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The Impact of Capital Structure on Profitability of Listed Companies in Vietnam Stock Market: A Non-Linear Analysis

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Abstract: This study assesses the impact of capital structure on the profitability of companies listed on the Vietnam Stock Exchange. Specifically, 342 companies (from various industries) listed on the Hanoi Stock Exchange of Vietnam were chosen for this purpose between 2016 and 2022. The capital structure is measured by the ratios of total debt to assets, short-term debt to assets, and long-term debt to assets. In contrast, profitability is measured by return on equity. The information for the abovementioned variables is extracted from the publicly available quarterly financial statements of the selected companies for 2016-2022. For empirical evaluation, this research employs panel ARDL and panel non-linear ARDL (NARDL) estimation methods, making it a novel contribution to the literature. The findings of the panel ARDL estimation indicate that short-term debt-to-asset ratio and total debt-to-asset ratio positively impact the companies' profitability. In contrast, the long-term debt-to-asset ratio has a negative impact. The results of the panel NARDL estimation indicate that positive shocks in capital structure increase the profitability of companies, while negative shocks in capital structure decrease it. The study provides policies for Vietnamese businesses based on its findings.

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1. Introduction

The most important aspect of a company's performance evaluation is its profitability, which indicates the equity, sales, or asset investment profit ratio. Increasing profitability is one of the essential challenges for businesses, particularly in light of Vietnam's current international economic integration. Because a highly stable economy with high profitability is the only source of sufficient financial resources for sustainable development, it can attract both domestic and foreign investors and investment. Profitability serves as a reliable metric for evaluating the success of a business and is a useful indicator of future performance. Profitability is attractive to investors because it indicates shareholder wealth. Consequently, identifying various factors that indirectly or directly impact profitability is a crucial research topic in economics, finance, and strategic management (T. N. L. Nguyen et al., 2020). Moreover, the primary concern in business is profitability, which is the general long-term objective for all organizations (Ngoc et al., 2021).

Several factors, such as financial stability, commercial risk, growth prospects, corporate governance, etc., impact the value or profitability of a company. Capital structure is the most essential of these factors (Y. Kim et al., 2023). A company's capital structure describes the sources and forms of financing used to administer the business. The capital structure used to finance a company consists of debt and equity (Younus et al., 2014). The return a company generates for its shareholders depends on its capital structure, so the capital structure of a company is of utmost importance. In addition, it determines whether a business will endure a depression or recession. The capital structure decisions that are made will substantially impact cooperation and negotiation, the enterprise's competitiveness, capacity to appease investor demands, and ability to maximize value and profitability. A firm enterprise is protected from such financial risk by a robust capital structure that appropriately balances equity and debt in the capital structure. Businesses with diverse capital sources will have diverse capital structures, affecting the company's profitability (Co et al., 2021).

Therefore, businesses must consider capital structure, as it influences shareholders' ability to increase profits, thereby increasing the company's value. Consequently, investors and shareholders are extremely concerned with profitability and capital structure (Detthamrong et al., 2017). Developing a solid capital structure is of utmost importance for financial managers, as it promptly increases the value of the company and the owners' profits. Businesses frequently raise funds from various sources (bonds, shares, borrowing from credit institutions, and banks). The capital structure decision significantly impacts the firm's profitability (Ngoc et al., 2021).

Due to its importance in corporate finance, the relationship between capital structure and business profitability has been the subject of numerous previous studies. Several studies reach contradictory conclusions regarding capital structure and the significance of its effect (Y. Kim et al., 2023). In addition, numerous studies on the relationship between capital structure and profitability have been conducted in various countries. Still, many recent studies have been conducted in developing and transitioning economies. Numerous earlier studies, including Detthamrong et al. (2017), Co et al. (2021), and Nasimi (2016), found a positive relationship between capital structure and profitability.

In contrast, Afroze and Khan (2022) and Do et al. (2022) found a negative relationship. Some studies support the Modigliani and Miller theory that profitability and capital structure are unrelated. Consistent with the signaling, market timing, and trade-off pecking order theories, other studies demonstrate the effect of capital structure on profitability (Hoang, 2022).

Consequently, studies on this relationship have yielded contradictory results, and the circumstances of various economies influence whether the relationship is positive or negative (Ngoc et al., 2021). This calls for additional investigation and determination of the relationship between the two variables.

Yet, it is asserted that there is a shortage of research on the relationship between capital structure and company profitability in Vietnam. A few studies on capital structure have been conducted in Vietnam, focusing on the factors that influence the capital structure or the effects of capital structure on business performance (H. T. Nguyen et al., 2020). In the existing literature, there is no analysis of the non-linear relationship between firm profitability and capital structure in the context of Vietnam firms. Consequently, the primary objective of this study is to estimate the non-linear relationship between capital structure and profitability for 342 companies listed on the Vietnam Stock Exchange from 2016 to 2022. Vietnam has one of the fastest development rates in Southeast Asia, and despite the negative effects of COVID-19, it is expected to recover by 2021. In addition, four industries significantly impact Vietnam's economy: In the first half of 2020, the wholesale trade sector, the food and beverage sector, and other market services will be significant growth drivers for Vietnam's economy. Due to rising income levels, increased demand, and the favorable effects of investment legislation on FDI inflows, the construction industry is anticipated to rise rapidly over the next decade (Dang & Do, 2021). Therefore, it is of the utmost importance to comprehend the factors, particularly capital structure, that influence the profitability of businesses. According to the study's authors, this research's concept and conclusions are essential for business management and other users of financial data. According to the study's findings, business managers will always consider the effects of decisions on firm profitability. They will know the various effects of capital structure decisions on firm profitability. Moreover, given that a rise in firm profitability corresponds to an increase in the investment rate, investors and creditors must consider the capital structure's composition and its future effects on firm value (Strong, 2022).

