ASEAN International Sandbox Conference 2025
http://aseansandbox.org

AISC Proceedings, Volume 4, 2025

The Impact of Non-Interest Income on Bank's Operational Efficiency during the COVID-19 Pandemic: Empirical Evidence from Vietnam

Dang Thu Hang*, Nguyen Hoang Hai, Dinh Thi Quynh Anh, and Do Thi Tho

University of Economics and Business, Vietnam National University, Hanoi, Vietnam
*Corresponding author: E-mail: danghang@vnu.edu.vn

Abstract

This paper investigates the impact of non-interest income and operational efficiency in Vietnamese banks during the Covid-19 pandemic. For this purpose, Fixed Effects and Random Effects models are employed. The results reveal a negative relationship between non-interest income and banks' operational efficiency during the pandemic. Overall, the loan-to-asset ratio has an insignificant effect on operational efficiency, while other factors influence bank efficiency in both positive and negative ways. This study contributes to the existing literature by being one of the first to take into account the Covid-19 pandemic as an independent variable in examining the relationship between non-interest income and bank operational efficiency. This is especially relevant for Vietnamese banks, where non-interest income has become a more significant revenue source due to technological advancements. Despite this, Vietnam's banking system remains underdeveloped and vulnerable, particularly in times of crisis. The findings underscore the need for greater attention to non-interest income in the banking sector during extraordinary events.

Keywords**:** *non-interest income, bank's operational efficiency, Covid-19, Vietnam.*

1. Introduction

In recent years, non-interest income has emerged as the second largest contributor to banks' earnings, complementing traditional interest income from loans and deposits. The Covid-19 pandemic has intensified the focus on understanding the role of non-interest income for commercial banks. Banks have increasingly relied on service fees, recognized as a more stable and less risky source of income than conventional lending. Moreover, banks have actively expanded financial services, including customer guarantees, letters of credit (LCs), non-cash transactions, and cross-selling insurance products (Bancassurance) and securities. Lately, Vietnamese banks have increasingly focused on expanding non-interest income through enhanced service activities, a trend reflected in the 2022 financial results (Chi, 2023). These statistics underscore the significance of non-interest income for banks, highlighting the importance of investigating this revenue stream. Such an inquiry is particularly crucial for banks operating in emerging economies, such as Vietnam. Generally, banks' non-interest income activities can be divided into two main categories: trading activities and commission or fee-based activities (Lepetit, 2008). Similarly, DeYoung and Rice (2004) define non-interest income as revenue not directly related to lending but derived from service and trading-based activities. Research by Lepetit et al. (2008) suggests that non-interest income can mitigate a bank's risk exposure. However, non-interest income is not universally regarded positively. Abedifar (2018) cites several studies that highlight the standalone and systemic risks associated with non-interest income, recommending constraints on banks' non-traditional activities. The relationship between non-interest income and risk is context-dependent. For example, Lee, Yang, and Chang (2014), using data from Asian countries, found that the risk impact of non-interest income varies with a bank's specialization and the country's income level. Specifically, in high-income countries, non-interest activities tend to increase banks' risk, while in middle- and low-income countries, these activities are associated with enhanced profitability or reduced risk.

On the other hand, bank operational efficiency reflects a bank's capacity to optimize the use of its available resources (Banu, 2019). This concept is consistent with the foundational notion of productive efficiency, which defines efficiency as the achievement of maximum output from a given set of inputs (Farrell, 1957). Therefore, investigating the relationship between non-interest income and bank's operational efficiency is essential to understand how alternative revenue channels impact efficiency, enabling banks to optimize their resource allocation, adapt to economic changes, and potentially improve performance amidst varying market conditions. Chiorazzo et al. (2008), indicate that increasing non-interest income will enhance operational efficiency for banks, and the extent of improvement will be positively correlated with the size of the bank. Research by Saklain (2024), in addition, concludes that there is a positive correlation between bank profitability and both non-interest income as well as a more market-oriented financial structure. Nevertheless, Tan and Floros

(2012) uses GMM method and data from China banks to conclude that low profitability can be attributed to a higher volume of non-traditional banking activities and increased taxation. This result casts doubt on the positive impact of non-interest income and the bank's operational efficiency.

