Optimizing profitability through capital structure: An empirical analysis of Vietnamese commercial banks

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A B S T R A C T

This study examines how the way Vietnamese commercial banks manage their money affects their profits. Vietnam's financial scene is changing quickly, and commercial banks are always trying to make more money. Capital structure, which includes things like debt and assets, is very important in this. This research looks closely at how different parts of capital structure affect a bank's profits. It uses data from 18 commercial banks in Vietnam that are listed on the stock market. The study uses the Generalized Least Squares (GLS) method, a detailed way of analyzing data. This method shows a clear link between capital structure—which includes debt ratio, growth rate, asset turnover, and asset size—and the profits of these banks. The results show how important capital structure is and suggest ways bank managers can improve profits by changing their capital structure. This can help make the banking sector in Vietnam stronger and more effective.

1. Introduction

Capital structure is a key topic in the field of corporate financial management. In Vietnam, companies are experiencing good growth conditions, with many opportunities and options for using capital in their operations. The choice of different capital sources leads to various capital structures for these companies. This raises the question: how do these capital structures influence company profits? There has been a lot of research on the factors that determine the relationship between capital structure and company value. Studies by researchers like Abor (2005), Onaolapo and Kajola (2010), Aggarwal and Padhan (2017), Dang and Do (2021), Ha et al. (2023), and Nguyen et al. (2023) have found that the ratio of debt to total assets affects a company's profitability. Specifically, these studies indicate that increasing debt has a negative impact on company performance. Additionally, it has been observed that larger companies have more advantages than smaller ones in this context.

Studies by researchers such as Abor (2005), Zeitun and Tian (2007), Onaolapo and Kajola (2010), Ahmad et al. (2012), Abdullah and Tursoy (2021),

Pham and Thu Ho (2022), and Cuc et al. (2023) have shown that a larger company size positively affects its performance. Zeitun and Tian (2007) and Abor (2005) suggested that companies with high growth potential tend to perform better because they can generate good returns on investment. Additionally, asset turnover is another factor positively influencing business performance, as supported by Onaolapo and Kajola (2010). However, other studies like those by Al-Taani (2013), Ahmad et al. (2012), Sheikh and Wang (2013), and Dodoo et al. (2023) indicated a negative relationship between capital structure and firm profitability. Given these findings, the impact of capital structure on the profitability of enterprises, particularly commercial banks listed on the Vietnamese stock market, is an important research area. This study aims to investigate how capital structure affects the profitability of these commercial banks to better understand the relationship between capital structure and company profits. The results of this research will also provide a foundation for policy recommendations to help commercial banks enhance their profitability and achieve their profit development goals.

2. Literature review

Modigliani and Miller (1963) described capital structure as a mix of debt and equity. It influences a company's value through this mix. Abor (2005) explained capital structure as the combination of debt and equity a company uses in its operations.

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Ahmad et al. (2012) viewed capital structure as the ratio of debt to equity in a company's capital. Hasan et al. (2014) defined it as a mix of short-term debt, long-term debt, common stock, preferred stock, and other sources of funding used by a company for its operations and growth. Pandey (1980) defined profitability as a company's ability to make a profit, which involves comparing profitability with other factors and assessing business performance and investment strategies in relation to capital and revenue. Bauer et al. (2004) measured a company's profitability by its profits over the years. Siminica and Stefan (2011) saw profitability as the ability to generate income to cover an activity. Profitability indicators include:

- Return on total assets (ROA): Measures how much profit a company makes per dollar of assets, showing the link between profitability and assets.
- Return on equity (ROE): Measures the profit made for each dollar of equity.
- Return on sales (ROS): Analyzes profitability based on net sales, indicating the net profit earned per dollar of revenue.

This study assesses the profitability of commercial banks listed on Vietnam's stock market using ROA and ROE criteria based on data from their financial statements.

Previous research has indicated that a company's capital structure may not significantly influence its profitability. For instance, Abor's (2005) study, which analyzed data from 22 Ghana Stock Exchange companies over five years (1998–2002), used regression analysis to explore the relationship between ROE and capital structure indicators. This study found a positive connection between short-term debt and ROE but a negative link between long-term debt and ROE. It suggested that profitable companies often rely on debt for financing, but this conclusion isn't definitive and needs further investigation.

Ahmad et al. (2012) examined how capital structure affects company performance in Malaysia. They analyzed the performance of 30 publicly listed trading and service companies from 2008 to 2017, focusing on return on asset (ROA) and ROE in relation to various debt types. Their multivariate regression analysis revealed a significant connection between capital structure and company performance in the trading and service sectors. This study adds new insights, particularly in the Malaysian context.