The remainder of the investigation is organized as follows: Section 2 reviews the theoretical and empirical literature. In section 3, data, variables, and applied methodology are provided. The fourth section contains findings and discussions. Section 5 provides a conclusion and policy recommendations.

2. Literature Review

2.1 Basic Theories

2.1.1 Miller and Modigliani's Theory

A company's capital structure is the combination of stock and loan capital that it uses to execute its functions. Capital structure theories describe how companies decide how much debt and equity to have, how their capital structure is determined, and how it relates to the company's value (Nguyen & Tran, 2019). The Modigliani and Miller (MM) theory was the first to address the capital structure issue (Modigliani & Miller, 1958). In an optimal capital market, they asserted that capital structure does not appear to impact business market values substantially. This suggests that a company's value is determined by its assets rather than the proportion of shares and debt it has issued. This hypothesis established the foundation for modern capital structure theories.

Nonetheless, the ideal capital market necessitates the absence of taxes, transaction fees, bankruptcy fees, unequal financing costs for businesses and investors, complete information accessibility for all investors, and competitive markets. Under these conditions, capital structure has no bearing on a

company's value because a decline in the stock price will negate the advantages of using debt. In contrast, these assumptions do not hold in the real market. In a subsequent publication, (Modigliani & Miller, 1963) acknowledged their flaws and incorporated taxes into their model. Expanding a company's financial leverage will increase its value because interest payments are tax deductible in imperfect markets. However, this resulted in the erroneous belief that a company must be 99.99 percent debt-financed to increase its value. As demonstrated, capital structure significantly impacts by permitting only one of the ideal capital market hypotheses. Given that almost all of the conditions cannot be satisfied in the actual market, it is evident that capital structure is crucial (Domnick, 2018).

2.1.2   Trade-Off Theory

According to Kraus and Litzenberger's (1973) trade-off theory, a company's capital structure achieves a balance between the benefits and drawbacks of debt. The trade-off hypothesis compares costs and benefits to determine how much equity and debt a company should employ (Frank & Goyal, 2009). The tax shield (Modigliani & Miller, 1963) enables a company to reduce its profits by deducting interest-rate-related tax obligations. Due to a rise in financial risk, direct and indirect bankruptcy costs increase debt service expenses (E. H. Kim, 1978). An optimal capital structure would balance costs and benefits. In other words, a company's debt's value is equivalent to its value without debt after adding the tax benefit and deducting the costs associated with financial distress. The tax shield benefits exceed the debt costs, so debt increases a company's value before the optimal point is reached. When the optimal capital structure has been established, debt harms the company's value because the debt costs exceed the tax shield benefits. Therefore, according to the theory, firm value and capital structure have an inverse relationship (Domnick, 2018).

2.1.3   The Pecking Order Theory

The Myers and Majluf (1984) pecking order theory is founded on the information asymmetry between business proprietors and investors. Consequently, managers would prioritize internal capital over debt and equity when financing. To finance production and commercial activities, managers will utilize a prioritized list. Future stock prices decreased due to the issuance of additional equity. According to this view, businesses should only seek external financing when internal resources are inadequate (Graham & Harvey, 2001). Additionally, the company will prioritize debt mobilization over issuing additional shares when seeking external financing (Hoang, 2022).

2.1.4   Signaling Theory

Spence (1973) initially analyzed the concept of signaling about the labor market and later refined it into the signaling theory. According to the content, a company with a strong financial position can distinguish itself from one with a weak financial position by sending a reliable signal to the capital market. Effective signals are those that a low-quality company cannot send to investors to intimidate them. Low-quality businesses will not send the same signal as high-quality businesses. After all, the cost of signaling exceeds the benefit (Hoang, 2022).

2.2   Empirical Evidence

Numerous empirical studies on the relationship between capital structure and profitability have produced contradictory findings. Like Co et al. (2021), this study examined the effect of capital structure on the profitability of rubber enterprises listed on the Vietnam stock exchange between 2015 and 2019. The authors used the Fixed Effects and Random Effects models

for empirical estimation. According to the study, short-term debt positively influenced profitability (ROE), whereas long-term debt negatively influenced it. T. N. L. Nguyen et al. (2020) analyzed the factors influencing the profitability of 1,343 companies on the Vietnam stock market from 2014 through 2017. It was determined that liquidity, firm size, financial leverage, solvency, and financial adequacy were the primary determinants of profitability as measured by return on assets (ROA), return on equity (ROE), and return on sales (ROS) (ROS). According to the findings of GMM estimation, all of the determinants positively affect the various measures of profitability. Abdullah and Tursoy (2021) examined the effect of capital structure on the profitability of non-financial companies listed on the German stock exchange between 1993 and 2016. Two-step distinction In the study, the GMM estimation technique was utilized to investigate the nexus empirically. The findings of the study demonstrated that capital structure had a positive effect on profitability. Y. Kim et al. (2023) also investigated the effect of capital structure-related factors on the firm performance of 423 ICT-related companies listed on the South Korean stock exchange. Also analyzed were the effects of liquidity, firm size, and leverage. Using Kruskal-Wallis one-way ANOVA and Tobit regression, the authors determined that the current ratio positively impacted the firm value of only small and medium-sized businesses. The debt-to-equity ratio positively affected the value of medium-sized ICT companies.

