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The Impact of Capital Structure on Firm's Profitability: A Case Study of the Rubber Industry in Vietnam

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Abstract

This study aims to examine and measure the impact of capital structure on the profitability of companies in emerging markets. The research sample includes eighteen rubber companies listed on the Vietnam stock exchange from 2015–2019. After collecting the research data, it was imported into excel to calculate the criteria for the research model. By using Stata 16 software, the study selected a data processing model and evaluated the relevance of the regression analysis model. The research results show that the profitability of listed rubber companies in Vietnam (measured by return on equity (ROE) has a positive relationship with the debt-to-asset ratio but has a negative relationship with the long-term debt-to-asset ratio. The results also show a positive impact of firm size and revenue growth on profitability while liquidity and the ratio of tangible fixed assets to total assets do not affect significantly. These results are consistent with most of the previously published studies. However, in contrast to many previous studies, our study shows that the long-term debt-to-assets ratio has a negative effect on profitability while the debt-to-asset ratio has a positive effect. This is entirely consistent with the characteristics of long-term debt use in emerging markets.

Keywords: Capital Structure, Debt to Asset, Long-term Debt to Assets, Profitability, Short-term Debt to Asset, Vietnam

JEL Classification Code: G32, L25, L65

1. Introduction

A company's capital structure refers to the type of money that funds the business and the source of those funds. Capital structure can have an impact on the return a company earns for its shareholders. It can also determine if a firm survives a recession or depression. Decisions on capital structure have a strong impact on the negotiation, the competitiveness of the enterprise, the satisfaction of investor requirements as well as the maximization of the value and profitability of the enterprise. A sound capital structure protects a business enterprise from such financial risk through a judicious mix of debt and equity in the capital structure. Enterprises using different sources of capital will have different capital structures and the impact on the profitability of the business will be different.

With a rather long history of development (since 1907), Vietnam's rubber product production and processing industry (Vietnam's rubber industry) is currently one of the important agroforestry production industries of our country - in terms of economic, social, and environmental aspects. The country's rubber area has reached nearly 1 million hectares, with nearly 70% of the area for latex collection with an output of about 1.1 million tons/year. Vietnam is the third-largest exporter of natural rubber in the world (Thuy Chung, 2021). Most rubber production enterprises are mainly state-owned enterprises (mostly belonging to the Vietnam Rubber Industry Group) and households (also known as smallholder rubber). Export is the focus of the rubber industry. The three main export product groups of the rubber industry include natural rubber materials (natural rubber), rubber products, and more recently rubberwood and furniture made from rubberwood.

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The development and growth of the rubber industry have created jobs for about five hundred thousand workers involved in different stages of the supply chain (Vu, 2021). Vietnam's rubber industry has been integrating deeply with the world market. Opportunities to expand export markets for the industry's products continue to be opened through free trade agreements. However, integration also increases international competition and creates market access difficulties caused by trade barriers and risks. One of the basic requirements of the markets consuming rubber products is that it is mandatory to strictly comply with regulations related to the sustainability of products. These regulations are not only limited to the policy of the country where production and business activities are carried out but also the provisions expressed in international treaties to which the Government has committed to implement.

So far, there have been studies on the impact of capital structure on the profitability of enterprises. However, due to the specificity of the economy and different business sectors, the impact of capital structure on the profitability of enterprises will be different. Research on the impact of capital structure on profitability will help businesses understand the trend and extent of the impact of capital structure on profitability. The results of this research can be used to build an optimal capital structure to improve the profitability of rubber companies in Vietnam.

2. Literature Review and Hypotheses

Abor (2005) using data collected from 22 companies on the Ghana Stock Exchange over 5 years (1998–2002) demonstrated that total debt (TD) and short-term debt (STD) together have a positive and statistically significant impact on return on equity (ROE), and long-term debt (LTD) affects ROE but not statistically significant. Ebaid (2009), when studying 64 non-financial companies listed on the Egyptian stock exchange in the period 1997–2005, found that the factors STD and LTD had a positive impact on ROE, while TD had a positive impact on ROE but not statistically significant.

Gill et al. (2011) extended Abor's (2005) study by examining the impact of capital structure on the profitability of manufacturing and service firms in the US. The results showed short-term debt and total debt had a positive and significant impact on profitability. San and Heng (2011) when studying 49 large, medium and small construction companies in Malaysia in the period 2005–2008 showed that LTD had a positive impact on ROE in medium and large enterprises. Gambo et al. (2016) also showed a positive and significant impact between debt use and corporate financial performance of cement companies in Nigeria. Research by Herciu and Ogrean (2017) shows that the profitability of firms (expressed in ROA and ROE) can be increased by using an optimal structure of liabilities, equity.

