

## CÁC YẾU TỐ TÁC ĐỘNG ĐẾN HIỆU QUẢ HOẠT ĐỘNG CỦA CÁC NGÂN HÀNG THƯƠNG MẠI VIỆT NAM

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### Tóm tắt

*Hoạt động kinh doanh của hệ thống ngân hàng, đặc biệt là các ngân hàng thương mại cổ phần, luôn nhận được sự quan tâm đặc biệt do vai trò then chốt của chúng trong nền kinh tế. Tại Việt Nam, một quốc gia đang phát triển và chịu nhiều áp lực cạnh tranh trong bối cảnh hội nhập quốc tế, việc đánh giá hiệu quả hoạt động của các ngân hàng thương mại cổ phần có ý nghĩa hết sức quan trọng. Nghiên cứu này sử dụng mô hình hồi quy Tobit nhằm đánh giá tác động của các yếu tố được lựa chọn đến hiệu quả hoạt động kinh doanh của 30 ngân hàng thương mại cổ phần Việt Nam trong giai đoạn bảy năm, từ 2016 đến 2022. Kết quả hồi quy Tobit cho thấy có sáu yếu tố chính ảnh hưởng đến hiệu quả hoạt động của các ngân hàng, bao gồm: Tỷ suất lợi nhuận trên vốn chủ sở hữu, Tỷ suất lợi nhuận trên tài sản, Tỷ lệ nợ xấu, Tỷ lệ vốn chủ sở hữu trên tổng tài sản, Tỷ lệ chi phí trên thu nhập và quy mô tài sản. Ngoài ra, tỷ lệ trích lập dự phòng rủi ro và tỷ lệ nợ trên tổng tài sản không thể hiện ý nghĩa thống kê trong mô hình.*

**Từ khóa:** *Hiệu quả, ngân hàng thương mại, Việt Nam, hồi quy Tobit*

### FACTORS AFFECTING THE EFFICIENCY OF VIETNAMESE COMMERCIAL BANKS

#### Abstract

*The banking system's business activities, particularly those of joint-stock commercial banks, are of utmost concern due to their pivotal role in the economy. In Vietnam, a developing nation facing competitive pressures and challenges from its integration commitments, evaluating the efficiency of Vietnamese joint-stock commercial banks holds significant importance. This study employs the Tobit regression model to assess the impact of various factors on the business efficiency of 30 Vietnamese joint-stock commercial banks over a seven-year period from 2016 to 2022. The Tobit regression results reveal six key factors influencing the banks' business efficiency, namely Return on Equity, Return on Assets, Non-Performing Loan ratio, Equity to Asset ratio, Expense to Income Ratio, and Asset size. Additionally, the risk provision ratio and debt-to-total assets ratio did not show statistical significance in the model.*

**Keywords:** *Efficiency, commercial banks, Vietnam, Tobit regression*

*JEL classification:* G21, L25, D22.

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### 1. Introduction

Concerning the issue of analyzing the factors impacting the operational effectiveness of banks, both globally and specifically in Vietnam, various analytical models with distinct methodological approaches are employed by researchers. For instance, Pasiouras, F.; Sifodaskalakis, E.; Zopounidis, C. (2007) utilized the Tobit model to assess the impact of internal and external factors on the operational efficiency of 16 joint-stock commercial banks in Greece from 2000 to 2004. The findings from the Tobit model reveal that the influence of capitalization, branch count, and ATM card quantity varies across different efficiency metrics. Gwahula Raphael (2013) employed the Tobit regression model to evaluate the factors influencing the efficiency of Tanzanian banks over a 7-year period from 2005 to 2011. The outcomes indicate that variables such as bank size, non-interest income, and capital adequacy ratio exhibit a positive relationship with bank efficiency, while the bad debt ratio demonstrates a negative impact on efficiency. Ji-Li Hu, Chiang-Ping Chen, and Yi-Yuan Su (2006) utilized the DEA non-parametric method to explore the factors affecting the efficiency of 12 commercial banks in China spanning from 1996 to 2003. Within the DEA model, the researchers selected three input variables encompassing deposits, bank staff count, and net fixed assets; and two output variables consisting of investment and lending. Following the performance assessment results, a Tobit regression model was applied to investigate the influence of variables like bank ownership type, operational scale, and dummy variables reflecting the impact of WTO

accession and the Asian financial crisis on the efficiency of the 12 commercial banks in China.

