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Article

Determinants of bank performance: Evidence from the commercial banks in Vietnam

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Abstract: This study analyzes the influence of five primary factors—inflation, capital ratio, deposits, non-performing loans, and bank size—on the performance of banks in Vietnam. Our sample encompasses 26 commercial banks from 2014 to 2023. The analysis incorporates data sourced from commercial banks' financial statements and annual reports. Our findings indicate that banks with higher capital ratios and sizes generally exhibit superior performance. Moreover, inflation positively influences the performance of Vietnamese commercial banks throughout the selected timeframe. In contrast, non-performing loans and deposits are inverse to bank performance. Our findings offer novel insights into the factors influencing bank performance in a growing economy like Vietnam, along with recommendations for Vietnamese commercial banks and the State Bank of Vietnam to implement effective methods to improve bank performance.

Keywords: bank performance; commercial banks; Vietnam; non-performing loans; bank size; inflation; deposits; capital ratio

1. Introduction

Banks are vital financial entities within the national economy. Banks function as financial middlemen between savers and investors, facilitating a more efficient distribution of capital throughout the economy. The performance of banks is contingent upon the variations in the economic cycle. During an economic recession, banks would curtail credit availability owing to diminished loan demand from businesses and families, which encounter restricted investment prospects (Berlin, 2012; Satria et al., 2016). Furthermore, bank losses typically escalate during recessions due to elevated default rates from borrowers experiencing business losses and income shocks, necessitating banks to augment provisions (Albertazzi and Gambacorta, 2009; Muriu, 2023).

The 2008 global financial crisis illustrated that bank performance significantly influences the economy (Claessens and Horen, 2014). In a delicate and competitive market, bank performance will deteriorate, resulting in widespread repercussions for various economic stakeholders. Bank failures will result in issues such as freezing customer deposits, disrupting lending relationships, and contraction of credit lines within the organization. Furthermore, the adverse externalities of bank failures, which frequently create a cascading effect, provide systemic hazards to the banking sector. Governments and central banks must meticulously oversee and regulate banking operations to prevent the financial repercussions of bankruptcy for banks and the economy. Consequently, management, control, and supervision practices are being restructured and redirected to address the challenge of systemic risk. The

government's primary task in this evolving landscape is maintaining financial system stability while capitalizing on economic and development prospects (Arora and Kaur, 2006).

In Vietnam, banks, particularly commercial banks, are assuming an increasingly significant role in the economy. The primary objective of economic development policy is to ensure commercial banks' seamless and effective functioning. Investigating the determinants of bank performance will provide the foundation for the Government, policymakers, and commercial banks to formulate suitable business strategies and risk management approaches. Consequently, this study utilizes data from 26 Vietnamese joint stock commercial banks throughout a decade, spanning from 2014 to 2023, to ascertain significant elements influencing bank performance.

This study will consist of five sections. The initial section serves as an introduction that articulates the justification for selecting the topic. The subsequent section is a literature review that presents the foundational theory pertinent to the topic. The third section delineates the research approach—the empirical findings comparing successful and ineffective scores. The final section discusses the inferences derived from the acquired results.

2. Literature review

2.1. Bank performance

Bank performance denotes the effectiveness and efficiency of a bank's operations, as evidenced by profitability, operational efficiency, and managerial effectiveness. It is crucial in assessing the probability of bank failure and influences the overall stability of the banking sector. Bank performance is the primary determinant of profitability derived from its operations. According to Chenini and Jarboui (2018), bank performance shows the ability of a bank to achieve its operational goals, value its stakeholders, and enhance its competitiveness among the other banks. Moreover, it constitutes the foundation and objective of all banking operations (Ferrouhi, 2018). Commonly utilized ratios for assessing bank performance include return on assets (ROA) and return on equity (ROE) (Gupta and Mahakud, 2020; Mkandawire, 2016; Saeed, 2014). These ratios are delineated as ROA = (Net Income/Total Assets) × 100; this ratio assesses the profitability of a bank's assets, reflecting overall performance. ROE = (Net Income/Equity) × 100; this ratio evaluates profitability by indicating the profit generated from shareholders' invested capital.