Shubita and Alsawalhah (2012) showed that there is a negative relationship between liabilities and profitability. Khan (2012) based on the capital structure model of Ebaid (2009) conducted a study on 36 engineering companies listed on the Karachi-Pakistan stock exchange from 2003–2009 (the period when the economy was affected by the world economic crisis). Results showed the negative impact of TD and STD on ROA, while LTD had a positive and statistically significant impact on GM. Salim and Yadav (2012) studied panel data of 237 Malaysian companies listed on the Bursa Malaysia stock exchange from 1995–2011 and concluded that there is a negative correlation between ROA and ROE, and short-term debt, long-term debt, and total debt. Chechet and Olayiwola (2014) studied 70 companies listed on the Nigerian Stock Exchange (NSE) for 10 years (2000 to 2009) and found that a high debt balance in the capital structure had a negative impact on the ability to enterprise profitability.

Dawar (2014), based on agency theory, empirically investigated the impact of capital structure choice on firm performance in India as one of the emerging economies. Results suggested that leverage has a negative influence on the financial performance of Indian firms, which is in contrast with the assumptions of agency theory. Javed et. al. (2019) studied 63 non-financial companies in Karachi, Pakistan in the period 2007–2011 and found that LTD had a negative and statistically significant impact on ROE. Ngo et. al. (2020)investigated the impact of debt on corporate profitability in the context of Vietnam. In this research, corporate profitability is measured as the return of EBIT on total assets. The debt ratio is a ratio that indicates the proportion of a company's debt to its total assets. Firm sizes, tangible assets, growth rate, and taxes are control variables in the study. The empirical results showed that debt has a significant negative effect on corporate profitability.

Zeitun and Tian (2007) found that capital structure had a positive impact on P/E but not statistically significant while TD and LTD had a negative and statistically significant impact on ROA and Tobin's Q. Meanwhile, STD had a positive and statistically significant effect on Tobin's Q, but a negative effect on ROA. Abor (2007), based on data collected from small and medium-sized companies (160 companies in Ghana and 200 companies in South Africa) for the period 1988–2003, found that TD and STD had a negative impact while LTD had a positive and statistically significant effect on GM. For ROA, all three variables TD, STD, and LTD are negative and statistically significant for both Ghana and South Africa.

Ahmad et al. (2012) investigated the impact of capital structure on firm performance by analyzing the relationship between the operating performance of Malaysian firms, measured by return on asset (ROA) and return on equity (ROE) with short-term debt (STD), long-term debt (LTD) and total debt (TD). 58 firms were identified as the sample

firms and financial data from the year 2005 through 2010 were used as observations for this study. The results showed that that TD and STD have a negative impact on ROE and ROA, while LTD has a positive and statistically significant impact on ROE but not on ROA.

Sheikh and Wang (2013) studied data from 240 non-financial companies on the stock exchange of Karachi - Pakistan over six years (from 2004 to 2009) and found that TD and STD factors have a significant negative impact on ROA, and LTD has a negative effect on ROA in the OLS model but has a positive effect on the FEM model and has no statistical significance in the REM model.

Qayyum and Noreen (2019) examined the effect of capital structure on the profitability of Islamic and conventional banks and then determined whether the capital structure of Islamic and conventional banks is the same or not. A sample of ten banks was taken over the period 2006–2016. Results showed that the capital structure of both types of banks was similar except for bank size which differed significantly. Moreover, ROA was negatively correlated to the capital structure of both conventional and Islamic banks. In contrast, ROE was positively correlated to the capital structure of both conventional and Islamic banks.

However, some previous studies showed that that capital structure does not affect profitability. Elkelish and Marshall (2007) studied unlisted food companies in the United Arab Emirates between 1996 and 2000 and found that the debt-to-equity ratio did not affect the profitability of businesses.

In summary, empirical studies have shown mixed views on the impact of capital structure on profitability. Therefore, testing the effect of capital structure on the profitability of listed companies in Vietnam is essential, especially in an emerging market like Vietnam. This is not only meaningful in understanding the impact of capital structure on profitability but also helps managers have useful countermeasures to build an optimal capital structure and improve profitability for rubber companies listed in Vietnam.

