

The impact of macroeconomic factors and capital structure on the profitability of listed commercial banks in Vietnam: Evidence from the PCSE method



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ABSTRACT

This study examines the impact of macroeconomic factors and capital structure on the profitability of listed commercial banks in Vietnam during the period 2014–2024. The study uses a balanced panel dataset of 15 listed commercial banks in Vietnam. Bank-level data were collected from the annual financial statements of the banks, while macroeconomic data were obtained from the General Statistics Office and the State Bank of Vietnam. The Panel-Corrected Standard Errors (PCSE) method was applied to address heteroskedasticity and cross-sectional dependence among banks. Return on assets (ROA) was used as the dependent variable to measure bank profitability, while the independent variables included GDP growth (GDP), money supply (M2), policy interest rate (RIR), capital structure (TLEV), and bank size (SIZE). The findings indicate that GDP, M2, and TLEV negatively affect ROA, whereas RIR and SIZE have positive effects on profitability. Inflation (INF) was not significant in the original PCSE model; however, it became significant when lagged effects were included. This study contributes to the literature by providing recent empirical evidence using the PCSE approach to clarify the effects of macroeconomic and internal factors on the profitability of listed commercial banks in Vietnam, and it offers recommendations to improve banking operational efficiency.

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1. Introduction

The banking sector plays an important role in enhancing economic growth and financial stability through three core functions, which include mobilizing funds, allocating credit, and supporting investment activities in the economy. In the context of a rapidly growing market such as Vietnam, the profitability of commercial banks not only reflects their performance but is also an important indicator of the health and stability of the national financial system (Nguyen, 2022).

Macroeconomic factors such as GDP growth, money supply, inflation, and policy interest rates directly impact bank profitability via channels such as credit demand, capital costs, and net interest margins. For example, a rapid economic growth can

expand lending opportunities while increasing credit risk at the same time; similarly, expansionary or contractionary monetary policy (via M2 and RIR) may also impact profitability through funding costs and interest rate spreads. Regarding bank-specific characteristics, capital structure and bank size are both considered to play an important role in maintaining profitability and risk tolerance, in which high leverage not only helps commercial banks expand operations but also increases financial costs and liquidity risk, while larger size allows commercial banks to exploit economies of scale, diversify income sources and enhance operational efficiency (Dietrich and Wanzenried, 2011).

Based on this background, the research focuses on analyzing the impact of macroeconomic factors and capital structure on the profitability of listed commercial banks in Vietnam from 2014 to 2024, using the PCSE estimation method to ensure the reliability of the estimation results.

2. Literature review

The relationship between bank capital and bank profitability has been debated over time with three

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distinct points of view, which are (i) capital has no effect on bank value (Modigliani and Miller, 1958); (ii) excessive capital can reduce bank value and profitability (Jensen, 1986); and (iii) excessive capital can enhance bank value and profitability (Berger and Bouwman, 2013). At the same time, macroeconomic factors are also considered important determinants that impact bank profitability, since commercial banks are financial intermediaries that are affected by both the economic cycle and the monetary policy environment. Therefore, the relationship between capital structure, macroeconomic factors, and bank profitability remains an important empirical research topic across countries and periods.

First of all, Demirgüç-Kunt and Huizinga (1999), using data from 80 countries during 1988–1995, illustrated that capital structure, such as equity and operational costs, as well as macroeconomic factors such as inflation and institutional environment, significantly impact bank profitability. Subsequently, Athanasoglou et al. (2008) studied Greek banks during 1985–2001, emphasizing that bank-specific factors (except size) significantly affect profitability, confirming that capital structure has an impact on bank profitability; meanwhile, the strong effect of GDP and inflation on profitability is also confirmed in the study. These studies conclude that bank profitability is affected by both internal and external factors. Sousa and Almeida (2025) systematized the factors affecting bank profitability by analyzing 634 studies over 54 years, confirming that internal factors such as size, capital, liquidity, and external factors such as GDP and inflation have a significant impact on profitability fluctuations.

However, empirical studies do not have a consensus on the conclusion of capital impact. Some studies conclude that capital has a negative impact on bank profitability. Tan and Floros (2012), using Chinese bank data during 2003–2009, indicated a negative relationship between GDP growth and profitability, indicating that in emerging economies, high growth does not necessarily improve bank efficiency; while higher capital levels were shown to be associated with lower profitability. Similarly, Horobet et al. (2021) in Central and Eastern Europe report that capitalization (as a proxy for capital structure) negatively affects profitability; at the same time, macro factors such as unemployment and inflation were also concluded to have an inverse relationship with bank profitability, reflecting the high sensitivity of banking systems to both internal and macro factors in the context of a transitional economy.