In contrast, numerous studies have found a negative correlation between a company's profitability and capital structure. Similarly, Afroze and Khan (2022) estimated the impact of capital structure on the profitability of Bangladesh's pharmaceutical and chemical industries between 2013 and 2020. Applying panel-corrected standard errors revealed a negative impact of capital structure on firms' profitability as measured by ROE, ROA, and earnings per share (EPS). In contrast, neither the debt-to-equity ratio nor the total debt ratio had any impact on the profitability of the companies. Younus et al. (2014) investigated the relationship between the financial performance and capital structure of sugar companies listed on the Karachi Stock Exchange in Pakistan from 2006 to 2011. According to the study's findings, the correlation between gross profit, net profit, and financial performance was feeble. Dang and Do (2021) investigated the impact of capital structure on the profitability of 435 non-financial Vietnamese firms from 2012 to 2019. The GMM estimation approach revealed that capital structure positively impacted the profitability of food and beverage firms but harmed the profitability of wholesale trade and construction firms. Moreover, the effect of capital structure on the profitability of real estate firms was negligible. Do et al. (2022) also estimate the impact of capital structure on the profitability of Vietnam stock market manufacturing and processing firms from 2015 to 2020? According to Feasible Generalized Least Square (FGLS) results, both short- and long-term debt had a significant negative impact on ROA. As measured by Tobin's Q, short-term debt/assets had no significant impact on the firm's profitability, whereas long-term debt/assets had a negative impact. In conclusion, empirical research has disclosed contradictory results regarding the relationship between capital structure and firm profitability; therefore, this topic requires further investigation. Testing the capital structure's effect on the profitability of listed companies is crucial, particularly in a developing market like Vietnam. This is essential for comprehending how capital structure affects profitability and providing managers with actionable strategies for establishing an optimal capital structure and increasing the profitability of companies listed on Vietnam's stock exchange. In addition, while most previous studies estimated the linear relationship between capital structure and profitability, to the author's knowledge, no

previous studies examined the non-linear relationship between capital structure and profitability. Consequently, this study aims to investigate the non-linear relationship between capital structure and firm profitability on Vietnam's stock exchange.

Thus, we formulate the hypothesis as follows:

H1: The capital structure of Vietnamese companies possesses a non-linear link with their profitability.

3. Data and Methodology

The primary objective of this study is to assess the impact of capital structure on the profitability of companies listed on Vietnam's stock exchange. The authors compiled data on 342 companies in Vietnam's Hanoi stock exchange. The primary data source for the study variables is publicly available financial statements of publicly traded companies. From 2016 to 2022,

quarterly data will be collected from these reports. Return on equity is used as a surrogate for firm profitability in this study (ROE). This indicator is selected due to its versatility and applicability across all industries and products. The short-term and long-term debt-to-assets ratios explain the study's explanatory variable, capital structure. The model includes firm size and liquidity as control variables.

The model in its functional form is specified as follows:

$$ROE = f\ (TDR,\ SDR,\ LDR,\ FS,\ LIQ) \qquad (1)$$

Which is given in its econometric form:

$$ROE_{it} = \beta_0 + \beta_1 TDR_{it} + \beta_2 SDR_{it} + \beta_3 LDR_{it} + \beta_4 FS_{it} + \beta_5 LIQ_{it} + \varepsilon_{it} \qquad (2)$$

Variables used for empirical estimation are comprehensively described in following Table 1.

Table 1. Variables Used in the Study

Variable	Abbreviations	Measurement
Return on equity	ROE	Net income/average total equity
Debt to asset ratio	TDR	Long-term debt plus short-term debt/total assets
Short-term debt ratio	SDR	The ratio of short-term debt to total assets
Long-term debt ratio	LDR	The ratio of long-term debt to total assets
Firm Size	FS	Net sales of the firm
Liquidity	LIQ	Cash equivalent and cash/total assets

4. Applied Methodology

4.1 Cross-sectional Dependency (CSD) test

The empirical estimation based on panel data is more likely to require the examination of CSD. In the literature, there are four commonly used assays for CSD, depending on the size of cross sections and period. Due to the large cross-section and short period, the Lagrange multiplier (CD_{lm}) test, the scaled version of the LM test, is the most applicable in our situation.

$$CD_{lm} = \sqrt{\frac{N}{N(N-1)}} \sum_{l=1}^{N-1} \sum_{j=i+1}^{N} T\hat{p}_{ij} - 1 \qquad (3)$$

Under the H0 of cross-sectional independence, when t approaches ∞ , and N approaches ∞, an asymptotic normal distribution is followed by the CD_{lm} test (Nazlioglu et al., 2011; Wolde-Rufael, 2014). When N is more than T, the CD_{lm} estimate is size dependent. Therefore, the CD test given below is more suitable in N larger than T situation:

$$CD_{lm} = \sqrt{\frac{N}{N(N-1)}} \sum_{l=1}^{N-1} \sum_{j=i+1}^{N} T\hat{p}_{ij} - 1 \qquad (4)$$