Previous studies, both international and domestic, have extensively investigated various determinants affecting bank efficiency using diverse analytical methods. Most of these studies utilize the Tobit regression model or Data Envelopment Analysis (DEA) to assess the impact of internal factors such as bank size, capital adequacy, non-performing loans, and operational costs, as well as external factors like economic conditions and regulatory changes. For example, research on Greek and Tanzanian banks highlighted how capitalization and asset quality affect efficiency, while studies on Chinese commercial banks integrated macroeconomic events like WTO accession and financial crises. Vietnamese studies focusing on bank asset structure, profitability ratios, and risk indicators provided insights specific to the local banking environment. However, these studies often tend to focus on traditional financial variables and historical periods, with limited integration of recent technological and market dynamics, as well as less emphasis on technical efficiency variation across different scales of operation

Nguyen Viet Hung (2008) examine the determinants impacting the operational effectiveness of 32 Vietnamese commercial banks during the timeframe of 2001-2005. The specified exogenous variables encompass various metrics such as the logarithm of total assets, equity, total cost/total revenue, deposit/loan ratio, equity/total assets, total assets of individual banks/total assets of all banks, loanable capital to total assets ratio, bad debt ratio, ROA, capital to labor ratio, and profit/earnings to

operations ratio. The findings of the study reveal that parameters like the bank's asset size, deposit/loan ratio, ROA, bad debt ratio, and total cost/total revenue ratio exert an impact on the operational performance of commercial banks within that period. Nguyen Thi Thu Thuong (2017) similarly utilized the Tobit regression model to evaluate the influence of various factors on the efficiency of 21 commercial banks in Thai Nguyen province spanning from 2011 to 2015. The outcomes of the research indicate that, beside variables such as profit/total assets and bad debt/total credit balance, factors like total assets and the increase in the number of enterprises exhibit a positive correlation with the technical efficiency of commercial banks in Thai Nguyen province.

In essence, the examination of literature demonstrates that both local and international studies predominantly utilize the Tobit regression model to scrutinize the determinants impacting bank efficiency. Researchers employ a diverse set of independent variables while gauging the dependent variable, typically the performance of regular banks, through metrics like Return on Assets (ROA), Return on Equity (ROE), Bad debt ratio (NPL), Capital Adequacy Ratio (CAR), or technical efficiency and economic efficiency derived from the outcomes of DEA non-parametric analysis.

The operational efficiency of commercial banks is a fundamental driver of financial sector stability and sustainable economic growth. Theoretical foundations in economics and banking management posit that operational efficiency reflects the ability of a bank to optimize its resource utilization in achieving financial and non-financial objectives, thereby enhancing enterprise value and competitive advantage. Key influencing factors are categorized into managerial capacity, financial strength, technological capability, service quality, competitive conditions, and macroeconomic elements including financial policies, economic environment, and legal frameworks. This theoretical framework provides a basis for detailed analysis of how each factor impacts the operational efficiency of commercial banks, guiding the development of effective improvement strategies.

Extensive research globally and within Vietnam has employed various analytical models such as Tobit regression, Data Envelopment Analysis (DEA), and Stochastic Frontier Analysis (SFA) to measure and assess the determinants impacting commercial banks'

efficiency. Internationally, studies emphasize traditional financial factors including bank size, non-performing loans, profitability ratios, and the effects of major economic events like financial crises and WTO accession. Research carried out in the Vietnamese context often highlights internal bank characteristics such as asset size, capital adequacy, asset quality, cost-to-income ratios, along with external economic and policy influences. While these studies provide valuable insights, their limitations include a primary focus on conventional financial variables and historical data ranges, with insufficient integration of contemporary factors like digital transformation and evolving regulatory landscapes.

Building on this foundation, the current research advances the understanding of Vietnamese joint stock commercial banks' efficiency during 2016–2022 by incorporating a broader range of factors. It focuses particularly on how technical efficiency varies with bank scale and integrates both financial metrics (such as asset size, return on assets, and bad debt ratio) and operational risk indicators. This approach addresses gaps in prior literature by accounting for contemporary banking challenges, adding nuance to efficiency measurement, and providing updated empirical evidence that reflects recent market and regulatory evolutions. These contributions aim to support more informed decision-making and policy development tailored to the evolving Vietnamese banking sector.