On the contrary, a number of studies have shown a positive relationship between capital and profitability. Saif-Alyousfi (2022), analyzing 47 Asian countries during 1995–2017, found that capitalization positively affects profitability; at the same time, GDP, inflation, high interest rates, and a high level of financial development also support bank performance. Flamini et al. (2009) showed that in Sub-Saharan Africa, profitability increases in large,

diversified, and privately owned banks; at the same time, macroeconomic variables such as low inflation and stable growth also support profitability. Similarly, Paukmongkol (2024) for Thailand finds that CAR, GDP, and inflation contribute positively to bank profitability, confirming the influence of capital structure and macroeconomic factors. Rahman et al. (2020) for Pakistan find a strong positive effect of CAR on profitability, emphasizing the importance of capital structure; however, macro variables such as interest rates, industrial production, and liquidity have negative effects, reflecting the sensitivity of banks to economic conditions. Hoxha et al. (2025) for the Western Balkans conclude that equity capital positively influences profitability, confirming the important role of capital structure; at the same time, macroeconomic variables such as inflation and GDP have a multidimensional impact on profitability.

Although the international literature provides a rich theoretical foundation and empirical evidence on determinants of bank profitability, there are still some limitations:

- Institutional differences across banking systems. Most of the previous studies (Demirgüç-Kunt and Huizinga, 1999; Athanasoglou et al., 2008; Flamini et al., 2009) were conducted in developed countries or stable banking systems. Thus, it would be difficult to transfer their results fully to emerging economies such as Vietnam, where monetary policy, competition level, and the role of the State in banking activities are still very different.
- Lack of uniformity in measurement and methods. Previous studies use diverse profitability indicators (ROA, ROE, NIM) or inconsistent capital structure measurements (debt ratio, D/E ratio). This leads to a lack of comparability and synthesis of results, making it difficult to generalize the relationships.
- Technical problems in econometric models. Traditional regression models (Pooled OLS, Fixed Effect, Random Effect) in many prior studies do not fully address issues such as autocorrelation, heteroscedasticity and cross-sectional dependence. This can distort the estimated coefficients and lead to inaccurate conclusions. Some recent studies (Paukmongkol, 2024) have overcome this limitation with more advanced methods, but such approaches remain less common in studies of developing countries.
- Insufficient consideration of recent global shocks. Many studies end in 2019 and have not reflected the COVID-19 and post-COVID period, during which macroeconomic factors and banks' capital structures fluctuated significantly. This makes the empirical evidence not up-to-date enough to reflect the latest conditions of financial markets.

Based on theoretical review and empirical evidence, this study proposes the following specific hypotheses regarding the relationships among

macroeconomic factors, capital structure, and profitability of Vietnamese listed commercial banks:

H1: Economic growth (GDP) has a positive effect on bank profitability (ROA). This aligns with Demirgüç-Kunt and Huizinga (1999), Athanasoglou et al. (2008), and Saeed (2014). That is, an increase in economic activity will lead to higher credit demand, thereby improving asset utilization efficiency and increasing bank profitability. Therefore, it is expected that an increase in GDP will increase bank ROA.

H2: Inflation (INF) has a significant effect on bank profitability (ROA). According to Flamini et al. (2009), high inflation increases operating costs and credit risk, negatively affecting profitability. However, some other studies, such as Saif-Alyousfi (2022), suggested that the impact of inflation depends on the bank's ability to adjust interest rates.

H3: Money supply (M2) has a positive effect on bank profitability. According to Sousa and Almeida (2025), increased money supply improves liquidity in the banking system, enabling credit expansion and higher profits.

H4: Policy interest rate (RIR) has a negative effect on bank profitability. Alexiou and Sofoklis (2009) and Rahman et al. (2020) indicated that when interest rates rise, funding costs increase, and interest spreads may compress, reducing bank profitability.

H5: Capital structure (TLEV) has a negative effect on bank profitability. Following traditional capital structure theory (Modigliani and Miller, 1958; Berger and Bouwman, 2013), high debt helps banks expand their scale of operations, but at the same time increases interest expenses and financial risks. Empirical works (Saif-Alyousfi, 2022) also suggested that high leverage reduces profitability due to increased funding costs and reduced capital efficiency. Thus, the study expects that TLEV has a negative impact on ROA.

H6: Bank size (SIZE) has a positive effect on bank profitability. Large banks can take advantage of economies of scale, reduce marginal costs, and increase profits. This hypothesis is consistent with the research of Athanasoglou et al. (2008), Petria et al. (2015), and Paukmongkol (2024).

The selected variables are consistent with the theoretical framework of Flamini et al. (2009) and recent extensive studies, reflecting the relationship among macroeconomic factors, capital structure, and profitability in Vietnamese listed commercial banks.

3. Research methods

3.1. Research data and model specification

The study uses panel data compiled from audited annual financial statements of listed commercial banks in Vietnam for 2014–2024. The dataset is constructed based on audited financial statements prepared under Vietnamese accounting standards, considered a balanced panel dataset as each of the

15 listed banks has complete observations for the entire 11-year period, resulting in 165 bank-year observations.