Similarly, Singh and Bagga's (2019) research on 50 Indian Stock Exchange companies (2008–2017) investigated the impact of capital structure on profitability using various regression models. They found that capital structure significantly positively affects profitability.

Co et al. (2021) studied 18 Vietnamese-listed rubber companies (2015–2019), using regression analysis to explore the relationship between profitability and debt-to-equity ratio. They found a positive relationship with overall debt but a negative

one with long-term debt. The study also noted the influence of firm size and revenue growth on profitability.

Pham and Thu Ho (2022) focused on the seafood industry in Vietnam, analyzing 20 listed companies (2016–2020). They used panel data regression to assess how internal factors, including capital structure, affect business efficiency, measuring it through return on assets and equity.

Lastly, Dodoo et al. (2023) evaluated the impact of capital structure on the performance of 15 non-financial firms listed on the Ghana stock exchange over a decade (2008–2017). They used a generalized method of moments and ordinary least squares regression, concluding that capital structure, particularly short-term and long-term debt, generally has little impact on company performance, as measured by ROA and ROE.

3. Research models and methods

3.1. Research model

Drawing on previous research, this study proposes a model to investigate how capital structure affects the profitability of commercial banks on the Vietnamese stock market. The model is defined as follows:

$$ROA_{it} = \beta_0 + \beta_1 DA_{it} + \beta_2 SIZE_{it} + \beta_3 GROUTH_{it} + \beta_4 TANG_{it} + u_{it}$$
$$ROE_{it} = \beta_0 + \beta_1 DA_{it} + \beta_2 SIZE_{it} + \beta_3 GROUTH_{it} + \beta_4 TANG_{it} + u_{it}$$

Variable descriptions: Bank profitability is assessed using ROA and ROE:

- ROA: Calculated as Profit after Tax divided by Total Assets.
- ROE: Calculated as Profit after Tax divided by Equity.

The variables in the model are:

- DA (Debt Ratio): Total Debt divided by Total Assets. Studies suggest that debt may negatively impact both ROA and ROE (Onaolapo and Kajola, 2010; Obuobi et al., 2020; Co et al., 2021; Cuc et al., 2023).
- SIZE (Asset Size): Logarithm of Total Assets. Larger businesses are thought to have advantages over smaller ones, potentially positively affecting performance (Abor, 2005; Zeitun and Tian, 2007; Onaolapo and Kajola, 2010; Ahmad et al., 2012; Obuobi et al., 2020; Abdullah and Tursoy, 2021).
- GROWTH: Growth Rate, calculated as $(Net\ Interest\ Income_n / Net\ Interest\ Income_{n-1}) - 1$. High growth potential is believed to correlate with high operational efficiency (Zeitun and Tian, 2007; Abor, 2005; Abdullah and Tursoy, 2021).
- TANG (Asset Turnover): Measures revenue generation efficiency from assets, computed as Net Sales to Total Assets. This is expected to positively

influence business performance (Onaolapo and Kajola, 2010; Co et al., 2021).

Error component: u_{it}, where i represents the bank (1 to 19), and t represents the year (2010 to 2022).

Hypotheses are as follows:

H1: The variable DA is expected to have a negative correlation and an inverse effect on ROA and ROE (-).
H2: The variable SIZE is expected to have a positive correlation and a congruent effect on ROA and ROE (+).
H3: The variable Growth is expected to have a positive correlation and a congruent effect on ROA and ROE (+).
H4: The variable TANG is expected to have a positive correlation and a congruent effect on ROA and ROE (+).

3.2. Research data and methods

3.2.1. Research data

The research gathers data from the financial statements of 18 banks listed on the Ho Chi Minh City Stock Exchange and the Hanoi Stock Exchange, covering the period from 2010 to 2022. Some metrics are directly obtained from these statements, while others are calculated using formulas from the study. The direct metrics include ROA, ROE, Total Debt, Total Assets, Profit After Tax, and Equity Capital. The calculated indicators, namely DA, SIZE, Growth, and TANG are computed using specific formulas described earlier. The symbols and methods for measuring these variables are detailed in Table 1.

3.2.2. Research methods

This study employs several methods:

1. Descriptive statistics to summarize the data.
2. Quantitative analysis, specifically panel regression analysis, to examine data collected over time and across various banks.

3. Fixed effects model (FEM) and random effects model (REM), which are approaches to account for specific characteristics of each bank that may not be explained by the study's main variables.
4. Generalized least squares (GLS) regression method for estimating the relationships.

In the baseline panel regressions, both fixed and random effects models are used. The fixed effect model is applied under the assumption that certain unique characteristics of each bank, not covered by the main variables, do not correlate with the error term in the model.