Based on a research review on the impact of capital structure on profitability, our study proposes the following research hypotheses:

H1: *The debt to asset ratio (DTA) has a negative (–) effect on the profits of listed rubber companies in Vietnam.*

H2: *Short-term debt to asset ratio (STD) has a negative impact (–) on the profit of listed rubber companies in Vietnam.*

H3: *Long-term debt to assets ratio (LTD) has a negative (–) impact on profits of listed rubber companies in Vietnam.*

H4: *Enterprise size by the logarithm of total assets (SIZ) has a positive impact on the profits of listed rubber companies in Vietnam.*

H5: *The ratio of fixed assets to total assets (TAN) has a positive impact on the profitability of listed rubber companies in Vietnam.*

H6: *Revenue growth rate (GRO) has a positive impact on the profits of listed rubber companies in Vietnam.*

H7: *Liquidity by the ratio of cash and cash equivalents to total assets (LIQ) has a positive impact on the profitability of listed rubber companies in Vietnam.*

Based on the hypotheses above, the conceptual framework of this study is depicted in Figure 1.

3. Research Methods

3.1. Research Model

The regression model is built with the following variables (Table 1):

- Dependent variable reflects profitability: Return on Equity (ROE).
- Independent variables reflect capital structure: DTA, STD, LTD, SIZ, TAN, GRO, LIQ.

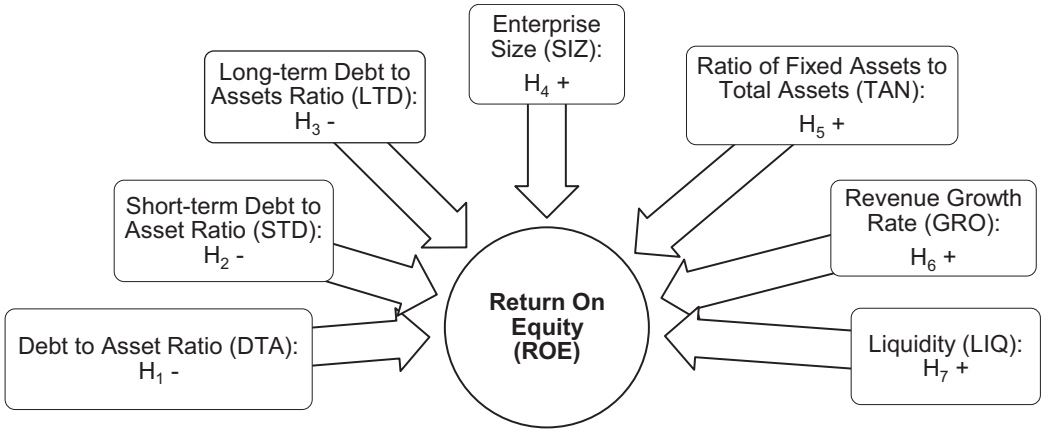

Figure 1: Overview of the Research Model

Table 1: Summary of Variables in the Model

Variable	Formula	Expected Sign
Dependent Variables		
ROE =	Net Income	
	Average Total Equity	
Independent Variables		
DTA =	Short-term Debt + Long-term Debt	–
	Total Assets	
STD =	Short-term Debt	–
	Total Assets	
LTD =	Long-term Debt	–
	Total Assets	
SIZ =	Natural logarithm of Net Sales	+
TAN =	Fixed Assets	+
	Total Assets	
GRO =	(Net Salesi – Net Salesi-1)	+
	Net Salesi-1	
LIQ =	Cash and Cash Equivalents	+
	Total Assets	

The built regression model has the following form:

$$ROE = \beta_0 + \beta_1 DTA_{i,t-1} + \beta_2 STD_{i,t-1} + \beta_3 LTD_{i,t-1} + \beta_4 SIZ_{i,t-1} + \beta_5 TAN_{i,t-1} + \beta_6 GRO_{i,t-1} + \beta_7 LIQ_{i,t-1} + \varepsilon_{i,t}$$

Where:

β_0: Intercept Term.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$: Slope Coefficients.

ε: Random Errors.

3.2. Research Data and Process

Research data is collected from financial statements of companies in the Rubber industry that have trading transactions at the Vietnam Stock Exchange for 5 years (from 2015–2019), and have made their financial statements public. As a result, there are 18 companies with 90 financial statements corresponding to 90 observations.