The study uses the Panel-Corrected Standard Errors (PCSE) method following Beck and Katz (1995) in order to overcome heteroskedasticity, autocorrelation, and cross-sectional dependence. This method ensures reliable standard errors, improving the accuracy of estimates and the ability to interpret results, thereby accurately reflecting the impact of macroeconomic factors and capital structure on the profitability of banks. The specific research model is as follows:

$$ROA_{it} = \beta_0 + \beta_1 \times GDP_t + \beta_2 \times INF_t + \beta_3 \times M2_t + \beta_4 \times RIR_t + \beta_5 \times TLEV_{it} + \beta_6 \times SIZE_{it} + \varepsilon$$

where, dependent variable in the model is ROA (ROA is measured as after-tax profit divided by total assets for each of the 15 listed commercial banks). The group of independent variables in the model includes:

- GDP: annual growth rate of Gross Domestic Product of Vietnam (%)
- INF: annual change of Consumer Price Index of Vietnam (%)
- M2: growth rate of money supply M2 (%)
- RIR: annual average of State Bank policy interest rate (%)
- TLEV: bank i's capital structure. TLEV is measured by total liabilities over total assets
- SIZE: bank i's size. SIZE is measured by the log of total assets

3.2. Scale test

The descriptive statistics results are presented in Table 1. Table 1 illustrates that all variables have reasonable distributions and no serious outliers are observed. The dependent variable ROA shows that some banks experienced losses during the study period.

Table 1: Descriptive statistics

Variable	Obs	Mean	SD	Min	Max
ROA	165	.011	.009	-.043	.032
GDP	165	.060	.017	.026	.080
INF	165	.029	.009	.006	.041
M2	165	.125	.037	.062	.184
RIR	165	.055	.010	.040	.065
TLEV	165	.917	.029	.829	.959
SIZE	165	8.530	.421	7.566	9.441

4. Research results

4.1. Model selection and diagnostic tests

The FEM, REM estimations, and Hausman test are used to select the most suitable model for the research (as presented in Appendices A, B, and C). However, due to the existence of heteroskedasticity, autocorrelation, and cross-sectional dependence, the PCSE method is employed as the main estimation

approach. The signs and statistical significance of all variables across FEM, REM, and PCSE are consistent, which strengthens the robustness of the results. Therefore, the regression results estimated by the PCSE approach are presented in Table 2.

4.2. Baseline PCSE regression results

According to Table 2, the model has an R-squared = 0.7032, which means that approximately 70.3% of the variation in ROA is explained by the independent variables. The Wald test (chi2 = 107.20, Prob =

0.000) confirms that the model is statistically significant.

4.3. Interpretation of baseline regression coefficients

GDP (Coefficient = -0.0886775, p = 0.034): Statistically significant at the 5% level. When GDP growth increases, banks may face higher funding costs and higher competitive pressure, which reduces ROA. This result reflects the cyclical characteristic of banking profitability in Vietnam.

Table 2: Regression results with PCSE

ROA	Coefficient	PCSE SE	t	p-value	95% confidence interval
GDP	-0.089	0.042	-2.12	0.034	[-0.171, -0.007]
INF	0.013	0.030	0.44	0.663	[-0.047, 0.074]
M2	-0.049	0.016	-3.16	0.002	[-0.080, -0.019]
RIR	0.220	0.089	2.47	0.014	[0.045, 0.396]
TLEV	-0.153	0.022	-6.88	0.000	[-0.197, -0.109]
SIZE	0.007	0.001	5.05	0.000	[0.004, 0.009]
Constant	0.089	0.023	3.91	0.000	[0.044, 0.134]

Model statistics: R² = 0.7032; Wald $\chi^2(6)$ = 107.20; Prob > χ^2 = 0.0000

INF (Coefficient = 0.0134006, p = 0.663): Statistically insignificant. This suggests that inflation does not have a significant impact on profitability, maybe because banks change their interest rates in alignment with price fluctuations. M2 (Coefficient = -0.0493187, p = 0.002): Statistically significant at the 1% level. This means that excessive money supply may lead to inflationary pressure and a decrease in banks' net interest margins. RIR (Coefficient = 0.220384, p = 0.014): Statistically significant at the 5% level. This means that higher policy interest rates may enhance banks' net interest income, especially when the lending–deposit interest rate spread widens. TLEV (Coefficient = -0.1532224, p = 0.000): Statistically significant at the 1% level. A higher leverage ratio may lead to an increase in interest expenses and financial risk, therefore reducing profitability. SIZE (Coefficient = 0.0071604, p = 0.000): Statistically significant at the 1% level. This means that larger commercial banks have advantages in diversification, economies of scale, and therefore achieve higher ROA. In summary, the variables that significantly impact bank profitability (ROA) are GDP, M2, RIR, TLEV, and SIZE. GDP, M2, and TLEV have negative effects on ROA, while RIR and SIZE have positive effects on ROA.

Fig. 1 illustrates the comparison of regression coefficients between FE and PCSE. After selecting the fixed effects model (FE) by the Hausman test (chi2(2) = 12.24; p = 0.0022), the study estimated the main model by using FE robust, and Panel Corrected Standard Errors (PCSE) method, which tests for heteroskedasticity, cross-sectional correlation, and AR(1) serial correlation within each bank.

4.4. Robustness analysis and model comparison

The results conclude that the model is statistically significant in both methods, in which the

result of FE robust is F(6,144) = 15.65, p < 0.01, while the result of PCSE is Wald chi2(6) = 107.20, p < 0.01. The FE model shows R² within \approx 0.49, while the PCSE estimation shows R² \approx 0.7032, indicating an improvement in explanatory power when adjusting both vertical and horizontal error dependencies in the panel data at the same time, thereby improving the reliability of the PCSE model compared to the traditional FE model.