2.2. The determinants of the bank performance

Numerous researchers have researched the elements influencing bank performance, presenting various ideas. The performance of banks is influenced by internal determinants unique to each bank and external variables, including macroeconomic and macro-financial factors, which represent the economic and legal context in which the bank functions (Nouaili et al., 2015). This study will concentrate on five primary factors: inflation, capital structure, deposits, non-performing loans (NPLs), and bank size.

2.2.1. Inflation

The inflation rate is the yearly percentage rise in a prominent price index, typically quantified as the percentage increase in the consumer price index or the GDP deflator (White, 1999). The inflation rate signifies an increase in the economy's price level. The inflation rate is a macroeconomic factor that indicates the uncontrollable failures that banks encounter owing to fluctuations.

The research conducted by Fadzlan (2009), Miguel et al. (2018), Gilbert and Jaya (2019), and Almansour et al. (2021) indicates a positive relationship between inflation and bank performance. Inflation can positively impact bank performance due to higher profits than costs. The fluctuations in the real GDP do not affect the banks (Derbali, 2021; Jara-Bertin et al., 2014). At an optimal inflation rate, the economy experiences robust growth, manufacturing and commerce flourish, stimulating consumption, while banks benefit from enhanced profitability due to a more extensive customer base.

In contrast, studies reveal a paradoxical impact of inflation on bank performance. Research conducted by Boyd and Champ (2006), Cetin (2019), and Mbabazize et al. (2020) indicates a negative relationship between inflation and bank performance. The central bank must adopt a stringent monetary policy to mitigate elevated inflation. During that period, banks will be compelled to elevate interest rates, thus augmenting the expense of capital acquisition for financial institutions. Consequently, companies will extend fewer loans, as elevated interest rates induce reluctance among clients to get funds for business purposes. Consequently, the bank's profits will diminish, thus resulting in a decline in performance.

2.2.2. Capital ratio

The capital ratio of a bank is a significant determinant of its performance. Saeed's (2014) analysis indicates that a bank's capital ratio positively influences its performance. Furthermore, signaling theory posits that banks can enhance their profitability by revealing their exceptional performance and favorable reputation. An augmentation of capital enhances future expectations (Trujillo-Ponce, 2012). A reduced leverage ratio may enable banks to perform more effectively than their competitors. Following the bankruptcy cost theory developed by Berger (1995), the banks will foresee the expenses that may ensue if they face the prospect of insolvency. They will opt to augment equity capital to mitigate bankruptcy risk and enhance financial stability.

2.2.3. Deposits

Deposits refer to clients' monies in their bank accounts for security and interest accrual. Financial institutions depend significantly on client deposits to provide loans to other clients. It is well recognized that funds acquired through public deposits represent banks' most economical financing method, establishing a positive correlation between client deposits and bank profitability. Banks compensate for deposits at one rate while they extend loans at a different rate. Banks assume risks as they must address the loan demand by competing for deposits intended for an unpredictable future. This results in establishing optimal interest rates on loans and deposits to mitigate the risk of interest rate volatility. Increasing deposits enables a bank to offer more excellent lending options to its clients and enhance its profitability (Lee and Hsieh, 2013). However, the obligation for banks to allocate funds via loans

may diminish their profitability, as they are required to pay interest to depositors on fixed-term deposits. The decline in deposits due to diminished consumption patterns can elevate funding costs, thus impairing bank performance (Elnahass et al., 2021).

2.2.4. Non-performing loans

Non-performing loans (NPLs) are bank loans that are either overdue or unlikely to be repaid by the borrower, a situation exacerbated during the financial crisis and following recessions (European Commission, 2024). They represent sunk expenses, and attempts to recoup them would lead to more significant losses. Prudent credit risk management enhances bank performance by reducing the likelihood of questionable receivables and defaulting clients. The influence of non-performing loans (NPLs) on banking performance has been examined in numerous prior research (Berger and DeYoung, 1997; Gazi et al., 2022; Phung et al., 2022; Yuan et al., 2022). As non-performing loans rise, banks must augment operating expenses associated with borrower oversight, collateral appraisal, and expenditures linked to debt resolution in instances of non-recovery. Consequently, a rise in non-performing loans (NPLs) will negatively impact bank performance (Berger and DeYoung, 1997; Qehaja-Keka et al., 2023).