4. Research results and discussion

4.1. Statistical results, description of variables in the model

Table 2 presents the results of descriptive statistics of the variables in the research model. Accordingly, descriptive statistics of the variables in the model show that the data of the variables in the model are relatively stable, without outliers. From a general perspective, this research data set is suitable for the research objectives. The results in Table 2 show that the average value of ROA is 1.102, and the average value of ROE for commercial banks in Vietnam is 13.286 during the period 2010-2022. There is a significant difference in ROE among banks, with the highest ROE bank reaching 30.33, while the lowest ROE bank only achieves 0.07. This is because larger commercial banks have the advantage of scale in capital and human resources, which enables them to generate much higher ROE than smaller banks. The average value of DA is 0.92, indicating that banks use relatively high levels of debt or capital mobilization. The average GROWTH of banks during the period 2010-2022 is 0.23, and the average SIZE is 19.064.

After looking at the variables in the research model through the correlation matrix (Table 3) and checking the exaggerated multiplier factor (VIF), there is no multicollinearity phenomenon (Table 4).

Table 1: Summary of variables in the research model

Variable name	Symbol	Measure	Expectation	Inheritance research
Return on total assets	ROA	Profit after tax/Total assets		
Return on equity	ROE	Profit after tax/Equity		
Debt ratio	DA	Total debt/Total assets	(-)	Onaolapo and Kajola (2010), Obuobi et al. (2020), Aggarwal and Padhan (2017), and Ha et al. (2023)
Asset size	SIZE	Logarithm of total assets	(+)	Abor (2005), Zeitun and Tian (2007), Onaolapo and Kajola(2010), Ahmad et al. (2012), and Aggarwal and Padhan (2017)
Growth	GROWTH	$(Net\ Interest\ Income_n/Net\ Interest\ Income_{n-1}) - 1$	(+)	Zeitun and Tian (2007), Abor (2005), and Aggarwal and Padhan (2017)
Asset turnover	TANG	Net interest income/Total assets	(+)	Onaolapo and Kajola (2010)

4.2. Estimation and analysis of the study

The regression outcomes for the models are presented in Table 5. The Hausman test is employed

to determine the most appropriate model. The results of the Hausman test indicate a Chi-Square statistical value of 112.29 and a Prob. Chi-Square value of 0.000. From these results, since the

probability is less than 5%, the null hypothesis H0 (which suggests no correlation between random errors and the independent variable) is rejected. This leads to the acceptance of the alternative hypothesis H1 in the Hausman test, indicating that the FEM is suitable for this research. Consequently, the study will use the fixed-effects regression model for analyzing the results. Additionally, the study will perform tests to check for potential issues in the hypothesis, such as constant error variance and autocorrelation of errors.

Table 2: Descriptive statistics of variables in the model

Observed variables	Definition	Number of observations	The average value	Standard deviation	The lowest value	The highest value
ROA	Return on total assets	216	1.102	0.741	0.01	3.58
ROE	Return on equity	216	13.286	7.666	0.07	30.33
DA	Total debt/Total assets	216	0.920	0.0556	0.75	1.30
GROWTH	Asset turnover	216	0.230	0.157	-0.55	0.99
TANG	Total debt/Total assets	216	0.043	0.128	0.00035	1.00
SIZE	Asset size	216	19.064	1.046	16.309	21.474

Table 3: Correlation coefficients between variables in the research model

	ROA	DA	GROWTH	TANG	SIZE
ROA	1				
DA	-0.4475	1			
GROWTH	0.3733	-0.2883	1		
TANG	0.2023	-0.0122	-0.0023	1	
SIZE	0.1691	0.1675	-0.1082	-0.2409	1
	ROE	**DA**	**GROWTH**	**TANG**	**SIZE**
ROE	1				
DA	-0.2253	1			
GROWTH	0,3558	-0.2883	1		
TANG	0.2477	-0.0122	-0.0023	1	
SIZE	0.3364	0.1675	-0.1082	-0.2409	1

Table 4: Magnification multiplier

Observed variables	VIF	1/VIF
DA	1.11	0.89
GROWTH	1.10	0.91
TANG	1.10	0.91
SIZE	1.06	0.94
MEAN VIF	1.09	

Table 5: Regression results and Hausman test

Observed variables	Dependent variable ROA		Dependent variable ROE	
	FEM	REM	FEM	REM
Constant	-3.12**	-1.913**	-67.307***	-52.850***
DA	-4.062***	-4.309***	-17.279**	-20.547***
GROWTH	1.457***	1.418***	17.165***	16.918***
TANG	2.103***	1.975***	23.401***	22.859***
SIZE	0.394***	0.343***	4.792***	4.194***
Number of observations	216	216	216	216
R^2 correction	44.49%	44.22%	36.31%	35.94%
Hausman Test	0.0379			0.0634

***: $p< 0.01$; **: $p < 0.05$

The outcome of the White test for constant error variance showed a Prob. Chi-Square value of 0.000, which is below the 5% threshold. Similarly, the Breusch-Godfrey test for error autocorrelation yielded a Prob. F value of only 0.0001, also below 5%. These results indicate that the model exhibits both variability in error variance and error autocorrelation. According to Wooldridge (2002), in cases where there is changing error variance and autocorrelation of errors, the appropriate solution is to use a regression model that employs the General Least Squares (GLS) method. The results of applying the GLS method to estimate the regression coefficients are displayed in Table 6.