An asymptotically normal distribution is followed by The CSD test considering the H0 of CSD that considers t approaching ∞ and N approaching ∞ in any order. Moreover, when the population means pair-wise correlations are zero, and pair-wise individual correlation is not zero, the CSD test may result in misleading information. It is suggested to use the bais-adjusted test to reduce the negative impact. In the instance of the large panel, LM_{adj} uses the actual variance and mean of the LM statistics (t approaching ∞ first and later N approaching ∞). The LM statistics (bias-adjusted) are given in the following equation:

$$CD_{lm} = \sqrt{\frac{2}{N(N-1)}} \sum_{l=1}^{N-1} \sum_{j=i+1}^{N} \frac{(T-K)\hat{p}_{ij}^2}{v_{Tij}^2} \xrightarrow{d} (N,0) \qquad (5)$$

And k represents the no of regressions.

4.2 Panel ARDL Estimation

Using the Pooled Group Mean (PMG) proposed by Pesaran et al. (1999), we commence our empirical estimation by assuming a linear effect of capital structure on the profitability of companies listed on the Vietnam stock exchange. Although PGM can still estimate error variances and short-run coefficients, it

regards lower degrees of heterogeneity as mandating parameter homogeneity. The ECM term lacks correlation baseness, and the regressors are distributed normally so that the independent variable can be regarded as an exogenous variable. The model's dependent and independent variables have a long-term relationship. Long-term variables are constant throughout all transverse sections. Pesaran suggested the ARDL model (p, q... n) as an empirical form.

$$y_{it} = \sum_{j=1}^{p} \beta_{ij} y_{i,t-j} + \sum_{j=0}^{q} \gamma_{ij} x_{i,t-j} + \mu_i + \varepsilon_{it} \qquad (6)$$

In the above equation, y_{it} represents the dependent variable, and x_{ij} shows the explanatory variable. N represents the group, and T shows time. Moreover, the parameters of m_i denote fixed effects in the above equation.

To examine the link between profitability and capital structure, the study's main focus is the PGM estimator. The generalized empirical ARDL equation (1,1,1,1,1) is provided below in panel form:

$$\Delta REO_{it} = \beta_0 + \beta_1 ROE_{it-1} + \beta_2 TDR_{it-1} + \beta_3 SDR_{it-1} + \beta_4 LDR_{it-1} + \beta_5 FS_{it-1} + \beta_6 LIQ_{it} +$$
$$\delta_{iJ} \Delta ROE_{it-J} + \sum_{J=1}^{Q-1} \delta_{iJ} \Delta TDR_{it-J} + \sum_{J=1}^{R-1} \delta_{iJ} \Delta SDR_{it-1} +$$
$$\sum_{J=1}^{P-1} \qquad \sum_{J=1}^{S-1} \delta_{iJ} \Delta LDR_{it-1} + \qquad (7)$$
$$\sum_{J=1}^{T-1} \delta_{iJ} \Delta FS_{it-1} + \sum_{J=1}^{U-1} \delta_{iJ} \Delta LIQ_{it-J} + \mu_{it} + \varepsilon_{it}$$

i shows the cross section (1 to N), and t shows the period (1 to T). ROE shows profitability, SDR shows the short-term debt and assets ratio, LDR represents the long-term debt and assets ratio, FS shows the firm size, and LIQ shows liquidity, respectively. The variable order of integration is the fundamental benefit of PGM analysis. PGM-ARDL analysis can operate effectively irrespective of the order of integration of the variables.

4.3 Panel NARDL

In contrast to linear estimation, non-linear panel research integrates negative and positive shocks to the explanatory variables. In other words, positive and negative shocks may not result in coefficients bearing the same sign. The non-linear form of equation (7) is shown below in equation (8).

$$\Delta ROE_{it} = \beta_0 + \beta_1 ROE_{it-1} + \beta_2^+ TDR_{t-1}^+ + \beta_2^- TDR_{t-1}^- + \beta_3^+ SDR_{t-1}^+ + \beta_3^- SDR_{t-1}^- + \beta_4^+ LDR_{t-1}^+ + \beta_4^- LDR_{t-1}^- + \beta_5^+ FS_{t-1}^+ +$$

$\beta_5^- FS_{t-1}^- + \beta_6^+ LIQ_{t-1}^+ + \beta_6^- LIQ_{t-1}^- + \sum_{J=0}^{P-1} \delta_{iJ}\Delta ROE_{it-J} +$
$\sum_{J=0}^{q-1} (\delta_{ij}^+\Delta TDR_{it-j}^+ + \delta_{ij}^-\Delta TDR_{it-j}^-) + \sum_{J=0}^{r-1} (\delta_{ij}^+\Delta SDR_{it-j}^+ +$
$\delta_{ij}^-\Delta SDR_{it-j}^-)$ $+\sum_{J=0}^{s-1} (\delta_{ij}^+\Delta LDR_{it-j}^+ +$
$\delta_{ij}^-\Delta LDR_{it-j}^-) + \sum_{J=0}^{t-1} (\delta_{ij}^+\Delta FS_{it-j}^+ +$
$\delta_{ij}^-\Delta FS_{it-j}^-) + \sum_{J=0}^{u-1} (\delta_{ij}^+\Delta LIQ_{it-j}^+ + \delta_{ij}^-\Delta LIQ_{it-j}^-) + \varepsilon_{it}$ (8)

Where + and – signs indicate positive and negative shocks in every variable.