2.2.5. Bank size

The size of a bank also influences its performance. Consequently, larger banks possess numerous advantages in their operations, including a substantial borrower base, a diverse business portfolio, and decreased expenses (Bikker and Hu, 2002; Elsas et al., 2010; Mercieca et al., 2007). A large bank typically surpasses a smaller bank due to enhanced market access and the ability to achieve economies of scale. Some studies indicate that bank size adversely affects performance due to increased marketing, operating, and administrative expenditures and information asymmetry, resulting in diminished performance (Barros et al., 2007; Djalilov and Piesse, 2016; Tan, 2016).

3. Research methodology

3.1. Hypotheses development

To the best of our knowledge, few studies have examined the determinants of bank performance. As discussed above, the existing literature has identified the relationships between five main factors, namely inflation, capital ratio, deposit, non-performing loans, and bank size, in Vietnam and many countries worldwide. In this study, we would like to hypothesize the following:

H_1: Inflation positively affects bank performance.

H_2: Capital ratio positively affects bank performance.

H_3: Deposit negatively affects bank performance.

H_4: NPL negatively affects bank performance.

H_5: Bank size positively affects bank performance.

3.2. Sample and specification of the model

3.2.1. Sample

This paper's research sample comprises 26 commercial banks in Vietnam throughout the decade from 2014 to 2023. This dataset is the most comprehensive compilation of operational data for the 26 commercial banks chosen for analysis (see Appendix A). The information is derived from the public financial statements of commercial banks. Furthermore, inflation data for Vietnam from 2014 to 2023 is sourced from the General Statistics Office of Vietnam.

3.2.2. Econometric specification of the model

The author selected the linear regression model for this investigation because of its demonstrated capacity to yield significant results (Bourke, 1989; Berger and Mester, 2003). The linear regression model will be expressed as follows:

$$Y_{it} = \beta_0 + \beta_1 \text{In}fl_{it} + \beta_2 \text{CR}_{it} + \beta_3 \text{Dep}_{it} + \beta_4 \text{NPL}_{it} + \beta_5 \text{lnTA}_{it} + e_{it} \ (*)$$

In which:

Y_{it} are dependent variable, ROA_{it}, ROE_{it}. They are, respectively, the return on assets of the commercial bank i in the year t and the return on equity of the commercial bank i in the year t.

There are five independent variables: In*fl*, CR, Dep, NPL, and TA. $\text{In}fl_{it}$ is the year's inflation rate and will be the same for all commercial banks. CR_{it} is the ratio of equity to total assets of the commercial bank i in the year t. Dep_{it} is the ratio of the total deposit to total assets of the commercial bank i in the year t. NPL_{it} is non-performing loans of the commercial bank i in the year t, and it is calculated by dividing the amount of non-performing loans by the total loans. Moreover, lnTA_{it} is the logarithm of total assets of the commercial bank I in the year t.

3.3. Model estimation

3.3.1. The first regression

In the first regression, we employ ROA as the dependent variable. Then the (*) equation will be written as below:

$$\text{ROA}_{it} = \beta_0 + \beta_1 \text{In}fl_{it} + \beta_2 \text{CR}_{it} + \beta_3 \text{Dep}_{it} + \beta_4 \text{NPL}_{it} + \beta_5 \text{lnTA}_{it} + e_{it}$$

The descriptive statistics reveal that most variables display considerable differences between the maximum and minimum values, underscoring the extensive range of the research sample selection (see **Table 1**). The majority of variables demonstrate minimal standard deviation values. Some variables demonstrate left or right skewness; nevertheless, the quantity of observations reflecting this skewness is low and has negligible influence on the entire sample.