After collecting data, it was imported into excel to calculate the criteria for the research model. Then the authors use Stata 16 software to analyze the multivariable regression model. From there, the authors proceed to select the data processing model and evaluate the fit of the regression model. Specifically, the steps are as follows:

- ***Descriptive statistics***:
  The collected data is aggregated, calculated, and presented in the form of statistical tables. For each variable, the number of observations, mean, minimum value and maximum value, standard deviation, and kurtosis are calculated. Based on the results of the statistics of the observed variables, the authors will interpret and analyze the significance of the above data.
- ***Correlation analysis:***
  It is done by setting up the correlation coefficient matrix and looking at the pairwise correlation coefficient between the variables. If the pairwise correlation coefficient between variables is too high, it can cause multicollinearity.
- ***Data processing method:***
  To process panel data, the study uses the Pool OLS model, fixed-effects model (FEM), and random effects model (REM). Then, conduct Hausman test to select an estimation method suitable for the research model.

4. Results

4.1. Descriptive Analysis

Statistical results describe variables through statistical indicators: the number of observations (Obs), mean value (Mean), standard deviation (Std. Dev), minimum value (Min), and maximum value (Max) of the research variables are shown in Table 2 below.

Table 2 shows that there are many variables with large standard deviations. Specifically:

- The dependent variable reflecting profitability (ROE) has a large variation (average ROE is 0.033; the minimum value is –2.288 and the maximum value is 0.651). This proves that there is a significant difference in the return on equity of companies in the rubber industry in the period (2015 to 2019).
- The independent variables reflecting capital structure are DTA, LTD, and STD with mean values of 0.397, 0.171, and 0.225 respectively. Thus, rubber trading companies use mainly short-term loans.
- Control variables affecting profitability are: SIZ, LIQ, GRO, and TAN, which have an average value of 27,745, 0.748, 0.225, and 0.236 respectively, showing relatively good growth; however, there is a lot of difference between each company's growth.

Table 2: Descriptive Statistics of Variables

Variables	Obs.	Mean	Std. Dev.	Min	Max
ROE	90	0.0333859	0.2910205	–2.287724	0.6514002
DTA	90	0.3966737	0.1957947	0.0061188	0.9257797
LTD	90	0.1714216	0.1253161	0	0.5326013
STD	90	0.2252521	0.1878769	0.0030758	0.8133346
SIZ	90	27.7447	1.352686	25.22008	31.19966
LIQ	90	0.0747919	0.0825189	0.0002045	0.481099
GRO	90	0.2248642	1.322347	–0.9861923	9.427019
TAN	90	0.2358538	0.2042578	0	0.8226949

Table 3: Hausman Test Results for ROE

Hausman FEM REM				
Coefficients				
	(b)	(B)	(b–B)	sqrt (diag(V_b–V_B))
	FEM	REM	Difference	S.E.
DTA	–1.294218	0.0540103	–1.348229	0.3847801
LTD	0.1199398	–0.6141172	0.7340571	0.3258402
SIZ	0.3487844	0.0518919	0.2968924	0.1122959
LIQ	0.107731	0.3464598	–0.2387288	0.0911649
GRO	0.0576478	0.0695541	–0.0119063	
TAN	0.1759817	0.0619471	0.1140346	0.3762425

b: consistent under Ho and Ha; obtained from xtreg.
B: inconsistent under Ha, efficient under Ho; obtained from xtreg.

4.2. Correlation Analysis and Model Selection

The results of the correlation analysis show that there is a correlation relationship between the variables, especially, a correlation between the variables SDA and DA. To avoid multicollinearity in the regression model, the variable SDA was removed from the analytical model.

Next, the study uses Pool OLS, FEM, and REM models for regression analysis and Hausman Test to determine the appropriate analytical method for the research model. The results of ROE estimation by Pool OLS model show that the model has statistical significance, in which, the variables STD, LIQ, and GRO have a positive relationship with ROE. Similarly, the results of ROE estimation by FEM also show that the model is statistically significant. The DTA variable has a negative relationship with ROE, while the SIZ and GRO variables have a positive relationship with ROE.

The results of ROE estimation by REM show that the model is statistically significant, in which, the LTD variable has a negative relationship with ROE and the GRO variable a positive relationship with ROE

To consider the appropriateness of using the ROE analysis model, the study used the Hausman test. Hausman test results in Table 3 show that prob > χ^2 = 0.0000, proving that there is no correlation between ε_i and the independent variables. It also means that using REM in ROE model analysis is more appropriate than using FEM.

