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EFFECTS OF CENTRAL BANK SUPPORT MEASURES IN COVID-19 ON COMMERCIAL BANKS' PERFORMANCE: EVIDENCE FROM THAILAND

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Abstract

Thailand's Central Bank implemented financial rehabilitation measures during the COVID-19 pandemic to support individuals, businesses, and the banking sector. This study examines the effects of these policies on the performance of Thai commercial banks listed in the Stock Exchange of Thailand from 2017 to 2021. Using financial ratios and stock returns as performance indicators, we find notable differences between indicators from before and during the pandemic. Regression analysis revealed a negative correlation between the credit risk reduction measure and return on equity, while a positive, though statistically weak, correlation was also observed between this policy and stock returns. In contrast, the liquidity improvement and debt repayment holiday measures showed limited effects. These findings provide insights into the design and effectiveness of central bank policies during times of crisis.

Keywords: bank performance, Central Bank policy, banks' returns; pandemic, COVID-19

INTRODUCTION

The global response to COVID-19 involved strict lockdowns, essential for curbing the virus, but with significant economic consequences. Industries such as hospitality, tourism, and aviation were hit the hardest, facing cash flow disruptions and declining revenue. This downturn led to rising unemployment, lower household income, and reduced savings, contributing to a broader economic recession.

The banking sector, reliant on steady lending and timely repayments, faced major challenges during the pandemic. As businesses struggled with declining revenue and closures, households also experienced financial strain, affecting their ability to meet loan obligations. The economic and social environment simultaneously increased the demand for financial

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support and new credit within the banking sector (Andersen et al., 2020; Buckley et al., 2021; Guerrieri et al., 2020; Mojon et al., 2021; Sriring & Stapornchamchai, 2021; Thaitrakulpanich, 2020).

To mitigate the negative effects on businesses, households and banks, many central banks introduced financial support and rehabilitation programs. While necessary, these measures, such as interest rate adjustments and interest-only payment options, aimed at directly assisting borrowers, likely had indirect effects on banks.

While previous studies, including Jordà et al. (2020), Karlsson et al. (2014), Kim et al. (2020), and Phan et al. (2020), examined support programs and banking strategies during crises, significant gaps remain. Specifically, an exploration into banks in emerging markets and how these banks are influenced by various support programs, is still lacking.

This study attempts to address this gap by examining how central bank support and rehabilitation programs affect the banking sector in emerging markets, using Thailand as an exemplary case study. Given the Thai economy's heavy reliance on hospitality, the pandemic severely impacted its economy. In response, the Bank of Thailand (BOT) introduced various financial support programs to aid borrowers. This study evaluates the performance of 11 Thai banks listed in the Stock Exchange of Thailand (SET) before and during the pandemic, focusing on the effects of BOT's initiatives while taking each bank's individual responses into account.

Our mean value comparison illustrates the differences in return on equity (ROE), return on assets (ROA), net profit margin (NPM), and stock returns, across two periods: prior to and during the pandemic. Regression analysis revealed more meaningful outcomes. Policies aimed at reducing credit risk and promoting debt restructuring had more pronounced effects on ROE and stock returns. In contrast, other interventions, such as liquidity support measures and debt repayment holidays, yielded a limited impact.

Consequently, this study makes two key contributions. Academically, it advances the existing literature on banking resilience during global crises by examining central bank interventions in a crisis period. It provides empirical evidence on how policies such as credit risk reduction, liquidity support, and debt repayment holidays influence key banking performance metrics, including ROE, NPM, and stock returns.

However, bank performance is also shaped by internal factors. A bank's size, capital reserves, and operational strategies determine its financial stability. Globally Systemically Important Banks (G-SIBs) maintained strong capital levels, managed credit risk effectively, and kept non-performing loans (NPLs) low before the pandemic (Bitar & Tarazi, 2020). Similarly, banks affiliated with the U.S. Federal Reserve System (and the U.S. Federal Deposit Insurance Corporation) benefited from stable deposits, improved liquidity, and asset growth (A. Andersen et al., 2020). By incorporating internal factors and strategic aspects of banks, our analysis can more effectively isolate and distinguish the effects of central bank interventions during a crisis on bank performance.

Beyond its academic contributions, this study offers practical insights for policymakers and banking practitioners. It informs central bank policy design for economic downturns, and helps commercial banks develop appropriate financial rehabilitation strategies and navigate central bank policy measures aimed at crisis mitigation. These findings are particularly important for emerging economies, equipping them with an improved understanding to support effective navigation of future external shocks.