Table 1. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	260	0.009	0.007	0	0.064
INFL	260	0.029	0.009	0.006	0.041
CR	260	0.085	0.031	0.038	0.212
DEP	260	0.687	0.109	0.065	0.912
NPLs	260	0.018	0.009	0.005	0.068
lnTA	260	19.066	1.171	16.615	21.538

Source: Result from STATA 17.

Table 2. Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) ROA	1.000					
(2) INFL	0.049	1.000				
(3) CR	0.321*	−0.029	1.000			
(4) DEP	−0.388*	−0.060	−0.300*	1.000		
(5) NPLs	−0.221*	0.096	0.135*	0.063	1.000	
(6) lnTA	0.389*	0.034	−0.413*	0.142*	−0.211*	1.000

* shows significance at $p < 0.1$. Source: Result from STATA 17.

The correlation coefficients of the variables are below 0.8 (see **Table 2**). This indicates the presence of potential multicollinearity among the variables in the model. Hence, the author conducted a Pooled Ordinary Least Squares (OLS) test for the model and an autocorrelation test using the VIF coefficient to ascertain the presence of multicollinearity. Mean VIF and all VIF are less than 2. This indicates that there is no presence of multicollinearity in the regression model (The obtained results are in the following **Table 3**).

Table 3. Variance inflation factor.

	VIF	1/VIF
CR	1.31	0.763
lnTA	1.247	0.802
DEP	1.123	0.891
NPLs	1.078	0.928
INFL	1.021	0.98
Mean VIF	1.156	

Source: Result from STATA 17.

The author performed a sequential regression study employing Pooled OLS, FEM, and REM models to assess the appropriateness of various regression techniques (see Appendix B). The author subsequently performed the Breusch-Pagan Lagrangian test to determine the suitable regression method, following the procedure outlined in **Table 4**.

Table 4. Breusch and pagan lagrangian multiplier test for random effects.

```
ROA[code_nh,t] = Xb + u[code_nh] + e[code_nh,t]
   Test: Var(u) = 0
            chibar2(01) = 138.92
          Prob > chibar2 = 0.0000
```

Source: Result from STATA 17.

According to the Breusch-Pagan Lagrangian test findings, it may be inferred that the REM regression model is the most suitable and chosen. Once the REM regression model is chosen, the author proceeds to examine the shortcomings of the model: the autocorrelation test, specifically the Wooldridge test, is conducted with the hypothesis:

Ho: There is no first-order autocorrelation.

The result of the Wooldridge test is F (1.25) = 26.372 with Prob > F = 0.0000. That means the conclusion rejects hypothesis H0, and the model has autocorrelation (Result from STATA 17). Heteroscedasticity test: Based on the results of the Breusch-Pagan Lagrangian test as above with Prob > chibar2 = 0.00 < 5%, it can be concluded that the model has heteroscedasticity (see **Table 5**). Due to autocorrelation and heteroskedasticity in the REM model, the author chooses to employ the FGLS model (feasible generalized least squares estimation method). The results of the regression analysis are shown below:

Table 5. Cross-sectional time-series FGLS regression.

ROA	**Coef.**	**St.Err.**	***t*-value**	***p*-value**	**[95% Conf**	**Interval]**	**Sig**
INFL	0.028	0.009	3.08	0.002	0.01	0.046	***
CR	0.122	0.011	11.53	0	0.101	0.142	***
DEP	−0.013	0.002	−5.84	0	−0.017	−0.008	***
NPLs	−0.109	0.018	−5.90	0	−0.145	−0.073	***
lnTA	0.004	0	14.35	0	0.003	0.004	***
Constant	−0.064	0.006	−11.39	0	−0.075	−0.053	***
Mean dependent var		0.009		SD dependent var		0.007	
Number of obs		260		Chi-square		356.817	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Source: Result from STATA 17.

