect model is preferred over fixed effect model
F-test			
Reject the null hypothesis			Fixed effect model is preferred over pooled OLS model
	Reject the null hypothesis		Fixed effect model is preferred over pooled OLS model
		Reject the null hypothesis	Fixed effect model is preferred over pooled OLS model

The results of panel data analysis model selection tests are summarized in Table 8, which shows that FEM is more suitable to run the panel data when the dependent variable is ROE and ROA. On the other hand, REM is more suitable to run the panel data when dependent variable is Tobin's Q. When the dependent variable is measured by ROE or ROA, it triggers heteroscedasticity problem in the data. Similarly, when the dependent variable is measured by Tobin's Q, it triggers both heteroscedasticity and autocorrelation issues in the data. Hoechle (2007) suggests 'robust standard errors' to address the problem of heteroskedasticity and 'cluster standard errors' to address both heteroskedasticity and autocorrelation problems. Hence, FEM with 'robust standard errors' function when running the main and robustness results by employing ROE and ROA respectively. When running the result for additional analysis, Tobin's Q will be employed as the dependent variable by using REM panel data analysis with 'cluster standard errors'.

Regression results

Main results

A total of 3 regressions were carried out, as reported in Table 9 in examining the relationship between capital structure and firm financial sustainability to test H1(a) to H3(b) using model in equation 1. Full sample covers 2018 to 2022 period, while pre-Covid 19 and during Covid 19 covered 2018 to 2019 and 2020 to 2021 periods respectively.

Table 9: Main results of FEM with ROE as response variable

Regression Variables /	Full sample (2018 – 2022)	Pre Covid-19 period (2018 -2019)	During Covid-19 period (2020 -2021)
DR	-20.6365 (9.5664) **	14.8218 (19.7601)	-49.6514 (30.4015) ⁺
STD	-30.2064 (13.4547) **	-66.1696 (29.2564) **	-43.1313 (33.2001)
LTD	-19.8309 (9.9747) *	-43.5671 (22.7246) *	-26.6441 (20.6142)
Fsize	131.7127 (55.3110) **	309.4514 (130.2072) **	248.0227 (127.7473) *
Constant	-342.5029 (150.4134) **	-837.4864 (354.1407) **	-648.0572 (341.6346) *
Observations	500	200	200
R-squared	0.1017	0.1498	0.1784

Note(s): ***, **, * statistically significant at the <1%, <5%, <10% levels respectively; ⁺ regarded statistically significant at 10%; robust standard errors in parentheses. All other variables are defined in Table 2.

Table 9 depicts the results of capital structure and financial sustainability measured using ROE. The results of full sample and during Covid-19 period show that a 1% increase in DR decreased the firm financial sustainability by 2,063.63% (significant at 5% level) and 4,965.14% (with p-value of 0.106) respectively. On the other hand, the result of pre Covid-19 period reveals a 1% increase in DR increased the firm financial sustainability by 1,482.18% (but not significant). Considering DR and ROE during Covid-19 period has the p-value of 0.106, which is very close to 10% significant level, therefore when interpreting the result for DR and firm financial sustainability during Covid-19 period is regarded as significant at 10% level. The full samples consist of the data of pre and post Covid-19 periods, which posits that DR decreases the percentage in firm financial sustainability of the firm by 2,901.51% to 4,965.14% during Covid-19 period. Pre Covid-19 period (without Covid-19 period data) shows that a 1% increase in DR increased the firm financial sustainability of the firms by 1,482.18% with insignificant result, which indicate leveraging through debts and/or credits by suppliers and/or leases and/or bond has potential in improving financial sustainability of the firms. There is a sharp decline in ROE among ASEAN corporations, including Malaysia between 2019 to 2020 (OECD, 2023). The ROE decrease in Malaysian companies explained the decrease in firm financial sustainability of the firm during Covid-19 period. The findings are in contrast with Kong, et al. (2023)'s results where they found DR increases the firm financial sustainability in the context of Ghanaian listed companies. Conversely, the results are in line with Aulia & Gandakusuma (2020)'s study where they discovered DR had a strong adverse impact on ROE of manufacturing companies in the ASEAN 5 countries.