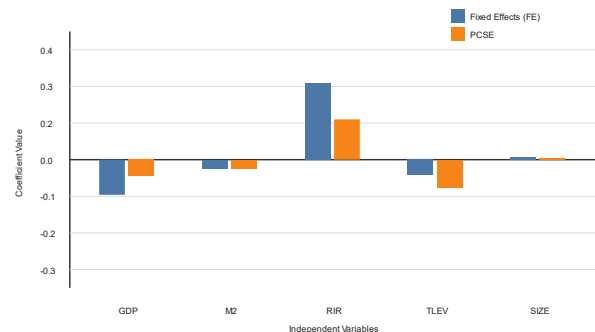


Fig. 1: Comparison of regression coefficients: FE vs PCSE

The result of the PCSE regression model after excluding INF is presented in Appendix D. The result concludes that after removing the variable INF (which was statistically insignificant), all the variables GDP, M2, RIR, TLEV, and SIZE have the same signs and statistical significance as in the original model, confirming the stability and reliability of the results. Fig. 2 illustrates the PCSE model coefficients with 95% Confidence Intervals, confirming that RIR has the highest positive coefficient while TLEV has the highest negative coefficient. Thus, excluding the INF variable helps simplify the model without altering the nature of the relationships between the factors and bank profitability. The model is therefore more efficient and stable for explaining the determinants of bank profitability.

Regression function:

$$ROA = 0.0877093 - \beta_1 \times 0.0896604 - \beta_2 \times 0.0492444 + \beta_3 \times 0.2248059 - \beta_4 \times 0.1528928 + \beta_5 \times 0.0072941$$

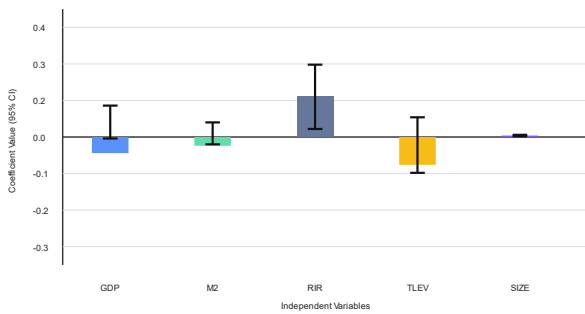


Fig. 2: PCSE model coefficients with 95% confidence intervals

4.5. Lagged effects of macroeconomic variables

The result of the PCSE regression model with lagged variables is presented in Table 3. Table 3 indicates that the model has an R-squared = 0.6365 and Prob > chi2 = 0.0000, confirming that the model is statistically significant overall. All variables are estimated using the Panel Corrected Standard Errors (PCSE) method for heteroskedasticity and cross-sectional dependence, therefore ensuring the reliability of results for the balanced panel dataset.

4.5.1. Current macroeconomic effects

GDP (-0.764) has a negative and significant impact (p = 0.000). This shows that during periods of strong economic growth, banks' ROA tends to decline slightly, possibly due to increased credit competition and rising funding costs in economic booms. INF (0.983) has a positive and significant impact (p = 0.000), showing that moderate inflation can help banks raise nominal interest income, thereby improving profitability. M2 (-0.250) has a negative and significant impact (p = 0.000). This means that an excessive money supply can decrease

the net interest margin (NIM). RIR (1.184) has a strong positive and significant impact (p = 0.000). This means that higher policy interest rates may reflect an effective credit environment, therefore enhancing bank profitability.

4.5.2. Lagged macroeconomic effects

L.GDP (-1.266) remains negative and significant (p = 0.000), showing that the negative effects of rapid economic growth may influence the result of the following period, which reflects the policy lag in the credit cycle.

L.INF (0.474) remains positive and significant, showing that inflation in the previous period may improve current profitability, which means that commercial banks respond slowly to price changes.

L.M2 (-0.447) shows a strong negative effect, suggesting that monetary expansion tends to reduce ROA in the following period.

L.RIR (1.658) shows the strongest positive effect (p = 0.000), highlighting the lagged effect of policy interest rate in enhancing net interest margins.

TLEV (-0.155) has a negative and significant impact, showing that high leverage may reduce profitability.

SIZE (0.0063) has a positive and significant impact, showing that larger banks have advantages in cost control and management.

The results of the Testing lagged effect Wald Test (Appendix E) conclude that the lagged macroeconomic variables have a significant overall impact on ROA. In other words, macroeconomic factors not only influence bank profitability in the current period but also extend their effects into the subsequent period, reflecting the relatively slow response of the Vietnamese banking system to macroeconomic shocks. Thus, the PCSE model with lagged variables is considered the optimal model, as it effectively captures the delayed transmission of macroeconomic policies to the profitability performance of commercial banks.