Based on the result of the FGLS regression, the regression equation is expressed as follows:

$$ROA = -0.064 + 0.028Infl + 0.122CR - 0.013Dep - 0.109NPL + 0.04lnTA + e_{it}$$

3.3.2. The second regression

In the first regression, we employ ROE as the dependent variable. Then the (*) equation will be written as below:

$$ROE_{it} = \beta_o + \beta_1 Infl_{it} + \beta_2 CR_{it} + \beta_3 Dep_{it} + \beta_4 NPL_{it} + \beta_5 lnTA_{it} + e_{it}$$

The descriptive statistics indicate that most variables exhibit significant disparities between the maximum and minimum values, highlighting the broad range of the research sample selection (see **Table 6**). The majority of variables exhibit low standard deviation values. Certain variables exhibit left or right skewness; nevertheless, the number of observations indicating this skewness is minimal and has a minor impact on the overall sample.

Table 6. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	260	0.112	0.07	0	0.409
INFL	260	0.029	0.009	0.006	0.041
CR	260	0.085	0.031	0.038	0.212
DEP	260	0.687	0.109	0.065	0.912
NPL	260	0.018	0.009	0.005	0.068
lnTA	260	19.066	1.171	16.615	21.538

Source: Result from STATA 17.

The correlation coefficients among the variables are less than 0.8. This signifies the existence of possible multicollinearity among the variables in the model. Consequently, the author performed a Pooled Ordinary Least Squares (OLS) analysis for the model and an autocorrelation assessment utilizing the VIF coefficient to determine the existence of multicollinearity. The mean VIF and all individual VIF values are below 2. This signifies the absence of multicollinearity in the regression model (The findings are presented in **Table 7**).

Table 7. Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) ROE	1.000					
(2) INFL	0.071	1.000				
(3) CR	−0.112*	−0.029	1.000			
(4) DEP	−0.203*	−0.060	−0.300*	1.000		
(5) NPL	−0.350*	0.096	0.135*	0.063	1.000	
(6) lnTA	0.616*	0.034	−0.413*	0.142*	−0.211*	1.000

* shows significance at $p < 0.1$. Source: Result from STATA 17.

The correlation coefficients among the variables are less than 0.8. This signifies the existence of possible multicollinearity among the variables in the model. Consequently, the author performed a Pooled OLS analysis for the model and an autocorrelation assessment utilizing the VIF coefficient to determine the existence of multicollinearity. The mean VIF and all individual VIF values are the same as **Table 3**. This signifies the absence of multicollinearity in the regression model.

The author performed a sequential regression study employing Pooled OLS, FEM, and REM models to assess the appropriateness of various regression techniques (see Appendix C). The author subsequently used the Breusch-Pagan Lagrange multiplier test to determine the suitable regression approach, employing the following procedure: The author conducted a sequential regression analysis employing Pooled OLS, FEM, and REM to evaluate the suitability of different regression methods. Subsequently, the author conducted the Breusch-Pagan Lagrange multiplier test to determine the appropriate regression method, utilizing the following strategy (refer to **Table 8**).

Table 8. Breusch and Pagan Lagrangian multiplier test for random effects.

```
ROE[code_nh,t] = Xb + u[code_nh] + e[code_nh,t]
Test: Var(u) = 0
        chibar2(01) = 128.14
      Prob > chibar2 = 0.0000
```

Source: Result from STATA 17.

Based on the results of the Breusch-Pagan Lagrangian test, it may be concluded that the REM regression model is the most appropriate and preferred. After selecting the REM regression model, the author then analyzes its limitations. Specifically, they run an autocorrelation test, the Wooldridge test, with the hypothesis:

Ho: There is no first-order autocorrelation.

The result of the Wooldridge test is F (1.26) = 27.782 with Prob > F = 0.0000. That means the conclusion rejects the hypothesis H0, and the model has autocorrelation. Heteroscedasticity test: Based on the results of the Breusch-Pagan Lagrangian test as above with Prob > chibar2 = 0.00 < 5%, it can be concluded that the model has heteroscedasticity. Due to autocorrelation and heteroskedasticity in the REM model, the author utilizes the FGLS model (feasible generalized least squares estimation method). The regression results are displayed below (refer to **Table 9**):

Table 9. Cross-sectional time-series FGLS regression.