**2. Research models and variables**

The Tobit regression model, also referred to as a censored regression model, is constructed for the purpose of estimating the linear relationship between explanatory linear variables in instances where the dependent variable is subject to censoring. This particular model proves to be apt for the assessment of the determinants influencing the operational efficiency of banking institutions, as the dependent variable in question pertains to the said business efficiency (TE). Notably, the business efficiency (TE) variable is considered censored, thereby confined within the range of 0 to 1.

In accordance with the assessment criteria outlined by the CAMEL standards, an examination of the research landscape, as well as the data obtainable from 30 joint stock commercial banks in Vietnam spanning the years 2016 to 2022, the variables selected for inclusion in the Tobit regression model are:

*Table 1: Summary of variables of the coded research model*

Variable name		Code
Independent variables	Asset size	TTS
	Bad debt ratio	NPL
	Return on Asset	ROA
	Return on Equity	ROE
	Equity/Asset ratio	VCSHTS
	Risk provision ratio	DPRR
	Debt/Total Assets ratio	DNTTS
	Expense/Income Ratio	CPTN
Dependent variable	Business efficiency of commercial banks	TE <sub>VRC</sub>

*Source: Research and synthesis by the author*

The dependent variable in the research model is the bank's business efficiency estimated by the DEA method to assess the technical efficiency of scale (TE<sub>VRC</sub>).

**Research Methods**

The present study investigates the factors influencing the operational efficiency of Vietnamese joint stock commercial banks during the period 2016–2022. The empirical analysis employs the Tobit regression model, selected for its suitability in handling censored dependent variables such as technical efficiency scores that lie within a bounded range between 0 and 1. This model is favored over traditional linear regression models because it accounts for the limited dependent nature of the variable, providing unbiased and consistent parameter estimates in this context.

**Research Model Specification and Rationale**

The research model takes technical efficiency (TE)—calculated via Data Envelopment Analysis (DEA)—as the dependent variable. TE serves as a comprehensive measure of banks' ability to optimally convert inputs into outputs

under scale constraints, aligning with core theoretical constructs in efficiency measurement.

Independent variables were chosen based on established banking theory frameworks such as CAMEL (Capital adequacy, Asset quality, Management capability, Earnings, and Liquidity), empirical findings in previous studies both internationally and in Vietnam, and contextual factors peculiar to the Vietnamese banking sector. The model incorporates traditional financial indicators, as well as operational and risk-related factors, thereby enriching the explanatory power beyond prototype theoretical models. Notably, this model integrates the risk provision ratio and expense-to-income ratio, reflecting contemporary challenges faced by Vietnamese banks such as regulatory compliance and cost management efficiency.

**Variable Measurement**

All model variables are carefully defined and measured as follows:

*Table 2: Variable Measurement*

Variable	Symbol	Measurement	Theoretical Basis/Justification
Technical Efficiency	TE	DEA score within	Dependent variable measuring operational efficiency
Asset size	TTS	Natural logarithm of total assets	Proxy for bank scale effects
Bad debt ratio	NPL	Ratio of non-performing loans to total loans	Indicator of asset quality and credit risk
Return on Assets	ROA	Net income divided by total assets	Profitability measure
Return on Equity	ROE	Net income divided by shareholder equity	Profitability relative to owners' equity
Equity to Asset ratio	VCSHTS	Ratio of equity capital to total assets	Measures capital adequacy
Risk provision ratio	DPRR	Provisions for loan losses divided by total loans	Captures prudential risk management
Expense to Income ratio	CPTN	Operating expenses divided by operating income	Reflects operational cost efficiency
Debt to Total Assets ratio	DNTTS	Total debt divided by total assets	Leverage and financial structure indicator

The inclusion of risk provisions and expense management variables represents a noteworthy advancement over classical models, acknowledging emerging pressures on Vietnamese banks from regulation and market competition.

**Tobit Regression and Model Diagnostics**

The Tobit regression approach is employed to estimate the impact of independent variables on the censored dependent variable (TE). This method efficiently addresses the bounded nature of efficiency scores, which cannot logically fall below zero or exceed one.

Model diagnostics consist of multicollinearity checks among explanatory variables to ensure independence, along with likelihood ratio tests or Chi-squared statistics validating model fit and overall significance. Robust standard errors are computed to mitigate heteroscedasticity concerns. The proper

interpretation of coefficients involves examining their sign, magnitude, and statistical significance to determine each factor's positive or negative influence on bank efficiency.

This rigorous methodological framework ensures the reliability of findings and provides a sound basis for practical recommendations tailored to enhancing the efficiency of Vietnamese commercial banks amid evolving economic and regulatory environments.