Table 3: PCSE regression with lagged variables

Variable	Coefficient	PCSE SE	t	p-value	95% confidence interval
GDP	-0.764	0.113	-6.78	0.000	[-0.985, -0.543]
L.GDP	-1.266	0.212	-5.96	0.000	[-1.680, -0.850]
INF	0.983	0.159	6.16	0.000	[0.670, 1.296]
L.INF	0.474	0.084	5.67	0.000	[0.309, 0.638]
M2	-0.249	0.050	-4.96	0.000	[-0.348, -0.151]
L.M2	-0.446	0.077	-5.78	0.000	[-0.597, -0.295]
RIR	1.184	0.164	7.23	0.000	[0.863, 1.505]
L.RIR	1.658	0.282	5.88	0.000	[1.106, 2.211]
TLEV	-0.155	0.024	-6.38	0.000	[-0.203, -0.107]
SIZE	0.006	0.001	5.06	0.000	[0.004, 0.009]

Model statistics: R² = 0.6365; Wald $\chi^2(10)$ = 233.07; Prob > χ^2 = 0.0000

4.6. Combined effects analysis

According to Table 4, GDP + L.GDP has a negative combined effect, indicating that high economic growth reduces banks' ROA in the short and medium term. INF + L.INF shows a positive combined effect, suggesting that a stable inflation rate supports profitability. M2 + L.M2 has a negative effect,

meaning that an increase in money supply may reduce profitability, especially when liquidity becomes excessive. RIR + L.RIR has the strongest positive impact on ROA in both the current and following periods.

Results from the Lincom tests show that all four macroeconomic factors (GDP, INF, M2, and RIR) have strong and statistically significant cumulative effects

($p < 0.01$). This confirms that macroeconomic variables not only impact in the current period but also remain impactful in the following period, confirming the policy lag.

Overall, all macroeconomic variables have a significant and sustainable cumulative impact on ROA, while the policy interest rate (RIR) has the strongest effect. The PCSE model with lagged variables accurately reflects the transmission cycle of monetary policy, credit conditions, and bank profitability in Vietnam.

Table 4: Test of combined effects

Combined effect	Coefficient	SE	t	p-value
GDP + L.GDP	-2.030	0.322	-6.31	0.000
INF + L.INF	1.457	0.242	6.01	0.000
M2 + L.M2	-0.196	0.031	-6.42	0.000
RIR + L.RIR	2.842	0.427	6.65	0.000

4.7. Final estimated model

The model with lagged policy effects is used for the official conclusion of the study:

$$ROA = 0.0478048 - \beta_1 \times 2.030381 + \beta_2 \times 1.456935 - \beta_3 \times 1.963297 + \beta_4 \times 2.841783 - \beta_5 \times 1.549837 + \beta_6 \times 0.06281$$

The coefficients of macroeconomic variables in the lagged-effect model reflect the cumulative impact of explanatory variables over time. This result shows the combined impact of current-year variables and one-period lagged variables on bank profitability.

Therefore, considering both immediate and lagged effects is essential to accurately capture the influence of macroeconomic factors on banking profitability in Vietnam.

5. Discussion

GDP (coefficient = -2.030381): The impact is negative and significant on ROA; this means that when GDP increases by one unit, ROA decreases by an average of 2.030381 units, assuming other factors remain constant. However, this result does not imply that ROA decreases immediately; instead, it reflects the cumulative effect. This impact has a relatively high coefficient compared to the GDP coefficient that is collected from the original PCSE model, reflecting the persistent influences of macroeconomic factors on banks' performance. The result illustrates that economic expansion may lead to an increase in credit and therefore rising non-performing loans, as a result, decreasing the profitability. Due to the credit growth management policy of the SBV in the context of the Vietnamese economy during the study period, GDP growth does not fully lead to bank profit growth. This can be explained by credit competition and narrowing profit margins among commercial banks, which GDP growth may create "reverse competition" in the short term. This result is consistent with the results of [Tan and Floros \(2012\)](#), who suggested that rapid growth can reduce margins as a result of increased interest rate

competition and credit risk. The coefficient of INF (1.456935). The impact is positive and significant on ROA, which means that when the inflation increases by one unit, ROA increases by an average of 1.456935 units. The INF variable in the PCSE model is not statistically significant, suggesting that its short-term effect on ROA remains unclear. However, when lagged effects are considered, the variable becomes significant at the 5% level, reflecting that inflation can influence bank profitability via indirect channels such as lending rates, cost of capital, and credit quality, with a lag of approximately 1–2 years. Regularly, inflation increases the cost of capital and the cost of living immediately, but in reality, banks can adjust lending interest rates with a suitable lag due to contractual constraints and the monetary policy of the SBV. This result is consistent with the results of [Mashamba and Chikutuma \(2023\)](#).

The coefficient of M2 (-0.1963297). The impact is negative and significant on ROA; it means that when the money supply increases by one unit, ROA decreases by an average of 0.1963297 units, assuming other factors remain constant. The result may reflect that an increase in money supply reduces lending margins. As commercial banks have to lower interest rates to attract customers, net interest income may decrease, thereby lowering profitability. This reflects a characteristic of the Vietnamese economy where excessive money supply expansion may decrease credit quality or put pressure on inflation in the following period. This result is consistent with the research of [Athanasoglou et al. \(2008\)](#). The coefficient of RIR (2.841783). The impact is positive and significant on ROA; it means that when the policy interest rate increases by one unit, ROA increases by an average of 2.841783 units, assuming other factors remain constant. The result may be because commercial banks tend to adjust lending rates more rapidly than deposit rates, therefore widening commercial banks' profitability. This is consistent with findings by [Flamini et al. \(2009\)](#) and [Korytowski \(2018\)](#). However, this impact in the Vietnamese context may not fully reflect market mechanisms like other developed economies. The range of interest rate adjustments varies over different periods.