In Vietnam, some studies already analyze the relationship between non-interest income and the operational efficiency of banks. Minh and Thanh (2020) uses the Generalized Method of Moments (GMM) method to study the nexus using 26 commercial banks' data in Vietnam from 2008 to 2017, concluding that in this period, the average non-interest income ratio of Vietnamese commercial banks stood at only 8.32%, which is low compared to the interest income ratio (of more than 90%). Notably, during the research period, non-interest income was found to have a positive effect on the performance of Vietnamese commercial banks. Other studies, such as Le and Pham (2017) highlighted that non-interest income does not significantly impact risk but exerts a positive influence on the performance of commercial banks during the respective research periods.

Although previous studies have comprehensively evaluated the impact of non-interest income on the performance of banks in Vietnam, the data in these studies primarily cover periods before 2019. The outbreak of the Covid-19 pandemic during the 2019-2022 period significantly affected the overall economy and the banking sector. Therefore, the author aims to contribute additional data regarding Covid-19 to assess the influence of non-interest income on bank performance by incorporating a Covid-19 variable into the regression model. Research indicates that non-interest income can affect banks' operational efficiency differently. However, limited studies have focused on Covid-19's impact in this context. This study addresses that gap by examining bank operational efficiency during Covid-19, revealing a negative relationship between non-interest income and efficiency during the pandemic. These findings suggest that in unexpected crises, banks should prepare carefully, as non-interest income, typically a driver of efficiency, may negatively impact performance under such conditions.

This research is structured into five sections. Sections 1 and 2 provides an overview of the theoretical framework and reviews relevant literature. Section 3 introduces the research model and data employed in the analysis. Section 4 presents the empirical research findings, and Section 5 discusses the results, proposes solutions, addresses study limitations, and offers recommendations for future research directions.

2. Objectives

1) Assessing the extent of the impact of non-interest income on the operational efficiency of banks across Vietnam, particularly within the context of social fluctuations.
2) Recommending non-interest income sources to support the bank's net interest income and enhance its operational efficiency.

3. Methodology and data

3.1. Model and methodology

In our study, we use the quantitative regression method with data estimated using two models: the Fixed Effects Model (FEM) and the Random Effects Model (REM). Based on the research model of Chiorazzo et al. (2008), the model has been modified by Le and Pham (2017) to fit the conditions of Vietnam. This adjusted model has also been utilized in the study of Phan (2023).

$$Y_{i,t} = \alpha_1 + \alpha_2 ICONON_{i,t} + \alpha_3 INF_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 NPL_{i,t} + \alpha_6 LOAN_{i,t} + \alpha_7 EQUITY_{i,t} + \alpha_9 COVID_{i,t} + \varepsilon_{i,t} + a_i$$

Where the dependent variables $Y_{i,t}$ represent the performance indicators measured by ROA and ROE.
The independent variables include:
$ICONON_{i,t}$ the ratio of non-interest income
$INF_{i,t}$ the inflation rate
$SIZE_{i,t}$ the size of the bank
$NPL_{i,t}$ the non-performing loan ratio
$LOAN_{i,t}$ the loan-to-total assets ratio
$EQUITY_{i,t}$ the equity-to-total assets ratio of the bank
$COVID_{i,t}$ the impact of the COVID-19 pandemic
$\varepsilon_{i,t}$ model error term (unobserved factors)
a_i: latent factors that exist but cannot be directly observed

We employ two models:

$$ROA_{i,t} = \alpha_1 + \alpha_2 ICONON_{i,t} + \alpha_3 INF_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 NPL_{i,t} + \alpha_6 LOAN_{i,t} + \alpha_7 EQUITY_{i,t} + \alpha_9 COVID_{i,t} + \varepsilon_{i,t} + a_i$$
$$ROE_{i,t} = \alpha_1 + \alpha_2 ICONON_{i,t} + \alpha_3 INF_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 NPL_{i,t} + \alpha_6 LOAN_{i,t} + \alpha_7 EQUITY_{i,t} + \alpha_9 COVID_{i,t} + \varepsilon_{i,t} + a_i$$

3.2. Hypothesis

Non-interest income (ICONON)

The "non-interest income ratio" (ICONON) includes net income from services, trading, investments, and other activities of the bank. We hypothesize that this type of income has a positive impact on the bank's operational efficiency, aligning with the results of several studies in Vietnam.