Table 6: Results of model regression by GLS method

Observed variables	Observed variables	
	ROA	ROE
Constant	-3.12***	-52.850***
DA	-4.062**	-20.547***
GROWTH	1.457***	16.918***
TANG	2.103***	22.859***
SIZE	0.394***	4.194***
Observed variables	216	216
R^2 correction	44.49%	35.94%

***: $p< 0.01$; **: $p < 0.05$

The variable DA negatively affects the ROA and ROE of commercial banks listed on the Vietnam stock market. This finding aligns with the hypothesis' expectations. It is statistically significant at the 1% level for ROE and the 5% level for ROA.

This result is in full agreement with the research conducted by Onaolapo and Kajola (2010).

4.3 Discussion

The study utilizes the GLS method for its regression analysis. The findings indicate that variables such as the DA, SIZE, GROWTH, and TANG significantly explain changes in the ROA and ROE of commercial banks in Vietnam. These results align with the expectations and are supported by previous research (Obuobi et al., 2020; Nguyen et al., 2023).

Specifically, an increase in the DA, while other factors remain constant, is found to decrease the profitability of commercial banks. This outcome, which suggests that excessive debt with high costs can reduce overall profits, is a common challenge faced by many businesses in general (Mwangi et al., 2014; Obuobi et al., 2020).

In terms of the DA, its negative impact on profitability is consistent with the current trends in the Vietnamese banking sector. Regarding the growth variable, it positively influences both ROA and ROE, which is statistically significant at the 1% level. This finding corroborates the studies of Zeitun and Tian (2007), Abor (2005), Aggarwal and Padhan (2017), and Abdullah and Tursoy (2021). It reflects the operational reality that banks with higher growth potential tend to have better operational efficiency due to their ability to generate returns on investment.

The TANG variable also shows a positive impact on both ROA and ROE, in line with the hypothesis and significant at the 1% level. This is consistent with Onaolapo and Kajola's (2010) research, and it aligns with the operational practices of Vietnamese commercial banks, where higher TANG boosts bank performance.

Lastly, the SIZE variable positively affects ROA and ROE, confirming the hypothesis and significant at the 1% level. This aligns with studies by Abor (2005), Zeitun and Tian (2007), Onaolapo and Kajola (2010), Ahmad et al. (2012), and Abdullah and Tursoy (2021), indicating that larger banks tend to have advantages leading to higher profits.

5. Conclusions and recommendations

5.1. Conclusion

This study analyzes data from commercial banks listed on Vietnam's stock market from 2010 to 2022 to understand how capital structure influences their profitability. The findings indicate a significant effect of capital structure on the profitability of these banks in Vietnam. Specifically, the DA negatively impacts the profitability of commercial banks listed on the Vietnamese stock market. In contrast, the GROWTH, TANG, and SIZE positively affect their profitability. The research highlights that improper use of capital structure can significantly affect a company's profitability. The results of this research provide a scientific foundation for commercial banks in Vietnam to make informed decisions that enhance profitability and operational efficiency.

5.2. Recommendations

This study finds that the way debt is used can significantly influence the profitability of banks. Consequently, commercial banks should consider various strategies to enhance their capital. One method is to use annual dividend sources to increase capital for the next year, including paying dividends in the form of shares, depending on the bank's financial situation and capabilities.

Banks could also consider issuing shares to the public. In situations where state shareholders are unable to purchase these shares, banks should actively seek other investors and minority shareholders, including offering preferred shares to employees, to raise capital. Although increasing capital by issuing additional shares to current or new investors and attracting strategic foreign investors can be challenging in the short term, success depends on investor interest and market conditions.

In terms of banking operations, interest rates are a crucial tool for capital creation through economic mobilization. However, the effectiveness of this tool may vary over time and is influenced by competitive and regulatory constraints. Rather than relying solely on interest rates, banks should focus on improving service quality.

Additionally, commercial banks should aim to increase SIZE and net revenue, enhancing profitability. For policymakers, it's important to understand and assess the capital structure of enterprises to develop policies that support the growth of Vietnamese commercial banks. For investors evaluating bank profitability, considering the capital structure, alongside other market factors, is crucial for making informed investment decisions.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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