The results of full sample and pre Covid-19 period show that a 1% increase in STD decreased the firm financial sustainability by 3,020.64% (significant at 5% level) and 6,616.96% (significant at 5% level) respectively. On the other hand, the result of during Covid-19 period reveals a 1% increase in STD decreased the firm financial sustainability by 4,313.13% (but not significant). The results for STD concur with Le and Phan (2017) and Bui (2017) studies, where they found that STD has a detrimental effect on ROE.

The results of full sample and pre Covid-19 period show that a 1% increase in LTD reduced the financial sustainability of the firms by 1,983.09% (significant at 10% level) and 4,356.71% (significant at 10% level) respectively. On the other hand, the result of during Covid-19 period reveals a 1% increase in LTD reduced the financial sustainability of the firms by 2,664.41% (but not significant). The results for LTD is in line with Muhammad et al. (2020)'s findings where they discovered that LTD bring negative impacts on ROE among Nigerian industrial goods companies.

Collectively, both STD and LTD do not bring financial sustainability to Malaysian corporations, which could be due to unfavourable loans/debt terms, such as interest. The extra profit generated from debt(s) borrowing could not contribute sufficiently to the profit after deducting interest. In contrast, the results of full sample, pre Covid-19 period and during Covid-19 period show that a 1% increase in Fsize improved the firm financial sustainability by 13,1712.7%, 3,094.51% and 2,480.02% respectively. This indicates firm size brings an increase in firm financial sustainability, which concurs with Kong, et al. (2023)'s findings where they found firm size increases the firm financial sustainability.

Robustness check

Table 4 shows that ROE and ROA have high correlations. Hence, ROA is a suitable variable to surrogate ROE with ROA to run the robustness test to compare with the main results in Table 9.

Table 10: Robustness check using FEM with ROA as response variable

Regression / Variables	Full sample (2018 – 2022)	Pre Covid-19 period (2018 -2019)	During Covid-19 period (2020 -2021)
DR	-17.0582 (5.8873) ***	-1.7813 (11.1915)	-27.6369 (19.2512)
STD	-16.2190 (7.7570) **	-29.5107 (14.9400) *	-25.2746 (19.3581)

LTD	-8.4530 (6.2323)	-20.0285 (12.1139)	-14.2210 (10.8860)
Fsize	70.6372 (29.8303) **	170.3403 (67.2870) **	155.5388 (86.2311) *
Constant	-181.1439 (81.0328) **	-457.8656 (183.3993) **	-408.4203 (230.931) *
Observations	500	200	200
R-squared	0.1110	0.1366	0.1801

Note(s): ***, **, * statistically significant at the <1%, <5%, <10% levels respectively; robust standard errors in parentheses. All other variables are defined in Table 2.

The robustness results in Table 10 with ROA as the response variable is compared with the main results with ROE as the response variable in Table 9 shows that there are consistent outcomes for all the variables' relationship across full sample, pre Covid-19 period and during Covid-19 period, except for DR in pre Covid-19 period. There are some small fluctuations of results' significant across all the variables relationship over the full sample, pre Covid-19 period and during Covid-19 period with no change in the direction of the relationship (excluding DR with the response variable for pre Covid-19, where there is a change in relationship direction from positive (when ROE is the response variable) to negative (when ROA is the response variable). The overall results of the robustness test show that the main results in Table 9 are robust and reliable.

Additional analysis

Singh, et al. (2017) suggests that Tobin's Q have the strength over other accounting measures of performance due to Tobin's Q ratio do not rely of accounting profits that can be affected by accounting policies selected and manager's influences on profit and investment decisions. Hence, it will be objective to do some additional analysis to preview the influence of capital structure decision on Tobin's Q summarized in Table 11.