Inflation rate (INF)

Most studies suggest a negative relationship between inflation (INF) and bank's performance. Sergeeva (2021) analyzes data from banks in Ukraine, suggesting that inflation negatively affects the performance of banks. Gul, Irshad, and Zaman (2011) findings align with Sergeeva in terms of Pakistan banks. However, this is not always the case as few studies tell a different story of a positive nexus between inflation and bank's profitability (Batsinda & Shukla, (2019); Tan and Floros, (2012)). These studies indicate that the relationship depends on each economic scenario. With our knowledge, during periods of inflation, banks face challenges retrieving deposit funds as customers prefer to invest in gold, considering it a safer option. When customers refrain from depositing money into banks, the capital structure weakens, making it difficult for the bank to meet business and investment demands. As a result, the bank's operational efficiency declines, and the risk of financial loss increases. Therefore, we hypothesize that the Inflation rate negatively affects bank's operational efficiency.

Bank size (SIZE)

There are differing perspectives regarding the impact of bank size (SIZE) on operational efficiency. According to Adam, Safitri, and Wahyudi (2018), bank size has a negative effect on bank profitability. This conclusion is based on an analysis of 30 commercial banks in Indonesia during the period from 2012 to 2016. Kawshala and Panditharathna (2017) and Kosmidou (2008) suggest the same result with Adam et al. (2018). Meanwhile, studies conducted with data from Vietnamese commercial banks show a different pattern, as a positive nexus is recorded for bank size and bank's operational efficiency (Phuong, Anh, Chanh, & Hanh 2022). We predict that bank size has a positive impact on the bank's operational efficiency.

Non-performing loans (NPL)

Intuitively, non-performing loans (NPL) affect negatively to bank's performance. A high non-performing loan (NPL) ratio indicates challenges in debt recovery for the bank, heightening liquidity risk. Moreover, as the NPL ratio rises, the need for greater loan loss provisions increases. Without effective mitigation, a persistently high NPL ratio may significantly elevate the risk of bank insolvency, potentially impacting depositors adversely (Nair & Fissha, 2010). Kubai's results (2016) in research conducted in Kenya align with the above statement. Similarly, Phuong et al. (2022) in research in Vietnamese commercial banks suggest that an increase in NPLs contributes to heightened operational risks, consequently diminishing the profitability of banks. As a result, we forecast that non-performing loans are detrimental to bank's operational efficiency.

Loan-to-Asset ratio (LOAN)

Loan-to-Asset ratio (LOAN) reveals the primary sources of a bank's income; a higher ratio signifies that the bank generates a substantial portion of its income from loans and investments, whereas a lower ratio suggests reliance on non-interest-earning activities like trading or asset management. According to Chiorazzo et al. (2008) and Stiroh (2004), banks focused primarily on lending tend to pay less attention to other activities, and conversely, those less focused on lending give greater emphasis on alternative operations. We suggest a positive impact on the bank's operational efficiency.

Equity-to-capital ratio (EQUITY)

Banks holding a high equity-to-capital (EQUITY) ratio reduce liquidity risks and build trust with their customers (Chiorazzo et al., 2008). A strong capital structure is essential for banks in developing countries, as it supports them through financial crises and enhances depositor security amidst unstable macroeconomic conditions. Additionally, as banks grow, they gain a competitive edge through product diversification, better income allocation, and efficient use of equity capital for investment projects, which can increase operational costs (Tran & Vy, 2021). Thus, equity capital positively influences a bank's operational efficiency.

The Covid-19 pandemic (COVID)

The Covid-19 pandemic (COVID) has significantly impacted Vietnam's economy, leading to notable differences in the operational performance of Vietnamese commercial banks between the three pandemic-affected years (2019, 2020, and 2021) and the pre-Covid-19 period. The Covid-19 caused a slowdown in economic activities across the board (Nga et al., 2022). This could be attributed to measures and policies introduced by the State Bank of Vietnam, requiring commercial banks to provide support to struggling businesses and individuals. These policies may explain why banks fared relatively better than businesses during the pandemic. Nonetheless, commercial banks could not entirely escape the adverse effects of the Covid-19, which ultimately led to a decline in their operational performance. Thus, we anticipate that the pandemic has an inverse relationship with banks' operational efficiency.

3.3. Data

The research data for this study is derived from the financial reports of 26 commercial banks in Vietnam during the period from 2012 to 2022, covering the pandemic period.