This paper is structured as follows. Section 2 reviews the literature on the effects of central bank policies on commercial bank performance, key performance metrics during normal and pandemic periods, and financial rehabilitation programs implemented internationally. Subsequently, section 3 provides an overview of Thailand's BOT-led rehabilitation policies. Section 4 outlines the study's hypotheses regarding the expected effects of these policy measures. Section 5 describes the analysis methodology and data. Section 6 presents the empirical findings and discussion. Section 7 offers directions for future research. Section 8 concludes the paper with summary reflections and key policy implications.

LITERATURE REVIEW

Theoretical Foundations of Central Bank Policies and Commercial Bank Performance

A substantial body of research has demonstrated that central bank policies influence commercial banks through mechanisms beyond traditional interest rate channels, including credit supply constraints and financial frictions, which directly affect banks' profitability and valuation. Bernanke and Blinder (1988) introduced the credit view, proposing that monetary policy impacts aggregate demand not only through interest rate adjustments but also by altering banks' loan supply. Building on this foundation, Bernanke and Gertler (1995) further formalized the credit channel into two distinct mechanisms: the bank lending channel, focusing on the capacity of banks to provide credit, and the balance sheet channel, emphasizing how changes in borrowers' net worth affect their access to external financing. Collectively, these studies imply that expansionary monetary policy facilitates increased lending, reduces perceived credit risk, and positively impacts key performance indicators such as ROA, ROE, and stock prices.

Subsequent studies have offered theoretical refinement and empirical support. Gertler and Kiyotaki (2010) utilized a general equilibrium framework to illustrate that financial shocks decrease intermediary net worth, tighten leverage constraints, and consequently reduce credit availability, asset prices, and bank profitability. Kashyap and Stein (1994) further showed that banks' responses to monetary tightening vary by size and balance sheet strength. In particular, smaller and less liquid institutions with weaker balance sheets tend to contract loan supply more sharply, limiting their capacity to generate income and undermining investor confidence.

Underlying these dynamics is the inherent fragility of the banking sector. Diamond and Rajan (2006) highlighted the vulnerability of banks, which arises from their critical role in liquidity transformation, particularly under contractionary monetary policy or credit disruptions that reduce depositor confidence. In response, central banks play a vital role by providing external liquidity to sustain bank stability. Freixas and Rochet (2008) expanded on these insights by modeling how asymmetric information and coordination failures exacerbate systemic risk. Their analysis underscored the importance of central banks' prudential regulation and lender-of-last-resort interventions in preventing lending disruptions and preserving banks' capital adequacy, ultimately safeguarding profitability and market value.

Collectively, these studies provide a unified theoretical framework for understanding how central bank policies, through credit transmission, liquidity support, and macro-financial interactions, shape commercial banks' performance, stability, and valuation, particularly during periods of economic or financial stress.

Bank Performance Metrics and Their Driving Factors: Normal Periods and the Pandemic

Financial metrics such as ROE, ROA, and NPM, are typically recognized as key indicators of bank performance (European Central Bank, 2010; Pennacchi & Santos, 2021). As highlighted by Naceur and Omran (2011), higher ROE and ROA generally reflect a bank's stronger capacity to generate profits, which can, in turn, lead to higher stock prices. Stock returns, therefore, also serve as a relevant indicator of bank performance.

Various factors, both internal and external, influence bank performance. The size of a bank, its capital reserves, and operational strategies play a central role in determining its financial health and thereby performance (Mirzaei, 2013). For instance, G-SIBs, because of their strong capital levels, managed credit risks well, and had fewer NPLs before the COVID-

19 outbreak. In the perspective of operational strategies, banks associated with the US Federal Reserve System benefited from strengthening deposit bases and assets, as well as improved liquidity (Anderson et al., 2020). Externally, macroeconomic elements such as inflation, interest rate changes, and cyclical output, have also been identified as key drivers of bank performance (Bourke, 1989; Chaudhry et al., 1995; Molyneux & Thornton, 1992).

However, the importance of these typical internal and external factors may vary across situations. For example, during global pandemics, aspects that are often overlooked, such as credit and liquidity risks, can become relevant (Berger & Bouwman, 2013). Typical internal factors such as capital adequacy, liquidity, and bank size, may take on new importance. As pointed out by Mirzaei and Mirzaei (2011), larger banks are generally more resilient in weathering negative circumstances. Furthermore, elements such as non-performing financing can also exacerbate poor bank performance in these challenging periods, as discussed by Ichsan et al. (2021).