We compute the long-run coefficients as follows:

$TDR^+ = \frac{-\beta_{2it}^+}{\beta_{2i}} TDR^-$, $SDR^+ = \frac{-\beta_{3it}^+}{\beta_{3i}} SDR^-$, $LDR^+ =$
$\frac{-\beta_{4it}^+}{\beta_{4i}} LDR^-, FS^+ = \frac{-\beta_{5it}^+}{\beta_{5i}} FS^-, LIQ^+ = \frac{-\beta_{6it}^+}{\beta_{6i}} LIQ^-$ respectively.

According to the following equations, these shocks are calculated through both negative and positive partial sum variable decomposition methods:

$TDR_i^+ = \sum_{k=1}^{t} \Delta TDR_{ik}^+ = \sum_{K=1}^{T} MAX (\Delta TDR_{ik}, 0)$

$TDR_i^- = \sum_{k=1}^{t} \Delta TDR_{ik}^- = \sum_{K=1}^{T} MIN (\Delta TDR_{ik}, 0)$

$SDR_i^+ = \sum_{k=1}^{t} \Delta SDR_{ik}^+ = \sum_{K=1}^{T} MIN (\Delta SDR_{ik}, 0)$

$SDR_i^- = \sum_{k=1}^{t} \Delta SDR_{ik}^- = \sum_{K=1}^{T} MAX (\Delta SDR_{ik}, 0)$

$LDR_i^+ = \sum_{k=1}^{t} \Delta LDR_{ik}^+ = \sum_{K=1}^{T} MAX (\Delta TDR_{ik}, 0)$

$LDR_i^- = \sum_{k=1}^{t} \Delta LDR_{ik}^- = \sum_{K=1}^{T} MIN (\Delta LDR_{ik}, 0)$

$FS_i^+ = \sum_{k=1}^{t} \Delta FS_{ik}^+ = \sum_{K=1}^{T} MAX (\Delta FS_{ik}, 0)$

$FS_i^- = \sum_{k=1}^{t} \Delta FS_{ik}^- = \sum_{K=1}^{T} MIN (\Delta FS_{ik}, 0)$

$LIQ_i^+ = \sum_{k=1}^{t} \Delta LIQ_{ik}^+ = \sum_{K=1}^{T} MAX (\Delta LIQ_{ik}, 0)$

$LIQ_i^- = \sum_{k=1}^{t} \Delta LIQ_{ik}^- = \sum_{K=1}^{T} MIN (\Delta LIQ_{ik}, 0)$

Equation (8) in its error correction form is given as

$\Delta ROE_{it} = \tau_{1i}\varphi_{it-1} + \sum_{J=0}^{P-1} \delta_{iJ}\Delta ROE_{it-J} + \sum_{J=0}^{q-1} (\delta_{ij}^+\Delta TDR_{it-j}^+ +$
$\delta_{ij}^-\Delta TDR_{it-j}^-) + \sum_{J=0}^{r-1} (\delta_{ij}^+\Delta SDR_{it-j}^+ + \delta_{ij}^-\Delta SDR_{it-j}^-)$
$+\sum_{J=0}^{s-1} (\delta_{ij}^+\Delta LDR_{it-j}^+ + \delta_{ij}^-\Delta LDR_{it-j}^-) + \sum_{J=0}^{t-1} (\delta_{ij}^+\Delta FS_{it-j}^+ +$
$\delta_{ij}^-\Delta FS_{it-j}^-) + \sum_{J=0}^{u-1} (\delta_{ij}^+\Delta LIQ_{it-j}^+ + \delta_{ij}^-\Delta LIQ_{it-j}^-) + \varepsilon_{it}$ (9)

In the panel NARDL equation (9), the error correction term captures the speed of adjustments to equilibrium in the long run. When shocks in an explanatory variable occur in the short run, the corresponding coefficient describes how long it takes to attain long-term equilibrium.

5.   Results and Discussions

To commence empirical estimation, we first applied unit root tests, the results of which are presented in Table 2 below. The results indicate that panel variables exhibit a varied order of integration. Some series are stationary, while others become stationary when the difference is calculated. This necessitates using panel ARDL to examine the relationship between capital structure and profitability.

Table 2. Unit Root Test Findings

Series	Breitlung	IPS	LLC	ADF-Fisher	Hadri	Decision
ROE	4.246***	3.339***	11.097***	-11.70***	8.3089***	I(0)
d.ROE	--------	----------	-----------	------------	-----------	
TDR	0.8545	1.2416	1.472	0.11333	7.498	I(1)
d.TDR	7.4169***	4.875***	53.917****	33.401****	11.234***	
SDR	0.998	5.209	1.378	0.6434	11.128	
d.SDR	-4.089***	22.0224***	19.571***	15.781***	14.674***	I(1)
LDR	55.985***	9.887***	14.413****	98.075***	27.817***	I(0)
d.LDR	--------	-----------	-----------	------------	-------------	
FS	11.997***	31.941***	4.557***	7.894***	41.531***	I(0)
d.FS	-----------	----------	------------	------------	------------	
LIQ	0.227	1.892	3.876	11.432	9.532	
d.LIQ	-3.245***	-2.315***	-4.543***	-14.077***	12.971***	I(1)

The CSD test is then administered; the results are listed in Table 3. The p-value refutes the null hypothesis (H0) that CSD does not exist. Thus, all variables under consideration are cross-sectionally dependent, indicating that all variables exhibit a common dynamism.