4. Results and Discussion

4.1. Descriptive statistics

Table 1 Descriptive Statistics of Research Variables

Variable	Observations	Mean Value	Standard Deviation	Minimum Value	Maximum Value
ICONON	262	581944	1620799	-586096	7365994
INF	262	2755191	1936853	0,81	8,19
NPL	262	2149395	1218151	0,4666945	8806623
SIZE	262	1882638	1128077	1650921	2147497
EQUITY	262	0,0912512	0,0374414	0,0371741	0,236745
LOAN	262	0,5946235	0,1271934	0,2252535	0,9771297
COVID	262	0,2748092	0,4472725	0	1

Source: Table by authors

Table 1 presents the Non-Interest Income Ratio (ICONON) to total assets for the period 2012–2022, which had an average value of 5.82% with a standard deviation of 1.62%. The lowest recorded value of ICONON was observed at Techcombank (TCB) in 2017, at -5.86%, while the highest value was noted at VietABank (VAB) in 2016, at 7.37%. Non-interest income at VAB showed robust growth in 2016, contributing nearly 8% to the bank's total revenue. The inflation rate (INF) averaged 2.75%, with a standard deviation of 1.93%, fluctuating between 0.81% and 8.19%. This period of relatively low inflation can be attributed to effective monetary policies and fiscal management by the government, which focused on stabilizing prices and curbing inflationary pressures. The Non-Performing Loan Ratio (NPL) had an average value of 2.15%, with a standard deviation of 1.21%. The lowest NPL ratio was recorded at Saigon Commercial Bank (SCB) in 2015, at 0.47%, while the highest was observed at Saigon-Hanoi Commercial Joint Stock Bank (SHB) in 2012, at 8.81%. In 2015, SCB resolved approximately 17,000 billion VND of bad debts by selling them to the Vietnam Asset Management Company (VAMC) and addressed 1,500 billion VND of non-performing loans, reducing its NPL ratio to below 1% by year-end. In contrast, SHB's NPL ratio peaked at 8.8% at the close of 2012, following its merger with Habubank.

The average bank size (SIZE) during the period 2012–2022 was 18.83%, with a standard deviation of 1.13%. The smallest bank size (SIZE) was recorded at Saigon Industrial and Commercial Bank (SGB) in 2013, at 16.51%, while the largest size was observed at the Bank for Investment and Development of Vietnam (BIDV) in 2022, reaching 21.47%. By the end of 2022, BIDV's total assets amounted to 2.121 quadrillion VND, reflecting a 20.4% increase compared to 2021. The average Equity to Total Assets Ratio (EQUITY) was 0.09%, with a standard deviation of 0.04%. SCB recorded the lowest equity ratio in 2017 at 0.03%, while the highest value was observed at SGB in 2013, at 0.24%. The Loan to Total Assets Ratio (LOAN) had an average of 0.59% and a standard deviation of 0.13%. The lowest value was noted at Maritime Bank (MSB) in 2014, at 0.23%, while the highest was recorded at Vietnam Prosperity Bank (VPB) in 2016, at 0.98%. MSB's lending activities declined by

14.2% from 2013, with outstanding loans totaling 23,509 billion VND. In contrast, VPB experienced a credit growth of 17.5% in 2016, supported by strengthened measures for bad debt management and robust controls on the NPL ratio.

4.2 Correlation Analysis

Table 2 Correlation Analysis Between Dependent and Independent Variables

	ROA	ROE	EQUITY	INF	NPL	SIZE	Covid	LOAN	ICON-ON
ROA	1								
ROE	0.8151	1							
EQUITY	0.3629	-0.1395	1						
INF	-0.0313	-0.1438	0.2293	1					
NPL	-0.0789	-0.2096	0.1982	0.3863	1				
SIZE	0.1635	0.3751	-0.4856	-0.2578	-0.2911	1			
COVID	0.0841	0.0774	-0.0642	-0.3328	-0.1985	0.2197	1		
LOAN	0.1385	0.0926	0.0482	-0.3146	-0.2134	0.2908	0.2518	1	
ICONO-N	-0.7371	-0.5596	-0.2541	0.0024	0.0152	-0.0996	-0.0661	-0.1464	1

Source: Table by authors

To evaluate the correlation between the dependent and independent variables, as well as the interdependence among independent variables within the model and to test for multicollinearity, a correlation analysis was conducted. The findings are as follows:

In the Return on Assets (ROA) model, the return on assets (ROA) is most strongly correlated with non-interest income (ICONON), exhibiting a correlation coefficient of -0.7371. The negative sign of this coefficient indicates that non-interest income has an inverse effect on ROA. Additionally, the variables inflation rate (INF) and non-performing loan ratio (NPL) also display negative coefficients, suggesting they inversely affect ROA. In contrast, the remaining variables show positive coefficients, indicating a positive relationship with ROA. In the Return on Equity (ROE) model, the return on equity (ROE) demonstrates the strongest correlation with non-interest income (ICONON), with a coefficient of -0.5596, further suggesting an inverse relationship. Similarly, the variables equity ratio (EQUITY), inflation rate (INF), and NPL all exhibit negative coefficients, indicating inverse relationships with ROE. The remaining variables, however, show positive coefficients, indicating a positive association with ROE.