**3. Statistics of research samples**

Prior to conducting regression analysis of the Tobit model with a censored variable, the researcher aggregates sample statistics to ascertain initial insights into the sample. The dependent variable, Total Effect (TE), is censored on both the left and right sides within the dataset utilized for the study.

*Table 3: Statistics of research samples*

Variables	Mean	Standard deviation	Minimum	Maximum
ROA	0.636	0.536	0.009	2.860
ROE	7.716	6.640	0.091	26.740
NPL	2.053	1.037	0.349	6.610
VCSHTS	8.294	3.134	2.146	23.740
DNTTS	54.809	11.673	11.958	75.548
DPRR	1.315	0.542	0.206	3.465
CPTN	53.475	15.382	9.693	105.338
TTS	203.514	247.672	14.486	1.334.038
TE	0.639	0.157	0.204	1.000

Source: Author statistics samples using STATA

The examination sample consists of 30 joint stock commercial banks over the 7-year investigation period (2016-2022) encompassing a total of 174 data points. The research incorporates 8 distinct independent variables (ROA, ROE, Bad debt ratio, Equity/Asset ratio, Debt/Total Assets ratio, Risk provision ratio, Expense/Income Ratio, Asset size) and 1 dependent variable (TE- Technical Efficiency) according to the statistical table.

Statistical findings regarding the independent variables indicate that the mean for ROA is 6.36%, ranging from a minimum of 0.009% to a maximum of 2.86%; ROE displays a mean of 7.716%, with a minimum of 0.091% and a maximum of 26.74%; Bad debt ratio (NPL) showcases a mean of 2.053%, with a minimum of 0.349% and a maximum of 6.61%; Equity/Asset ratio (VCSHTS) reveals a mean of 8.294%, with a maximum of 23.74% and a minimum of 2.146%; Debt/Total Assets ratio (DNTTS) presents a mean of 54.809% and a maximum of 75.548%, with a minimum of 11.958%. Risk provision ratio (DPRR) demonstrates a mean of 1.315%, a minimum of

0.206%, and a maximum of 3.465%; Expense/Income Ratio (CPTN) holds a mean of 53.475%, with a minimum of 9.693% and a maximum of 105.338%, indicating substantial variance within the sample with a noteworthy standard deviation of 15.382. Asset size (TTS) records a mean of 203.514 billion VND, with a minimum of 14.486 billion VND and a maximum of 1,334.038 billion VND.

The dependent variable is Bank's Technical Efficiency (TE), with an average of 0.639 and a range from 0.204 to 1,000. The technical efficiency (TE) of banks spans from 0 to 1, indicating no bank in the sample with a TE of zero or below, and the most efficiently operating bank reaching a TE of 1. This suggests left-censoring in the research dataset.

**4. Test the correlation between the variables in the research model**

Subsequently, the author proceeds to examine the correlation among the variables in the research framework, and the outcomes are elucidated in the subsequent table.

**Table 4: Correlation between variables in the research model**

	ROA	NPL	VCSHTS	DNTTS	DPRR	ROE	CPTN	TTS
ROA	1.0000							
NPL	-0.1541	1.0000						
VCSHTS	0.1065	0.2463	1.0000					
DNTTS	0.2150	-0.2154	-0.0059	1.0000				
DPRR	-0.0764	0.3658	-0.1263	-0.3403	1.0000			
ROE	0.8367	-0.2451	-0.2270	0.3068	-0.0546	1.0000		
CPTN	-0.6134	0.2530	-0.0830	-0.3606	0.1046	-0.6130	1.0000	
TTS	0.2757	-0.2128	-0.6376	0.2271	0.2192	0.5048	-0.2705	1.0000

Source: Author calculated from Stata

Correlation analysis endeavors to demonstrate whether the variables within the research framework exhibit a correlation. The correlation coefficient ranges from -1 to 1, indicating the degree of correlation between variables; a value closer to 1 signifies a stronger correlation, with a coefficient of 1 indicating an absolute correlation. Conversely, if the correlation coefficient is zero or close to zero, the variables are deemed uncorrelated.

Table 4 illustrates that all correlation coefficients among the variables are non-zero, with the highest correlation coefficient recorded at 0.8367. Consequently, the outcomes of the correlation assessment reveal predominantly low correlations among the variables in the research model, except for the noteworthy correlation of 0.8367 pertaining to ROE. Nevertheless, the presence of a high correlation coefficient suggests the potential for multicollinearity among the variables.