The coefficient of TLEV (-0.1549837). The impact is negative and significant on ROA, which means that when the leverage increases by one unit, ROA decreases by an average of 0.1549837 units, assuming other factors remain constant. This result emphasizes the need for banks to keep the capital structure well-balanced by using debt strategically to increase lending while maintaining financial stability. This result is consistent with the traditional capital structure theory of [Modigliani and Miller \(1958\)](#) and the result of [Berger and Bouwman \(2013\)](#), which shows that high financial leverage may increase financial expenses and risk of bankruptcy, therefore decreasing ROA. In the Vietnamese context, strict capital adequacy regulations and Basel requirements make maintaining high financial leverage more cautious.

This result provides evidence that in emerging economies, financial leverage can be more detrimental for ROA than in developed economies

The coefficient of SIZE (0.006281). The impact is positive and significant on ROA; it means that when the bank size increases by one unit, ROA increases by an average of 0.006281 units, assuming other factors remain constant. This may be because larger banks can take advantage of economies of scale and greater market power, which allows them to maintain higher margins. This result is consistent with the conclusion of Demirgüç-Kunt and Huizinga (1999) and Menicucci and Paolucci (2016).

As a result, the coefficients of macroeconomic variables in the model of lagged effect reflect the cumulative impact of explanatory variables over time. This result shows the combined impact of current-year variables and one-period lagged variables on a bank's profitability.

The research is based on data collected from listed commercial banks in Vietnam from 2014 to 2024, providing the empirical result of the impact of macroeconomic factors (GDP, INF, M2, RIR) and bank-specific characteristics (TLEV, SIZE) on profitability (ROA). The research emphasizes the need of implementing appropriate recommendations at both policy level and bank management level in order to maximize operational efficiency, enhance the competitiveness and ensure the safety and stability of the financial system in the long term.

First, at the policy level, the State Bank of Vietnam (SBV) should adjust monetary policy in a flexible manner, which synchronizes money supply (M2) and policy interest rate (RIR) to ensure liquidity while maintaining a suitable interest rate gap for commercial banks.

- The SBV should maintain the money supply at an appropriate level, avoiding excessive money supply, which may lead to liquidity surplus and decrease in lending margins. The results show that M2 has a negative effect on ROA, which means that when the system liquidity is excessive, market interest rates tend to decline, therefore reducing lending profit margins.
- The SBV should adjust the policy interest rate with the aim of balancing growth and financial stability. The result shows that RIR positively impacts ROA; therefore, adjusting this rate appropriately may help commercial banks expand their interest rate margins and improve profitability. However, these adjustments should be made in alignment with other refinancing operations or open market operations to prevent cost-of-capital shocks for businesses. At the same time, a flexible monetary policy with a reasonable lag should be applied, and coordinated with fiscal policy to support economic growth as well as control inflation and credit risks, therefore sustaining banking profitability.
- The SBV should encourage commercial banks to maintain the minimum level of CAR and apply Basel III standards to minimize systemic risk when financial leverage increases.

- The SBV should develop digital banking to increase cost efficiency, diversify non-interest income sources, and strengthen capital capacity according to Basel standards.
- The SBV should apply liquidity sterilization measures when the economy is overheating. At the same time, establishing a warning mechanism when the money supply increases faster than actual credit growth, while strengthening reporting requirements for market risk and interest rate risk.

Second, at the commercial banks' management level,

- Banks should focus on expanding their scale while using financial leverage effectively by avoiding excessive borrowing. In addition, commercial banks should maintain a suitable level of capital of equity. As TLEV has a negative impact on ROA, commercial banks need to restructure their capital by increasing equity capital and limiting excessive borrowing. Besides, banks should reduce dependence on high-cost short-term capital while increase issuing shares or bonds instead of short-term interbank borrowing. At the same time, they should monitor closely banks with high leverage ratios during periods of instability.
- Large banks should take advantage of economies of scale, focusing on digital transformation, product diversification, and operating costs optimization. Smaller banks should enhance partnerships or mergers with larger banks to expand their scale. However, this expansion process must be carefully controlled in order to avoid liquidity risks and financial imbalances during macroeconomic fluctuations.
- Since GDP and M2 have cyclical effects, banks should construct a profit forecasting model based on economic cycles while increasing loan loss provisions during periods of rapid growth. Inflation has a lagged effect, so banks need to improve their inflation forecasting capabilities, adjust the asset-liability maturity structure more flexibly, and increase the proportion of floating-rate assets.