Finally, examining the correlations among independent variables reveals that the strongest correlation exists between equity ratio (EQUITY) and bank size (SIZE), with a coefficient of -0.4856, indicating a negative relationship. Additionally, a positive correlation of 0.0024 is observed between the inflation rate (INF) and non-interest income (ICONON), suggesting a direct relationship.

4.3. Discussion of Regression Results

ROA Regression Result

Table 3 Research Methodology Model Results (ROA)

Within R-squared = 0.5893

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
EQUITY	7.708823	1.483608	5.2	0	4.403139	11.01451
INF	0.029377	0.006006	4.89	0.001	0.0159954	0.042758
NPL	-0.017	0.018888	-0.9	0.389	-0.0550972	0.025089
SIZE	0.429469	0.052805	8.13	0	0.311821	0.547126
Covid	-0.10986	0.031342	-3.51	0.006	-0.1769655	-0.04027

Within R-squared = 0.5893						
Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**	
LOAN	0.486818	0.38418	1.27	0.234	-0.3691884	1.342824
ICONON	-0.28006	0.036201	-7.74	0	-0.3607157	-0.1994
_cons	-6.33278	1.055526	-6	0	-8.684637	-3.98092

Source: Table by authors

Following the estimation of the regression model, the derived models are as follows:

When Covid = 0 (pre-COVID-19 period):

$$ROA_{i,t} = -6.33 - 0.28ICONON_{i,t} + 0.03INF_{i,t} + 0.43SIZE_{i,t} + 7.71EQUITY_{i,t} + a_i + \varepsilon_{i,t} \quad (1)$$

When Covid = 1 (COVID-19 period):

$$ROA_{i,t} = -6.44 - 0.28ICONON_{i,t} + 0.03INF_{i,t} + 0.43SIZE_{i,t} + 7.71EQUITY_{i,t} + a_i + \varepsilon_{i,t} \quad (2)$$

The ICOCON variable exhibits a negative coefficient at a 5% statistical significance level. Specifically, a 1% increase in ICOCON corresponds to a -0.28% reduction in ROA, holding other factors constant. This finding suggests an inverse relationship between non-interest income and ROA, diverging from prior studies in Vietnam. Previous research by Phan (2023); and Le and Pham (2017) indicated a positive impact of non-interest income on banking performance. While income from service activities stabilizes bank revenue and manages risks effectively, income from trading and investment can introduce volatility, potentially diminishing profitability due to market dependencies and higher risk exposure. Inflation Rate (INF) holds a positive coefficient at a 5% significance level. A 1% increase in INF leads to a 0.03% increase in ROA, with all else constant. Contrary to previous studies, the positive relationship found here aligns with Nguyen (2022), who suggests that inflation, while increasing operational costs, concurrently raises revenue. This contrasts with findings by Phuong et al. (2022), indicating that inflation impacts banks negatively as higher interest rates reduce customers' loan repayment capacity, increasing credit risk.

In addition, the Bank Size (SIZE) variable, measured as the natural logarithm of total assets, has a coefficient of 0.0043, significant at 5%. A 1% rise in SIZE corresponds to a 0.0043% increase in ROA. This positive correlation is consistent with previous studies by Phuong et al. (2022) and Nguyen (2022), indicating that larger banks have better recognition and credibility, which attract diverse customer segments. For banks, reputation and perceived stability often influence customer choice, suggesting that a larger size can positively impact profitability. Equity-to-Total-Assets Ratio (EQUITY) shows a positive coefficient with a 5% statistical significance level, indicating a positive effect on ROA. A 1% increase in EQUITY leads to a 7.71% increase in ROA. These findings align with research by Chiorazzo et al. (2008) and Sufian et al. (2012), showing that higher equity levels enhance liquidity and reassure depositors. As equity represents the bank's own funds, it plays a critical role in securing investor confidence, particularly given the banking sector's monetary sensitivity. The COVID-19 variable negatively correlates with bank performance, with a statistically significant impact at the 5% level. When COVID-19 increases by 1%, ROA declines by -0.11%, consistent with prior research, such as that by Nga et al. (2022), which identified a substantial difference in bank performance pre- and post-pandemic. The global economic disruptions due to COVID-19 led to significant challenges for businesses and individuals, reducing income and expenditure. Consequently, banks implemented relief policies, which impacted profitability, thus indicating the adverse effect of COVID-19 on bank performance.