ROE	**Coef.**	**St.Err.**	***t*-value**	***p*-value**	**[95% Conf**	**Interval]**	**Sig**
INFL	0.343	0.117	2.94	0.003	0.114	0.573	***
CR	0.326	0.102	3.18	0.001	0.125	0.527	***
DEP	−0.101	0.027	−3.73	0	−0.154	−0.048	***
NPL	−1.466	0.248	−5.92	0	−1.951	−0.981	***
lnTA	0.042	0.003	12.62	0	0.035	0.048	***
Constant	−0.629	0.072	−8.72	0	−0.771	−0.488	***
Mean dependent var		0.112		SD dependent var		0.070	
Number of obs		260		Chi-square		275.067	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Source: Result from STATA 17.

Based on the result of the FGLS regression, the regression equation is expressed as follows:

$$ROE = -0.629 + 0.343In\mathit{fl} + 0.326CR - 0.101Dep - 1.466NPL + 0.042lnTA + e_{it}$$

4. The research discussion

The findings from the initial and subsequent regression models indicate that the performance of the banks in the research sample is influenced by all five factors: inflation, capital ratio, deposits, non-performing loans (NPLs), and bank size. The influence of these factors on the ROA and ROE of the banks in the examined sample varies. Furthermore, they will be illustrated as follows.

Firstly, in the case of other things being equal, when the inflation rate changes by 1 unit, ROA changes by 0.028 units, and ROE changes by 0.343 units. Then, from this study, the inflation rate has a positive relationship with the ROA and ROE of commercial banks, being similar to the results of researchers such as Fadzlan (2009), Miguel Á. et al. (2018), Gilbert and Jaya (2019), and Almansour et al. (2021). Between 2014 and 2023, the Vietnamese economy sustained an appropriate inflation rate, experienced growth, saw an uptick in consumption, enabled banks to provide more loans, and generated income from credit activities, enhancing bank efficiency.

Secondly, in the case of other things being equal, when the capital rate changes by 1 unit, ROA changes by 0.122 units, and ROE changes by 0.326 units. The increase in the rate of equity to total assets will help commercial banks improve their performance. The State Bank of Vietnam will allocate lending limits to each commercial bank, contingent upon the total equity of each institution. When commercial banks augment their equity, they will possess greater loan capacity, resulting in increased profits and enhanced performance.

Thirdly, in the case of other things being equal, when the ratio of deposits to total assets changes by 1 unit, ROA changes to −0.013 unit, and ROE changes to −0.101 unit. This means that the ratio of deposits to total assets has a negative impact on the bank's performance. In Vietnam, savings deposit interest rates are notably elevated. Consequently, as banks attract additional deposits, they must elevate costs, resulting in diminished profits and negatively impacting ROA and ROE.

Fourthly, in the case of other things being equal, when the ratio of NPLs to total loans changes by 1 unit, ROA changes by −0.109 unit, and ROE changes by -1.466 unit. Then, NPLs have a negative impact on bank performance. As NPLs escalate, commercial banks must allocate additional risk provisions for non-performing loans and incur higher expenses for managing irrecoverable debts, resulting in diminished bank earnings.

Fifthly, in the case of other things being equal, when total assets change by 1%, ROA changes by 0.04%, and ROE changes by 0.042%. This means that the total assets of the commercial bank have a positive relationship with the bank's performance. When the total asset increases, the total profit of the commercial increases.

5. Conclusion

The research findings indicate the elements influencing the performance of commercial banks in Vietnam from 2014 to 2023, utilizing two metrics for assessing bank performance: ROA and ROE. Consequently, inflation, capital rate, and total assets positively influence bank performance. Conversely, variables such as non-performing loans and deposits adversely affect bank performance. Based on the reality above, we present some recommendations to enhance the performance of commercial banks in Vietnam, specifically as follows:

The Vietnamese commercial banks must implement strategies to enhance the value of their entire assets. The equity to total assets ratio positively influences operating efficiency. Consequently, a policy should be established to enhance equity. The analytical results align with the prevailing conditions of commercial banks in Vietnam, characterized by limited scale and equity, resulting in weak financial potential. Enhancing total assets via the augmentation of equity should be pursued through several methods. The State Bank of Vietnam must evaluate the operating efficiency of commercial banks; those deemed inefficient will be subject to monitoring and may be considered for suitable mergers. This enhances the financial capacity of banks and broadens the scope of activities. Furthermore, banks may contemplate augmenting capital by issuing shares to current shareholders or financial investors in the market. Consequently, capital sources will be augmented by soliciting investment funds. Furthermore, banks must have effective debt management procedures to swiftly identify consumers likely to incur lousy debt, restricting lending. Furthermore, banks must equilibrate their deposit mobilization and lending activities to prevent accumulating excessive deposits without securing borrowers, which could result in operational losses.

The Vietnamese government must uphold a monetary policy that aligns with the progression of the national economy. An optimal inflation rate will be essential to enhance the performance of commercial banks. The State Bank of Vietnam's credit

room regulations must be swiftly updated to satisfy the capital requirements of the economy, provide profitability for commercial banks, and uphold financial stability.

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Appendix A

No.	Name of commercial bank
1	Vietnam Joint Stock Commercial Bank for Industry and Trade
2	Joint Stock Commercial Bank for Investment and Development of Vietnam
3	Joint Stock Commercial Bank for Foreign Trade of Vietnam
4	Asia Commercial Joint Stock Bank
5	An Binh Commercial Joint Stock Bank
6	Bac A Commercial Joint Stock Bank
7	Lien Viet Post Joint Stock Commercial Bank
8	Southeast Asia Joint Stock Commercial Bank
9	Vietnam Maritime Commercial Joint Stock Bank
10	Kien Long Commercial Joint Stock Bank
11	Vietnam Technological and Commercial Joint Stock Bank
12	Nam A Commercial Joint Stock Bank
13	Orient Commercial Joint Stock Bank
14	Military Commercial Joint Stock Bank
15	Vietnam International Commercial Joint Stock Bank
16	Saigon Bank For Industry And Trade
17	Saigon – Hanoi Commercial Joint Stock Bank
18	Sai Gon Commercial Joint Stock Bank
19	Tien Phong Commercial Joint Stock Bank
20	Viet A Commercial Joint Stock Bank
21	Vietnam Prosperity Joint Stock Commercial Bank
22	Petrolimex Group Commercial Joint Stock Bank
23	Vietnam Export Import Commercial Joint Stock Bank
24	Ho Chi Minh City Development Joint Stock Commercial Bank
25	Vietnam Bank for Agriculture and Rural Development
26	Bao Viet Joint Stock Commercial Bank

Appendix B

Table B1. OLS regression results.

ROA	**Coef.**	**St.Err.**	***t*-value**	***p*-value**	**[95% Conf**	**Interval]**	**Sig**
INFL	0.028	0.026	1.08	0.28	-0.023	0.08	
CR	0.115	0.013	8.66	0	0.089	0.141	***
DEP	−0.016	0.004	−4.35	0	−0.023	−0.009	***
NPLs	−0.123	0.036	−3.38	0.001	−0.194	−0.052	***
lnTTS	0.005	0	11.23	0	0.004	0.006	***
Constant	−0.082	0.01	−8.63	0	−0.101	−0.064	***
Mean dependent var		0.009		SD dependent var		0.007	
Overall *R*-squared		0.514		Number of obs		260	
Chi-square		281.984		Prob > chi2		0.000	
R-squared within		0.532		R-squared between		0.516	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B2. REM regression results.