6. Conclusion

This research analyzes the impact of macroeconomic factors and bank internal factors on the profitability of listed commercial banks in Vietnam from 2014 to 2024 using the PCSE method. The results indicate that the effects of macroeconomic variables are dynamic and dependent on lag structures. The capital structure has a significantly negative impact on bank performance, while bank size shows a positive effect. Specifically, the empirical evidence supports hypotheses H1, H3, H4, H5, and H6 (in which GDP, M2, and TLEV are supported with negative signs, whereas RIR and SIZE are supported with positive signs); H2 is supported with a positive effect when

lagged values are considered. Therefore, it is important to consider both the immediate and combined lag effects in order to fully capture the influence of macroeconomic variables. Not all macroeconomic shocks are transmitted directly to bank profitability. This study contributes empirical evidence from an emerging market context like Vietnam by combining the PCSE method with a distributed lag framework, reflecting the current characteristics of the Vietnamese banking industry and emphasizing the need for coordinated monetary and bank management policies. The findings confirm the importance of maintaining capital structure in an appropriate way, maintaining a well-balanced monetary policy, and maximizing operational scale. In addition, it is necessary to maintain an appropriate CAR level and promote the process of applying Basel III standards to maintain liquidity and minimize risks while enhancing bank profitability. At the same time, the research highlights the need to study the lag effect of macroeconomic factors when assessing the policy effectiveness, as effective interest rate management should not only impact the current period but also be consistently maintained in order to ensure stability and predictability of the entire financial system.

Appendix A. FE regression results

This appendix presents the estimation results of the FE regression model used to examine the relationship between macroeconomic factors, capital structure, and bank profitability.

Table A1: Fixed effects regression results for ROA

Variable	Coefficient	Std. error	t-statistic	p-value
GDP	-0.193***	0.060	-3.22	0.002
INF	0.002	0.045	0.06	0.956
M2	-0.050**	0.021	-2.40	0.018
RIR	0.418***	0.139	3.01	0.003
TLEV	-0.083***	0.026	-3.16	0.002
SIZE	0.017***	0.005	3.30	0.001
Constant	-0.063	0.055	-1.16	0.249

Fixed effects estimation based on balanced panel data of 15 listed commercial banks in Vietnam during 2014–2024; R² (within) = 0.495; F-statistic = 15.65; Prob > F = 0.000; ***, p < 0.01; **, p < 0.05

Appendix B. RE regression results

This appendix reports the estimation results of the RE model for comparison with the FE and PCSE estimations.

Table B1: Random effects regression results for ROA

Variable	Coefficient	Std. error	z-statistic	p-value
GDP	-0.131**	0.052	-2.50	0.012
INF	0.013	0.046	0.28	0.781
M2	-0.057***	0.020	-2.91	0.004
RIR	0.252**	0.110	2.30	0.022
TLEV	-0.132***	0.022	-5.97	0.000
SIZE	0.008***	0.002	3.49	0.000
Constant	0.067**	0.027	2.48	0.013

Random effects estimation results; Overall R² = 0.602; Wald chi² = 111.07; Prob > chi² = 0.000; ***, p < 0.01; **, p < 0.05

Appendix C. Hausman test results

This appendix provides the Hausman specification test used to determine the appropriate

panel estimation model between FE and RE approaches.

Table C1: Hausman test comparing fixed and random effects models

Variable	FE coefficient	RE coefficient	Difference	Std. error
GDP	-0.193	-0.131	-0.062	0.033
INF	0.002	0.013	-0.010	0.004
M2	-0.050	-0.057	0.007	0.009
RIR	0.418	0.252	0.167	0.093
TLEV	-0.083	-0.132	0.050	0.015
SIZE	0.017	0.008	0.009	0.005

Hausman test statistic: chi²(2) = 12.24; Prob > chi² = 0.0022; The null hypothesis assumes that the random effects estimator is consistent

Appendix D. PCSE regression results after excluding the inflation variable

This appendix presents the robustness test results of the PCSE model after removing the statistically insignificant inflation variable (INF).

Table D1: PCSE regression results after excluding INF

Variable	Coefficient	Std. error	t-statistic	p-value
GDP	-0.089**	0.042	-2.12	0.034
M2	-0.049***	0.016	-3.11	0.002
RIR	0.225**	0.091	2.48	0.013
TLEV	-0.153***	0.023	-6.79	0.000
SIZE	0.007***	0.006	4.81	0.000
Constant	0.088***	0.023	3.73	0.000

Panel-corrected standard errors (PCSE) estimation after excluding the statistically insignificant INF variable; R² = 0.693; Wald chi² = 100.27; Prob > chi² = 0.000

Appendix E. Wald test for lagged effects

This appendix reports the Wald test results examining the joint significance of lagged macroeconomic variables in the PCSE model.

Table E1: Wald test of lagged macroeconomic effects

Hypothesis	chi ²	p-value
Lagged variables jointly significant	38.38	0.000

List of abbreviations

- AR(1) First-order autoregressive process
- CAR Capital adequacy ratio
- D/E Debt-to-equity
- FE Fixed effects
- FEM Fixed effects model
- GDP Gross domestic product
- INF Inflation
- L.GDP Lagged gross domestic product
- L.INF Lagged inflation
- L.M2 Lagged money supply
- L.RIR Lagged policy interest rate
- M2 Money supply
- Max Maximum
- Min Minimum
- NIM Net interest margin
- Obs Observations
- OLS Ordinary least squares
- p-value Probability value
- PCSE Panel-corrected standard errors
- Prob Probability
- RE Random effects
- REM Random effects model
- RIR Policy interest rate
- ROA Return on assets
- ROE Return on equity
- R² Coefficient of determination