Table 11: Additional analysis using REM with Tobin's Q as response variable

Regression Variables /	Full sample (2018 – 2022)	Pre Covid-19 period (2018 - 2019)	During Covid-19 period (2020 -2021)
DR	-0.5007 (0.2886) *	-1.0984 (0.5262) **	-0.8731 (0.4271) **
STD	-0.3250 (0.5810)	-0.5071 (0.5520)	-2.1189 (1.1024) *
LTD	-0.4741 (0.3757)	-0.4890 (0.6135)	-0.5640 (0.5457)
Fsize	0.2552 (2.2518)	0.4332 (0.9092)	-1.2962 (2.1663)
Constant	0.2877 (6.1613)	0.0994 (2.5230)	4.8469 (6.0233)
Observations	500	200	200
R-squared	0.0019	0.0427	0.0327

Note(s): ***, **, * statistically significant at the <1%, <5%, <10% levels respectively; robust standard errors in parentheses. All other variables are defined in Table 2.

The additional analysis results employing Tobin's Q as the response variable is tabulated in Table 11. Comparison of the results in Table 11 (Tobin's Q as the response variable) and Table 9 (ROE as the response variable) highlights a few differences in results particularly for pre Covid-19 and during Covid-19 periods for

DR in relation to the response variable. Under full sample analysis (Tobin's Q as the response variable), a 1% increase in DR decreased the firm financial sustainability by 50.07% (with reduced significant level to 10%). Similarly, pre Covid-19 and during Covid-19 analyses (Tobin's Q as the response variable), a 1% increase in DR decreased the firm financial sustainability by 109.84% and 87.31% respectively. The directions of the relationship between DR and firm financial sustainability are consistent for full sample and during Covid-19 period analyses, however, the relationship changes direction from positive (ROE as the response variable with insignificant) to negative (Tobin's Q as the response variable with 5% significant). The other variables have consistent relationship directions across full sample, pre Covid-19 period and during Covid-19 period analyses with fluctuation of levels of significant in results when comparing the results in Table 9 and Table 11.

Generally, the results in Table 11 depict a lower correlation magnitude in comparison with Table 9 between independent/control variables and the response variable. The DR correlation magnitude with Tobin's Q as the response variable ranges between 50.07% to 109.84%, while the DR correlation magnitude with ROE as the response variable ranges between 1,482.18% to 4,965.14%. This observation shows that Tobin's Q as the performance measurement does not influence by company's discretionary accounting policy and management's decision-making.

CONCLUSION

This study investigates the association between DR and firm financial sustainability under the analyses of full sample, pre Covid-19 period and during Covid-19 period. This study also conducted robustness check and additional analysis for further understanding of the subject investigated. DR decreases the percentage in firm financial sustainability, which reveals the debts borrowed by the corporations could not sufficiently cover its costs to produce additional profit. Similarly, both STD and LTD does not bring firm financial sustainability in the context of listed companies in Malaysia. On the other hand, the bigger firm size improved the firm's financial sustainability. The robustness check using ROA as surrogate for ROE supports the validity of the main results. During Covid-19 period, the increase in DR corresponded with a higher negative correlation magnitude to the firm financial sustainability, mainly due to higher companies' debts distress during Covid-19 period.

This study improves the comprehension of how capital structure impacts the firm financial sustainability in Malaysia. The findings of this study contribute toward the literature by providing provide a structure for future studies on how capital structure affecting firm financial sustainability, which is crucial for companies' survival in the foreseeable future. The findings of this study assist corporate managers to make good capital structure decision and provide reference for policymakers to formulate public incentive to promote sustainable capital structure among Malaysian companies.

This study is based on top 100 companies by market capitalization listed on Bursa Malaysia's main market. Generalized this study results into capital structure decisions into other categories of listed companies and private companies should consider the context of this study. Since this study data covers 2018 to 2022, applying the results in predicting the impact of future capital structure should consider the nature of this study. Future research can investigate other variables to better understand the dynamic capital structure and use other measurements for response variables. The study could be extended to other countries resides regionally to understand better capital structure among Asian corporations.

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