ROE Regression Result

After selecting an appropriate model, testing, and addressing model deficiencies, the estimated model results using regression estimation and standard errors are as follows:

Table 4 Research Methodology Model Results (ROE)

					Within R-squared = 0,3908	
ROE	**Coefficient**	**std. err.**	**t**	**P>t**	**Confident Interval (95%)**	
EQUITY	-4,277,831	2,474,901	-1,73	0,115	-9,792,254	1,236,592
INF	0,2511092	0,1005448	2,50	0,032	0,0270814	0,475137
NPL	- 0,4218584	0,18306	-2,30	0,044	- 0,8297414	-0,0139754
SIZE	3,967,158	0,6540697	6,07	0,000	25,098	5,424,516
Covid	-1,777,616	0,4376405	-4,06	0,002	-275,274	-0,8024922
LOAN	4,319,709	4,951,104	-0,87	0,403	-6,712,038	1,535,146
ICONON	-2,728,977	0,3418196	-7,98	0,000	-3,490,599	-1,967,356
_cons	-4,387,653	1,128,357	-3,89	0,003	-690,179	-1,873,516

Source: Table by authors

Following the estimation of the regression model, the derived models are as follows:

When Covid = 0 (pre-COVID-19 period):

$$ROE_{i,t} = -43.86 - 2.73ICONON_{i,t} + 0.25INF_{i,t} + 3.96SIZE_{i,t} - 0.42NPL_{i,t} + \varepsilon_{i,t} + a_i \quad (1')$$

When Covid = 1 (COVID-19 period):

$$ROE_{i,t} = -45.64 - 2.73ICONON_{i,t} + 0.25INF_{i,t} + 3.96SIZE_{i,t} - 0.42NPL_{i,t} + \varepsilon_{i,t} + a_i \quad (2')$$

The research findings indicate that the coefficient of determination (R^2) is 39.08%, meaning that the independent variables in the model account for 39.08% of the variation in ROE. Among the variables, five are statistically significant at the 5% level: INF, NPL, SIZE, COVID, and ICONON. In contrast, EQUITY and LOAN are not statistically significant. Consequently, the analysis will focus on the variables NPL, COVID, and ICONON, which exhibit negative coefficients, indicating an inverse relationship with ROE. Additionally, INF and SIZE display positive coefficients, suggesting a direct relationship with ROE.

Similar to the ICONON variable in the ROA model, the non-interest income variable (ICONON) also has a negative coefficient at the 5% statistical significance level in the ROE model. At this significant level, a 1% increase in ICONON results in a 2.73% decrease in ROE. This suggests that, in both the ROA and ROE models, ICONON exerts a negative impact on bank performance. Regarding the inflation rate variable (INF), both the ROA and ROE models exhibit a positive coefficient for INF at the 5% significance level, indicating a positive relationship with bank performance. Specifically, when the inflation rate INF increases by 1%, ROE increases by 0.25. Both models consistently show that INF positively influences bank performance.

In the ROE model, the bank size variable (SIZE) is calculated using the natural logarithm of the bank's total assets. Accordingly, the coefficient estimate for SIZE is 0.0396, indicating that a 1% increase in SIZE results in a 0.0396% increase in ROE. The positive coefficient of SIZE indicates a direct relationship with bank performance, like its impact in the ROA model. The ROE model also differs in terms of variables used, as the non-performing loan ratio (NPL) variable lacks statistical significance in the ROA model, making its results indiscernible. Conversely, in the ROE model, NPL is statistically significant at the 5% level, with a 1% increase in NPL leading to a 0.42% decrease in ROE. This inverse and adverse impact of NPL on bank performance aligns with prior studies by Odebode, Ezi, and Ishioro (2024) and Vellanita, Arimbawa, and Damayanti (2019), who highlighted the importance of minimizing non-performing loans to avoid credit risk. Non-performing loans are debts that the bank cannot recover, and a higher NPL ratio diminishes both profitability and the bank's earning capacity. Persistent non-performing loans, if left unresolved, result in capital loss and reflect poorly on the bank's debt management practices, ultimately impairing bank performance.