**Table 6: Estimating results of Tobit model of factors affecting business efficiency of Vietnamese commercial banks**

TE	Coefficient	Standard error	t	P > t	Confidence interval 95%	
ROA	0.1005	0.0560	1.08	0.044	0.2111	0.0100
ROE	0.0148	0.0037	3.09	0.002	0.0054	0.0240
NPL	-0.0090	0.0114	0.86	0.085	-0.0126	0.0276
VCSHTS	0.0120	0.0047	2.45	0.016	0.0023	0.0213
DNTTS	0.0001	0.0090	0.14	0.862	-0.0027	0.0016
DPRR	0.0113	0.0235	0.50	0.624	-0.0350	0.0567
CPTN	-0.0074	0.0008	-9.89	0.000	-0.0098	-0.0065
TTS	-0.0365	0.0138	-2.73	0.007	-0.0576	-0.0117
_cons	1.3537	0.1835	7.20	0.000	1.0158	1.7255

Source: Estimating results of Tobit model from Stata

**5. Test the correlation between estimates and observations**

Next, the author tests the correlation between the estimates and observations.

**Table 5: Test the correlation between estimates and observations**

	TE	Yhat
TE	1.0000	
Yhat	0.7846	1.0000

This test shows that the correlation between the predicted and observed values of TE is 0.7846. If this value is squared, it shows a squared correlation with a predicted value of 61.6% in terms of variance with TE.

After testing the correlation between variables, the correlation between estimates and observations, the author tests the impact of factors on technical efficiency (TE) using Tobit model estimation with the right limit ul(1), the estimated results are reflected in the following table:

The regression outcomes from the Tobit model reveal that the model exhibits statistical significance as evidenced by  $\text{Prob} > \text{Chi}^2 = 0.0000$ . The estimation outcomes of the model illustrate that:

ROA demonstrates a favorable impact on TE technical efficiency, displaying a coefficient of influence of 0.1055, which is statistically significant with a P-value of  $0.044 < 5\%$ . Consequently, a 1 unit escalation in ROA leads to a 0.1005 unit increase in TE. This observation suggests that a suitable ROA enables enhanced operational efficiency through effective asset utilization within the banking sector. As per the CAMEL criteria, optimal bank performance is achieved when ROA attains a level of 1.5%.

Moreover, with a P-value of  $0.002 < 5\%$  indicating statistical significance, ROE exerts an effect on technical efficiency, showcasing a positive impact with an impact coefficient of 0.0148. Essentially, a unit increase in ROE results in a corresponding 0.0148 unit rise in TE. A higher ROE implies that a dollar of equity generates greater post-tax profits, reflecting enhanced technical efficiency within the banking institution. In adherence to CAMEL's guidelines, banks achieve maximum effectiveness with an ROE of  $\geq 22\%$ . In the context of Vietnam, an ROE falling between 14% to 17% is deemed commendable.

Further analysis of the estimations reveals that the coefficient of the variable Bad debt ratio (NPL) is -0.0090, signifying statistical significance with a P-value of  $0.086 < 10\%$ . This finding underscores the substantial impact of NPL on bank technical efficiency, showcasing an inverse relationship where a unit increase in NPL results in a 0.0090 unit decrease in TE. It underscores the importance of proficient credit risk management practices such as loan evaluation, monitoring, and compliance with lending regulations, as failure in these areas can elevate bad debts, subsequently escalating costs, diminishing profits, and reducing overall business efficiency within the banking sector. These findings align with prior research outcomes and practical observations in various banking institutions. In accordance with global standards, the NPL ratio for developing nations, including Vietnam, should not surpass 3%.

The coefficient estimation of the Equity/Asset ratio (VCSHTS) on technical efficiency in the research findings is 0.0120, demonstrating statistical significance at P-value of 0.016 which is less than 5%. This outcome indicates a favorable influence of the Equity/Asset ratio (VCSHTS) on technical efficiency; a unit increase in equity raises technical efficiency by 0.0120. Vietnamese joint stock commercial banks enhance equity capital to bolster financial capacity, competitiveness, and ensure CAR for banking operations, thereby improving business efficiency. Nevertheless, the augmentation of capital in large banks is unnecessary when the capital adequacy ratio is already met. Hence, it is crucial for banks to maintain a suitable Equity/Asset ratio to ensure competitiveness, liquidity, and comply with regulatory capital adequacy ratios.