Table 3. CSD Test Findings

Test	Prob-value
LM$_{BP}$	84.45***
LM$_{PS}$	47.077***
CD$_{PS}$	23.637***
LM$_{adj}$	25.686***

Then, we apply panel ARDL regression estimation, considering the symmetry or linear relationship between capital structure and firm profitability. The Hausman test statistics validate the accuracy of the PMG estimation based on maximal likelihood. The ARDL results for the panel are provided in Table 4 below.

Table 4. Panel ARDL Findings

Long Run		Short Run	
Series	Coeff/Prob-value	Series	Coeff/Prob-value
TDR	0.976*** (0.024)	d. TDR	0.115*** (0.009)
SDR	0.346* (0.098)	d.SDR	0.188*** (0.023)
LDR	-0.021*** (0.000)	d.LDR	-0.933*** (0.043)
FS	0.554*** (0.031)	d.FS	1.342** (0.087)
LIQ	1.113*** (0.005)	d.LIQ	1.212*** (0.044)
Constant	0.245 (0.876)	Constant	1.024 (0.332)
		ECT (-1)	-0.786*** (0.007)
		Hausman Test	0.234 (0.876)
		Log Likelihood	2131.34

In the short run and the long run, capital structure has a significant and positive effect on ROE in the estimations of the ARDL panel. However, the coefficients of various capital structure measures have distinct signs. Specifically, short-term and total debt ratios have a positive and significant impact on ROE. Domnick (2018) and Abdullah et al. (2021) support our findings substantially. Therefore, it can be concluded that capital structure positively affects the profitability of businesses. This may be since issuing debt is less expensive than issuing equity, and high leverage enables managers to concentrate more on profitable ventures (Abdullah & Tursoy, 2021). Following Do et al. (2021) findings, LDR's impact becomes negative when the capital structure is measured. Therefore, increasing the company's long-term debt would increase its risk. This may be because, despite an extended repayment period, the selected countries tend to use more LDR than SDR. This negative impact is justifiable because interest rates on short-term loans in Vietnam are presently lower than interest rates on long-term loans due to banks' concerns about long-term inflation. LDR is more expensive and riskier than SDR. Long-term interest rates will exert significant pressure on operations. The longer the loan duration, the greater the potential risk and interest cost. A company with a large inventory misapplies capital and mortgage assets to acquire money will have additional responsibilities.

For control variables, the results indicate that firm size positively influences ROE in both the short and long term. Larger organizations may be better equipped to identify profitable opportunities because their business operations are more diverse, they bear less risk, and their cash flow is more consistent. As a result of the benefits of economies of scale, expanding a company's size increases its profitability. Businesses benefit from economies of scale by reducing costs and increasing output when production is efficient. In general, the economies of scale depend on the magnitude of the business. The size of a company increases with the amount of money saved.

Additionally, companies that effectively expand are more likely to increase dividend payments to investors, resulting in greater returns for investors. Businesses with increasing revenue can demonstrate their viability and provide additional benefits when seeking funding, resulting in increased profitability. Our findings are supported by the findings of Al-Slehat et al. (2020), Nguyen and Tran (2019), and Ngoc et al. (2021).

The findings of panel ARDL indicate that liquidity has both a short-term and a long-term positive impact on the ROE of the selected companies. This can be explained by the fact that businesses strive to establish effective cash management

practices to guarantee access to sufficient cash, thereby improving their operations and, ultimately, their profitability. One such strategy would have been to accelerate revenue collection from debtors. The findings suggest that management can eradicate inefficient and unnecessary short-term borrowing, ultimately increasing the firm's profitability. This result is consistent with those of Ngoc et al. (2021), Akenga (2017), Wu et al. (2023), and Kung'u (2017) from prior research.

After estimating the linear association using panel ARDL estimation, we will now estimate the non-linear relationship between capital structure and ROE of firms in Vietnam using the panel NARDL method. The results of these calculations are presented in Table 5 below. The findings indicate that positive disruptions in TDR, SDR, LDR, FS, and LIQ positively impact ROE over the long term. This indicates that further increases in LDR, SDR, TDR, FS, and LIQ result in a higher ROE in the long term. However, the findings regarding negative shocks in explanatory variables are varied. Long-term, the negative shocks in TDR, SDR, and LDR harm ROE, whereas the negative shocks in FS and LIQ do not impact ROE. The findings suggest that a decline in TDR, SDR, and LDR correlates with a decline in ROE. However, reductions in FS and LIQ have no long-term effect on ROE.

Similarly, in the short term, ROE positively correlates with positive shocks in TDR, SDR, LDR, LIQ, and FS. The result suggests that ROE can be improved by modifying the explanatory variables positively. However, except for LIQ, negative disruptions in all other variables are related to a decline in ROE. It suggests that negative growth in TDR, SDR, LDR, and FS can reduce profitability, whereas LIQ has no relationship with the profitability of Vietnamese enterprises in the short term.