Observing the two models (1') and (2'), it becomes evident that bank performance varied significantly between the Covid-19 period and the pre-pandemic period. The Covid-19 variable is statistically significant at the 5% level with a coefficient estimate of -1.77, indicating that the Covid-19 exerts a negative influence on bank performance. Specifically, a 1% increase in the Covid-19 variable leads to a 1.77% decrease in ROE. Therefore, both the ROA and ROE models demonstrate that Covid-19 harms bank performance.

5. Conclusion

Non-interest income is a crucial component for enhancing bank performance. However, the study's findings deviate from prior research, which generally indicates that non-interest income positively impacts profitability and bank performance, especially for banks in the Vietnamese market. In contrast, international studies, such as Williams (2016), suggest that non-interest income often carries higher risks compared to net interest income, although certain types of non-interest income can still enhance bank profitability. This discrepancy implies that while service-related activities may enhance bank performance, business and investment activities often involve market-related risks that are harder to control. Therefore, to improve performance, banks should effectively manage non-interest business activities. Specifically, when investing in projects, thorough due diligence and accurate project valuation are essential to prevent declines in bank performance.

In addition to non-interest income activities, banks should reinforce other operations. For instance, based on the study's findings, banks should focus on expanding their size, implementing strong inflation controls, and maintaining stable equity to support performance improvement. Expanding bank size, in particular, is vital for attracting customers and investors, as a larger scale fosters credibility and customer confidence in the bank's financial services. For example, BIDV, one of four commercial banks partially state-owned, maintained its position as the largest commercial bank in Vietnam by 2022, thus attracting more customers. However, banks must also implement measures to manage and reduce non-performing loans. Furthermore, to address major crises like the Covid-19 or other pandemics, banks should proactively develop response strategies to mitigate challenges and sustain operational stability.

6. References

Abedifar, P., Molyneux, P., & Tarazi, A. (2018). Non-interest income and bank lending. *Journal of Banking & Finance*, *87*, 411-426. doi: 10.1016/j.jbankfin.2017.11.003

Adam, M., Safitri, R., & Wahyudi, T. (2018). Effect of company size, liquidity and operational efficiency on bank profitability with problem credit risk as a moderating variable at commercial banks that are listed on the Indonesia Stock Exchange. *Journal of Perspectives on Financing and Regional Development*, *6*(3), 331-344. doi: 10.22437/ppd.v6i3.5894

Banu, M. (2019). Operational efficiency of Indian banking sector: A comparative analysis. *International Journal of Emerging Technologies*, *10*(3), 45-50.

Batsinda, G., & Shukla, J. (2019). Inflation and profitability of commercial banks in Rwanda: A case study of Bank of Kigali. *International Journal of Business and Management*, *14*(10), 35. doi: 10.5539/ijbm.v14n10p35

Chi, H. (2023). Enhancing non-interest income: An inevitable trend. *State Bank of Vietnam*.

Chiorazzo, V., Milani, C., & Salvini, F. (2008). Income diversification and bank performance: Evidence from Italian banks. *Journal of Financial Services Research*, *33*(3), 181-203. doi: 10.1007/s10693-008-0029-4

DeYoung, R., & Rice, T. (2004). Noninterest income and financial performance at U.S. commercial banks. *Financial Review*, *39*(1), 101-127.

Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the royal statistical society: series A (General)*, *120*(3), 253-281.

Gul, S., Irshad, F., & Zaman, K. (2011). Factors affecting bank profitability in Pakistan. *The Romanian Economic Journal*, *XIV* (39), 61-87.

Kawshala, H., & Panditharathna, K. (2017). The factors affecting bank profitability. *International Journal of Scientific and Research Publications*, *7*(2), 212-216.

Kosmidou, K. (2008). The determinants of banks' profits in Greece during the period of EU financial integration. *Managerial Finance*, *34*(3), 146-159.