ROA	**Coef.**	**St.Err.**	***t*-value**	***p*-value**	**[95% Conf**	**Interval]**	**Sig**
INFL	0.025	0.026	0.98	0.33	−0.026	0.076	
CR	0.105	0.014	7.33	0	0.077	0.133	***
DEP	−0.01	0.004	−2.51	0.013	−0.018	−0.002	**
NPLs	−0.128	0.037	−3.46	0.001	−0.2	−0.055	***
lnTTS	0.007	0.001	11.04	0	0.005	0.008	***
Constant	−0.115	0.013	−9.20	0	−0.14	−0.091	***
Mean dependent var		0.009		SD dependent var		0.007	
R-squared		0.548		Number of obs		260	
F-test		55.577		Prob > F		0.000	
Akaike crit. (AIC)		−2176.562		Bayesian crit. (BIC)		−2155.198	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B3. FEM regression results.

ROA	**Coef.**	**St.Err.**	***t*-value**	***p*-value**	**[95% Conf**	**Interval]**	**Sig**
INFL	0.028	0.026	1.08	0.28	−0.023	0.08	
CR	0.115	0.013	8.66	0	0.089	0.141	***
DEP	−0.016	0.004	−4.35	0	−0.023	−0.009	***
NPLs	−0.123	0.036	−3.38	0.001	−0.194	−0.052	***
lnTTS	0.005	0	11.23	0	0.004	0.006	***
Constant	−0.082	0.01	−8.63	0	−0.101	−0.064	***
Mean dependent var		0.009		SD dependent var		0.007	
Overall R-squared		0.514		Number of obs		260	
Chi-square		281.984		Prob > chi2		0.000	
R-squared within		0.532		R-squared between		0.516	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B4. Hausman (1978) specification test.

	Coef.
Chi-square test value	16.957
P-value	0.005

Appendix C

Table C1. OLS regression results.

ROE	Coef.	St.Err.	*t*-value	*p*-value	[95% Conf	Interval]	Sig
INFL	0.393	0.259	1.52	0.129	−0.114	0.9	
CR	0.129	0.13	0.99	0.322	−0.126	0.384	
DEP	−0.111	0.036	−3.12	0.002	−0.181	−0.041	***
NPLs	−1.704	0.355	−4.79	0	−2.401	−1.008	***
lnTTS	0.051	0.004	11.83	0	0.042	0.059	***
Constant	−0.774	0.093	−8.29	0	−0.957	−0.591	***
Mean dependent var		0.112		SD dependent var		0.070	
Overall *R*-squared		0.493		Number of obs		260	
Chi-square		218.055		Prob > chi2		0.000	
R-squared within		0.472		R-squared between		0.574	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C2. REM regression results.

ROE	Coef.	St.Err.	*t*-value	*p*-value	[95% Conf	nterval]	Sig
INFL	0.348	0.25	1.39	0.166	−0.145	0.841	
CR	−0.014	0.139	−0.10	0.918	−0.288	0.259	
DEP	−0.053	0.039	−1.34	0.183	−0.13	0.025	
NPLs	−1.756	0.358	−4.90	0	−2.461	−1.05	***
lnTTS	0.069	0.006	12.07	0	0.058	0.08	***
Constant	−1.148	0.122	−9.43	0	−1.388	−0.908	***
Mean dependent var		0.112		SD dependent var		0.070	
R-squared		0.492		Number of obs		260	
F-test		44.289		Prob > F		0.000	
Akaike crit. (AIC)		−995.036		Bayesian crit. (BIC)		−973.672	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C3. FEM regression results.

ROE	Coef.	St.Err.	*t*-value	*p*-value	[95% Conf	Interval]	Sig
INFL	0.393	0.259	1.52	0.129	−0.114	0.9	
CR	0.129	0.13	0.99	0.322	−0.126	0.384	
DEP	−0.111	0.036	−3.12	0.002	−0.181	−0.041	***
NPLs	−1.704	0.355	−4.79	0	−2.401	−1.008	***
lnTTS	0.051	0.004	11.83	0	0.042	0.059	***
Constant	−0.774	0.093	−8.29	0	−0.957	−0.591	***
Mean dependent var		0.112		SD dependent var		0.070	
Overall *R*-squared		0.493		Number of obs		260	
Chi-square		218.055		Prob > chi2		0.000	
R-squared within		0.472		R-squared between		0.574	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C4. Hausman (1978) specification test.

	Coef.
Chi-square test value	25.846
P-value	0