4.3. Regression Results

To conduct an accurate measurement of the impact of independent variables on the dependent variable (profitability (ROE)), the study uses STATA 16 to implement the REM regression model. The regression results for the ROE model are shown in Table 4.

Table 4: Regression Results of ROE Model

ROE	Coef.	Std. Err.	*z*	*P* > |*z*|	[95% Conf. Interval]	
DTA	0.0942515	0.0522063	1.81	0.071	–0.0080709	0.1965739
LTD	–0.2600565	0.122996	–2.11	0.034	–0.5011243	–0.189888
SIZ	0.0194981	0.0093381	2.09	0.037	0.0011957	0.0378005
LIQ	0.0195096	0.1401269	0.14	0.889	–0.2551341	0.2941533
GRO	0.0557773	0.009333	5.98	0.000	0.0374849	0.0740696
TAN	0.0574309	0.0371442	1.55	0.122	–0.0153703	0.1302321
_cons	–0.4902026	0.2566228	–1.91	0.056	–0.993174	0.0127688

The regression results in Table 4 show that the ROE model has statistical significance. Based on Table 4, the ROE model is estimated as follows:

$$ROE = – 0.49020 + 0.09425DTA – 0.26006LTD + 0.01950SIZ + 0.05578GRO$$

In this model, the DTA variable has a positive relationship with profitability. When DTA increases by 1 unit, ROE will increase by 0.09425 units respectively. This result is consistent with the studies of Abor (2005), Gill et al. (2011), Sheikh and Wang (2013), Gambo et al. (2016), and Nguyen and Nguyen (2020).

The LTD variable has a negative relationship with ROE. When LTD increases by 1 unit, ROE decreases by 0.26006 units. This result is consistent with the study of Abor (2005), Gill et al. (2011), Salim and Yadav (2012), and Sheikh and Wang (2013).

The SIZ variable has a positive relationship with ROE. When SIZ increases by 1 unit, ROE increases by 0.01950 units. The results of this study are consistent with the studies of Abor (2005), Khan (2012), Salim and Yadav (2012), Sheikh and Wang (2013), Dawar (2014), Gambo et al. (2016), Alqirem et al. (2020), and Ali and Faisal (2020).

The GRO variable has a positive relationship with ROE. When the variable GRO increases by 1 unit, the ROE increases by 0.055778 units. The results of this study are similar to those of Abor (2005), Gill et al. (2011), Sheikh and Wang (2013), and Dawar (2014).

TAN and LIQ do not affect profitability. The results of this study are similar to those of Sheikh and Wang (2013), and Dawar (2014).

5. Conclusion

The results obtained from this study show that the use of long-term debt has a negative impact on profitability, hence, increasing the use of long-term debt will make the business riskier. Despite having a longer payment period, the sample firms tend to use less long-term debt than short-term debt. This can be explained by the fact that in Vietnam today, short-term loan interest rates are lower than long-term loan interest rates because commercial banks in Vietnam are afraid of long-term inflation. The cost of using long-term debt is higher and the risk is also quite high. Long-term interest expenses will put great pressure on business operations. The longer the loan period, the higher the potential risk, the higher the interest burden. The burden will increase for enterprises if they have a lot of inventory, use capital inefficiently, and assets are mortgaged when borrowing.

The use of total debt (mainly short-term debt) has a positive impact on profitability. This shows the useful effect of short-term debt on total debt, even though the short-term debt has a short payment period which requires the ability to pay debts. Moreover, the liquidity of enterprises must be high. Firm size has a positive effect on profitability. The expansion of the business scale will lead to improved profitability. This is because of the benefits that come from economies of scale. Economies of scale are cost advantages reaped by companies when production becomes efficient. Companies can achieve economies of scale by increasing production and lowering costs. The size of the business generally matters when it comes to economies of scale. The larger the business, the more the cost savings. The revenue growth rate shows the ability of the business to grow. Businesses with positive growth are likely to bring higher returns to investors by increasing profits for dividend distribution to investors. Businesses with growing revenue can also prove that they are a good business, thereby leading to more advantages in the process of raising capital.

The above research results show that the rubber business market in Vietnam in the coming years has very positive and stable development potential. Enterprises in the rubber industry (from 2015 to 2019) did not use much debt since the ratio of short-term debt was less than long-term debt.

Research results show that the use of long-term debt has a negative effect while the use of total debt (mainly short-term debt) is positively related to profitability. Therefore, enterprises need to consider limiting the use of long-term debt and increasing the use of short-term debt to increase the profitability of the business.

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