6. Conclusion and Policy Recommendations

This study seeks to quantify the impact of capital structure on the profitability of companies listed on the Vietnamese stock exchange. While substantial evidence exists regarding the symmetric or linear relationship between capital structure and firm profitability, the previous literature lacks an evaluation of the asymmetric or non-linear relationship. To address this deficiency, the study estimates the non-linear relationship between the variables by examining 342 companies listed on the Hanoi stock exchange from 2016 to 2022. The quarterly financial statements of companies under consideration are analyzed to collect data on variables. ROE is used to measure profitability, while TDR, SDR, and LDR are used to measure the capital structure. In addition, FS and LIQ are the model's control variables. Using panel ARDL and panel NARDL estimation approaches, the empirical estimation reveals intriguing findings. Except for LDR, the

capital structure proxied by TDR and SDR positively affects short- and long-term profitability in panel ARDL estimation.

Positive shocks in SDR, LDR, and TDR increase ROE. In contrast, negative shocks in these variables are associated with a decrease in ROE for listed companies, as determined by panel NARDL estimation. Overall, the results of both estimations demonstrate a positive relationship between capital structure and the profitability of Vietnamese businesses.

Table 5. Panel NARDL Results

Long Run		Short Run	
Series	Coeff/Prob-value	Series	Coeff/Prob-value
ROE (-1)			
TDR+	0.456*** (0.041)	d. TDR+	0.313*** (0.049)
TDR-	-2.973*** (0.000)	d.TDR-	-2.009** (0.084)
SDR+	0.213* (0.025)	d.SDR+	0.213*** (0.011)
SDR-	-0.466* (0.086)	d.SDR-	-0.537*** (0.000)
LDR+	1.131*** (0.010)	d.LDR+	0.265*** (0.038)
LDR-	-1.652** (0.073)	d.LDR-	-1.894*** (0.004)
FS+	0.126*** (0.015)	d.FS+	0.415** (0.073)
FS-	-0.842 (0.942)	d.FS-	-1.653** (0.077)
LIQ+	0.141*** (0.007)	d.LIQ+	1.212*** (0.044)
LIQ-	-0.555 (1.739)	d.LIQ-	-1.708 (0.888)
Constant	0.498 (0.044)	Constant	0.701 (0.003)
Symmetry Test			
W_{TDR}	12.182***		5.887***
W_{SDR}	9.423***		15.776***
W_{LDR}	3.341***		8.095***
W_{FS}	10.532***		12.372***
W_{LIQ}	6.887***		11.398***
		ECT (-1)	-0.899*** (0.031)
		Hausman Test	0.323 (0.735)
		Log Likelihood	3121.42

The research findings would aid Vietnamese producers in effectively managing their capital structure and increasing their profitability. According to research, long-term debt harms profitability, while total debt, primarily short-term debt, positively affects profitability. To increase profitability, businesses should consider decreasing their long-term and short-term debt. Before deciding to invest, investors must also consider the debt ratio of companies listed on the Stock Exchange Market of Vietnam. The study also provides public institutions, the government, and banks with recommendations for increasing business earnings in Vietnam. Due to data availability, the study only considers companies listed on the Hanoi Stock Exchange. Future researchers can examine the companies listed on the HOSE and Hanoi stock exchanges in greater detail. In addition, companies in various industries, such as mining, manufacturing, food and beverages, and agriculture, can be examined separately in future research for a more focused examination of the relationship between profitability and capital structures.

References

Abdullah, H., & Tursoy, T. (2021). Capital structure and firm performance: evidence of Germany under IFRS adoption. *Review of Managerial Science, 15*(2), 379-398. doi: https://doi.org/10.1007/s11846-019-00344-5

Afroze, S., & Khan, S. (2022). Impact of Capital Structure on Firm Performance: Evidence from Bangladesh's Pharmaceuticals & Chemicals Sector. Retrieved from https://www.icmab.org.bd/wp-content/uploads/2022/04

Akenga, G. (2017). Effect of liquidity on financial performance of firms listed at the Nairobi Securities Exchange, Kenya. *International Journal of Science And Research, 6*(7), 279-285. Retrieved from https://www.academia.edu/download/76286271/39d8e81de71f1304b2962d7653bd254f4d01.pdf

Al-Slehat, Z. A. F., Zaher, C., Fattah, A., & Box, P. (2020). Impact of financial leverage, size and assets structure on firm value: Evidence from industrial sector, Jordan. *International Business Research, 13*(1), 109-120. doi: https://doi.org/10.5539/ibr.v13n1p109

Co, H. T. T., Uong, T. T. M., & Nguyen, C. V. (2021). The impact of capital structure on firm's profitability: A case study of the rubber industry in Vietnam. *Journal of Asian Finance, Economics and Business, 8*(7), 469-476. doi: https://doi.org/10.13106/jafeb.2021.vol8.no7.0469

Dang, T. D., & Do, T. V. T. (2021). Does capital structure affect firm value in Vietnam. *Investment Management and Financial Innovations, 18*(1), 33-41. doi: http://dx.doi.org/10.21511/imfi.18(1).2021.03

Detthamrong, U., Chancharat, N., & Vithessonthi, C. (2017). Corporate governance, capital structure and firm performance: Evidence from Thailand. *Research in International Business and Finance, 42*, 689-709. doi: https://doi.org/10.1016/j.ribaf.2017.07.011