Kubai, D. K. (2016). The effects of non-performing loans on operational efficiency of commercial banks in Kenya. A thesis for the degree of Master of Science in Finance. University of Nairobi. http://erepository.uonbi.ac.ke/handle/11295/99705

Le, L. H., & Pham, X. Q. (2017). Ảnh hưởng của thu nhập ngoài lãi đến hiệu quả kinh doanh của các ngân hàng thương mại Việt Nam giai đoạn 2006–2016. *Tạp chí Ngân hàng*, 9(2017), 13–17.

Lee, C. C., Yang, S. J., & Chang, C. H. (2014). Non-interest income, profitability, and risk in banking industry: A cross-country analysis. *The North American Journal of Economics and Finance*, *27*, 48-67.

Lepetit, L., Nys, E., Rous, P., & Tarazi, A. (2008). Bank income structure and risk: An empirical analysis of European banks. *Journal of Banking & Finance*, *32*(8), 1452-1467. doi: 10.1016/j.jbankfin.2007.12.002

Minh, S., & Thanh, T. (2020). Analysis of the impact from non-interest income to the operational efficiency of commercial banks in Vietnam. *Management Science Letters*, *10*(2), 455-462.

Nair, A., & Fissha, A. (2010). Rural banking: The case of rural and community banks in Ghana. *World Bank Agriculture and rural development discussion paper, (48)*.

Nga, P. T. H., Tien, P. M., Thu, N. T. A., Nhi, T. T., Xuan, T. N., Quynh, T. N. N., Anh, P. T. L. (2022). The impact of COVID-19 on the business performance of Vietnamese commercial banks. *Journal of Financial - Marketing Research*, *13*(2), 1-14. https://doi.org/10.52932/jfm.vi68.257

Nguyen, T. D. (2022, December 1). Factors impact on the profitability of commercial banks in Vietnam: Empirical evidence in the period of 2006–2021. Tạp chí Khoa học Kinh tế - Đại học Kinh tế Đà Nẵng, 10(04). https://data.tapchikhkt.vn/due-bucket/uploads/imports/10-04/03.pdf

Odebode, O. K., Ezi, C. T., & Ishioro, B. O. (2024). Effects of non-performing loans on return on equity of selected commercial banks in Nigeria. *World Journal of Advanced Research and Reviews*, *21*(1), 2599-2608. doi: 10.30574/wjarr.2024.21.1.0194

Phan, T. T. H. (2023). Tác động từ thu nhập ngoài lãi đến hiệu quả hoạt động của các ngân hàng thương mại Việt Nam. *Tạp chí Tài chính*, kỳ 2, 8/2023.

Phuong, L. C. M., Ánh, V., Chánh, N., & Hạnh, D. (2022). Yếu tố ảnh hưởng đến hiệu quả hoạt động của các ngân hàng niêm yết trên thị trường chứng khoán. Tạp chí Kinh tế và Phát triển, 774, 46–50.

Saklain, M. S., & Williams, B. (2024). Non-interest income and bank risk: The role of financial structure. *Pacific-Basin Finance Journal*, *85*, 102352. doi: 10.1016/j.pacfin.2024.102352

Sergeeva, E. (2021). Impact of inflation on banks' performance. *Modern Economics*, *25*, 123-129. doi: 10.31521/modecon.V25(2021)-19

Stiroh, K. J. (2004). Diversification in banking: Is noninterest income the answer? *Journal of Money, Credit and Banking*, *36*(5), 853-882.

Sufian, F., & Mohamad Noor, M. A. (2012). Determinants of bank performance in a developing economy: Does bank origin matter? *Global Business Review*, 13(1), 1–23. https://doi.org/10.1177/097215091101300101

Tan, Y., & Floros, C. (2012). Bank profitability and inflation: The case of China. *Journal of Economic Studies*, *39*(6), 675-696. doi: 10.1108/01443581211274610

Tran, T., & Vy, L. (2021). Effects of banking scale and operating expenses to profit of joint stock commercial banks in Vietnam. Science & Technology Development Journal: Economics- Law & Management, *5*(2), 1488-1498. doi: 10.32508/stdjelm.v5i2.733

Vellanita, A., Arimbawa, I. G., & Damayanti, E. (2019). Relationship between non-performing loans (NPL), capital adequacy ratio (CAR), and loan to deposit ratio (LDR) towards return on equity (ROE) at PT. Bank Central Asia 2014–2018. *Journal of World Conference*, 211-216.

Williams, B. (2016). The impact of non-interest income on bank risk in Australia. *Journal of Banking & Finance*, *73*, 16-37. doi: 10.1016/j.jbankfin.2016.07.019