SBV	State Bank of Vietnam
SD	Standard deviation
SE	Standard error
SIZE	Bank size
Std.	Standard
t	t-statistic
TLEV	Total liabilities over total assets
Wald chi ²	Wald chi-square statistic
ε	Error term
β	Regression coefficient
β ₀	Constant/intercept term
β ₁ -β ₆	Estimated coefficients of explanatory variables
χ ²	Chi-square statistic

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Compliance with ethical standards

Conflict of interest

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References

- Alexiou C and Sofoklis V (2009). Determinants of bank profitability: Evidence from the Greek banking sector. *Economic Annals*, 54(182): 93-118. <https://doi.org/10.2298/EKA0982093A>
- Athanasoglou PP, Brissimis SN, and Delis MD (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money*, 18(2): 121-136. <https://doi.org/10.1016/j.intfin.2006.07.001>
- Beck N and Katz JN (1995). What to do (and not to do) with time-series cross-section data. *American Political Science Review*, 89(3): 634-647. <https://doi.org/10.2307/2082979>
- Berger AN and Bouwman CH (2013). How does capital affect bank performance during financial crises? *Journal of Financial Economics*, 109(1): 146-176. <https://doi.org/10.1016/j.jfineco.2013.02.008>
- Demirgüç-Kunt A and Huizinga H (1999). Determinants of commercial bank interest margins and profitability: Some international evidence. *The World Bank Economic Review*, 13(2): 379-408. <https://doi.org/10.1596/1813-9450-1900>
- Dietrich A and Wanzenried G (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money*, 21(3): 307-327. <https://doi.org/10.1016/j.intfin.2010.11.002>
- Flamini V, McDonald CA, and Schumacher LB (2009). The determinants of commercial bank profitability in Sub-Saharan Africa. *IMF Working Paper No. 09/15*. <https://doi.org/10.5089/9781451871623.001>
- Horobet A, Radulescu M, Belascu L, and Dita SM (2021). Determinants of bank profitability in CEE countries: Evidence from GMM panel data estimates. *Journal of Risk and Financial Management*, 14(7): 307. <https://doi.org/10.3390/jrfm14070307>
- Hoxha A, Bajrami R, and Prekazi Y (2025). The impact of internal and macroeconomic factors on the profitability of the banking sector. A case study of the Western Balkan countries. *Business: Theory and Practice*, 26(1): 28-47. <https://doi.org/10.3846/btp.2025.18670>
- Jensen MC (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2): 323-329.
- Korytowski M (2018). Banks' profitability determinants in post-crisis European Union. *International Journal of Finance & Banking Studies*, 7(1): 1-12. <https://doi.org/10.20525/ijfbs.v7i1.14>
- Mashamba T and Chikutuma CN (2023). Determinants of bank profitability: Evidence from the emerging economy. *Corporate and Business Strategy Review*, 4(4): 310-323. <https://doi.org/10.22495/cbsrv4i4siart12>
- Menicucci E and Paolucci G (2016). The determinants of bank profitability: Empirical evidence from European banking sector. *Journal of Financial Reporting and Accounting*, 14(1): 86-115. <https://doi.org/10.1108/JFRA-05-2015-0060>
- Modigliani F and Miller MH (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 48(3): 261-297.
- Nguyen PT (2022). The impact of banking sector development on economic growth: The case of Vietnam's transitional economy. *Journal of Risk and Financial Management*, 15(8): 358. <https://doi.org/10.3390/jrfm15080358>
- Paukmongkol W (2024). Determinants of bank profitability in Thailand by Generalized method of moments estimation. *Asia Social Issues*, 17(1): e260597. <https://doi.org/10.48048/asi.2024.260597>
- Petria N, Capraru B, and Ilnatov I (2015). Determinants of banks' profitability: Evidence from EU 27 banking systems. *Procedia Economics and Finance*, 20: 518-524. [https://doi.org/10.1016/S2212-5671\(15\)00104-5](https://doi.org/10.1016/S2212-5671(15)00104-5)
- Rahman HU, Yousaf MW, and Tabassum N (2020). Bank-specific and macroeconomic determinants of profitability: A revisit of Pakistani banking sector under dynamic panel data approach. *International Journal of Financial Studies*, 8(3): 42. <https://doi.org/10.3390/ijfs8030042>
- Saeed MS (2014). Bank-related, industry-related and macroeconomic factors affecting bank profitability: A case of the United Kingdom. *Research Journal of Finance and Accounting*, 5(2): 42-50.
- Saif-Alyousfi AYH (2022). Determinants of bank profitability: Evidence from 47 Asian countries. *Journal of Economic Studies*, 49(1): 44-60. <https://doi.org/10.1108/JES-05-2020-0215>
- Sousa F and Almeida L (2025). Banking profitability: Evolution and research trends. *International Journal of Financial Studies*, 13(3): 139. <https://doi.org/10.3390/ijfs13030139>
- Tan Y and Floros C (2012). Bank profitability and inflation: The case of China. *Journal of Economic Studies*, 39(6): 675-696. <https://doi.org/10.1108/01443581211274610>