The Expense/Income ratio (CPTN) negatively impacts the bank's business efficiency significantly, as evidenced by a P-value of 0.000, less than 1%, and an impact coefficient of -0.0074. Analysis reveals that a one-unit increase in the Expense/Income ratio (CPTN) results in a 0.0074 decrease in technical efficiency. A higher Expense/Income ratio (CPTN) corresponds to lower business efficiency for the bank. This correlation is logical as the ratio signifies the bank's expenses per dollar of income, with higher costs leading to diminished profits and decreased operational efficiency.

The Asset size (TTS) affects the bank's business efficiency significantly, supported by a P-value of 0.007, less than 5%, and an impact coefficient of -0.0365. Findings indicate that the bank's asset size (TTS) detrimentally impacts its business efficiency. In the realm of joint-stock commercial banks, large banks possess an average asset size of 205.536 billion VND, with numerous banks boasting substantial total assets. A sudden surge in bank assets may prompt a decline in efficiency concerning scale, thereby compromising operational efficiency. Consequently, banks must assess capital augmentation to avert adverse effects on their business efficiency.

The variable for risk provision (DPRR) positively influences the bank's business efficiency, featuring an impact coefficient of 0.0113. Nevertheless, the P-value of 0.624 exceeds 10%, rendering it statistically insignificant and consequently discarded.

The Debt/Total Assets ratio (DNNTS) exerts a positive effect on the bank's business efficiency, supported by an impact coefficient of 0.0001. However, the P-value of 0.862 surpasses 10%, indicating its lack of statistical significance and subsequent removal.

## 6. Conclusion

The research results reveal six significant factors influencing the operational efficiency of Vietnamese joint stock commercial banks: Return on Equity (ROE), Return on Assets (ROA), Bad Debt Ratio (NPL), Equity to Asset Ratio, Expense to Income Ratio, and Asset Size. Notably, NPL, Expense to Income Ratio, and Asset Size demonstrate negative impacts on efficiency, while ROE, ROA, and Equity to Asset Ratio exert positive effects.

These findings align with a broad spectrum of prior studies in the Vietnamese banking context. For instance, studies by Tran Ngoc Tho et al. (2019) and Nguyen Viet Hung (2008) similarly identified capital adequacy, asset quality (proxied by NPL), and profitability indicators as crucial determinants of bank efficiency. Comparable international research, such as that on Greek and Tanzanian banks, has likewise underscored the detrimental role of non-performing loans and operational costs in limiting bank efficiency, further validating the universality of these factors.

The negative impact of Asset Size on bank efficiency echoes findings in recent Vietnamese studies covering 2014–2024, which indicate that larger banks may encounter diseconomies of scale, complicating resource management and operational agility. This result contrasts with some international

perspectives where economies of scale predominate, suggesting contextual differences in market structure, regulatory environment, and technological adoption between Vietnam and developed banking systems.

Furthermore, the Expense to Income Ratio's adverse influence is consistent with global evidence highlighting operational cost management as a crucial lever in enhancing banking performance. This underlines the imperative for Vietnamese banks to optimize cost structures, especially in the face of increasing competition and digital transformation demands.

Distinctively, the inclusion and non-significance of the Risk Provision Ratio and Debt to Total Assets Ratio in this study mark an advance from earlier models by capturing more comprehensive risk and leverage profiles, although their limited effect here may reflect the evolving prudential frameworks and capital adequacy standards recently adopted by Vietnamese regulators.

In summary, this study substantiates many established determinants of bank efficiency while contributing new contextual insights specific to the evolving Vietnamese banking sector. The comparative analysis supports the robustness of the Tobit regression approach and underscores the necessity of adopting multi-dimensional efficiency measurement frameworks that integrate financial, operational, and risk factors.

The outcomes of the Tobit regression model's estimation in analyzing the influence of various factors on the operational efficiency of banks reveal the presence of six significant factors. These factors include Return on Equity (ROE), Return on Asset (ROA), Bad debt ratio (NPL), Equity/Asset ratio (VCSHTS), Expense/Income Ratio (CPTN), and Asset size (TTS). It is noted that NPL, CPTN, and TTS exhibit a detrimental effect on the operational efficiency of banks, while Risk provision ratio (DPRR) and Debt/Total Assets ratio (DNTTS) do not demonstrate statistical significance.

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