Do, L. H., Luong, K. T., Mai, A. N., Dam, L. A., & Pham, H. T. (2022). The Impact of Capital Structure on Firm Performance: Case of Listed Firms in Processing and Manufacturing Industry in Vietnam, *International Journal of Economics, Business and Management Research*, 6(3), 96-113. doi: http://dx.doi.org/10.51505/ijebmr.2022.6307

Domnick, C. H. (2018). *Influence of capital structure on firm's financial performance: an inter-industry investigation of German listed firms.* University of Twente. Retrieved from https://purl.utwente.nl/essays/75458

Frank, M. Z., & Goyal, V. K. (2009). Capital structure decisions: which factors are reliably important? *Financial Management*, 38(1), 1-37. doi: https://doi.org/10.1111/j.1755-053X.2009.01026.x

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics*, 60(2-3), 187-243. doi: https://doi.org/10.1016/S0304-405X(01)00044-7

Hoang, N. N. (2022). The Nexus Between Capital Structure and Stock Prices: Evidence from Non-agricultural Firms in Vietnam. *European Journal of Business and Management Research*, 7(4), 66-70. doi: https://doi.org/10.24018/ejbmr.2022.7.4.1489

Kim, E. H. (1978). A mean-variance theory of optimal capital structure and corporate debt capacity. *The Journal of Finance*, 33(1), 45-63. doi: https://doi.org/10.1111/j.1540-6261.1978.tb03388.x

Kim, Y., Jung, S., & Kim, C. (2023). The Impact of Capital Structure on the Profitability Performance of ICT Firms. *Processes*, 11(2), 635. doi: https://doi.org/10.3390/pr11020635

Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The Journal of Finance*, 28(4), 911-922. doi: https://doi.org/10.2307/2978343

Kung'u, J. (2017). Effect of liquidity management practices on profitability of manufacturing industry in Kenya. *IOSR Journal of Economics and Finance*, 8(1), 84-89. doi: https://doi.org/10.9790/5933-0801038489

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 48(3), 261-297. Retrieved from https://www.jstor.org/stable/1809766

Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: a correction. *The American Economic Review*, 53(3), 433-443. Retrieved from https://www.jstor.org/stable/1809167

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187-221. doi: https://doi.org/10.1016/0304-405X(84)90023-0

Nasimi, A. N. (2016). Effect of capital structure on firm profitability (an empirical evidence from London, UK). *Global Journal of Management and Business Research*, 16(C4), 19-29. Retrieved from https://journalofbusiness.org/index.php/GJMBR/article/view/2026

Nazlioglu, S., Lebe, F., & Kayhan, S. (2011). Nuclear energy consumption and economic growth in OECD countries: Cross-sectionally dependent heterogeneous panel causality analysis. *Energy Policy*, 39(10), 6615-6621. doi: https://doi.org/10.1016/j.enpol.2011.08.007

Ngoc, N. M., Tien, N. H., & Thu, T. H. (2021). The Impact of Capital Structure On Financial Performance of Logistic Service Providers Listed On Ho Chi Minh City Stock Exchange. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 18(2), 688-719. Retrieved from https://archives.palarch.nl/index.php/jae/article/view/7484

Nguyen, H. T., & Nguyen, A. H. (2020). The impact of capital structure on firm performance: Evidence from Vietnam. *The Journal of Asian Finance, Economics and Business*, 7(4), 97-105. doi: https://doi.org/10.13106/jafeb.2020.vol7.no4.97

Nguyen, T. A., & Tran, T. P. T. (2019). The Impact of Capital Structure on Firm Performance of Vietnamese Non-financial Listed Companies Based on Agency Cost Theory. *VNU Journal Of Economics and Business*, 35(2). Retrieved from https://js.vnu.edu.vn/EAB/article/view/4212

Nguyen, T. N. L., & Nguyen, V. C. (2020). The determinants of profitability in listed enterprises: a study from Vietnamese stock exchange. *The Journal of Asian Finance, Economics and Business*, 7(1), 47-58. doi: https://doi.org/10.13106/jafeb.2020.vol7.no1.47

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, 94(446), 621-634. doi: https://doi.org/10.1080/01621459.1999.10474156

Spence, M. (1973). Job market signaling the quarterly journal of economics, *MIT Press, August 87*(3), 281, 283-306. doi: https://doi.org/10.1016/B978-0-12-214850-7.50025-5

Strong, B. K. J. (2022). Online Reputation Management: A Shark Tale from Instagram. 6. Retrieved from http://www.ijicases.com/search/shark-tale_case/

Wolde-Rufael, Y. (2014). Electricity consumption and economic growth in transition countries: A revisit using bootstrap panel Granger causality analysis. *Energy Economics*, 44, 325-330. doi: https://doi.org/10.1016/j.eneco.2014.04.019

Wu, N., Zhao, J., Musah, M., Ma, Z., Zhang, L., Zhou, Y., . . . Cao, S. (2023). Do Liquidity and Capital Structure Predict Firms' Financial Sustainability? A Panel Data Analysis on Quoted Non-Financial Establishments in Ghana. *Sustainability*, 15(3), 2240. doi: https://doi.org/10.3390/su15032240

Younus, S., Ishfaq, K., Usman, M., & Azeem, M. (2014). Capital structure and financial performance: Evidence from Sugar industry in Karachi Stock Exchange Pakistan. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4(4), 272-279. doi: http://dx.doi.org/10.6007/IJARAFMS/v4-i4/1344