Financial Rehabilitation Programs During the COVID-19 Pandemic

During the COVID-19 pandemic, many countries introduced relief packages to assist borrowers and indirectly support the banking sector (Ozili, 2022). These packages largely targeted credit risk and liquidity concerns. For example, Indonesia prioritized interest rate reductions and extended payment terms, while African nations such as Egypt and Nigeria implemented debt repayment holidays (Disemadi & Shaleh, 2020).

These measures altered the liquidity and borrowing conditions, which were likely reflected in changes in NPLs (Al-Romaihi et al., 2020), in turn influencing banks' returns and performance metrics. However, as noted by Demirgüç-Kunt et al. (2021), the effects of such measures varied across banks.

Thailand's Financial Rehabilitation Programs

The Thai Ministry of Finance (MOF) and BOT play critical roles in regulating Thailand's banking sector. The MOF oversees six specialized state-owned banks and has been instrumental in introducing targeted measures through them, such as liquidity support programs for low-rate loans, to mitigate the economic impact of the pandemic. In parallel, the BOT supervises commercial banks and financial institutions, implementing three key financial measures to address pandemic-related challenges.

These measures can be categorized into three policy groups, referred to throughout this paper as PG1, PG2, and PG3. PG1 focuses on debt restructuring to alleviate borrowers' financial burdens. PG2 aims to enhance liquidity for struggling businesses, while PG3 provides temporary debt repayment holidays to support both individuals and enterprises. Table 1 summarizes the specifics of these policies, offering a concise overview of the strategies employed to stabilize the banking sector during the pandemic.

Table 1 BOT's Policies Categorized by Their Objectives and Effects

Policy	Essence of BOT's Policy	Policy Details
PG1	Credit Risk Reduction/Debt Restructuring	a. Reduction of Principal and Interest Repayment b. Reduction of Interest Rates c. Extension of Debt Repayment Periods
PG2	Liquidity Improvement	a. Increased Loan Offering
PG3	Debt Repayment Holidays	a. Principal and Interest Repayment Holidays b. Principal Repayment Holidays

Note: Authors' arrangements and summary (Bank of Thailand, 2021a, 2021b, 2021c, and n.d.).

Expected Effects of Policy Interventions on Bank Performance

Conceptually, PG1, by reducing borrowers' repayment obligations, has the potential to alleviate the burden of banks' NPLs—an outcome generally regarded as positive. At the same time, however, such a reduction in repayment obligations unavoidably diminishes banks' income streams, which is naturally viewed less favorably. The overall effect of PG1 on banks' performance is, therefore, theoretically ambiguous. We thus seek to determine its impact empirically.

PG2 provides borrowers with additional credit that may be used to service existing obligations, thereby potentially improving banks' liquidity positions. However, the increased credit risk due to the new lending may adversely affect bank performance. As with PG1, the net effect of PG2 is theoretically indeterminate and thus worth empirical investigation.

PG3 involves a suspension of loan repayments. Similar in nature to PG1, this measure leads to an inevitable decline in banks' income streams, which negatively affects performance. At the same time, loans granted repayment holidays—whether on principal alone or on both principal and interest—may be excluded from classification as NPLs, which can be viewed as favorable to bank performance. The overall impact of PG3 remains unclear.

In short, these three policy groups—PG1, PG2, and PG3—present complex and potentially conflicting implications for the financial performance of banks. While each policy aims to support borrowers during times of crisis, their effects on a bank's balance sheet, risk profile, and income streams may vary. This study seeks to explore these critical issues by examining how these policy groups influenced key bank performance metrics during the COVID-19 pandemic.

RESEARCH METHODOLOGY AND MATERIALS

This study assesses the performance of commercial banks through key financial ratios—ROE, ROA, NPM—and stock returns, with each capturing a distinct aspect of bank performance. ROE measures how effectively a bank converts equity capital into profits, ROA gauges profitability relative to total assets, and NPM indicates the proportion of revenue that translates into net profit. Observing changes in these indicators between the pre-pandemic period and the period during the pandemic may indicate the combined effects of COVID-19 and the policies of the Central Bank on bank performance.

Nonetheless, the observed changes reflect the combined impact of both the pandemic and the policy interventions. To better untangle the effects of the pandemic from those of the policy measures, a more robust strategy is required. In addition, banks exercise discretion in selecting which policy intervention groups introduced by BOT to adopt. This choice-based nature introduces further challenges in evaluating the effects of these policy initiatives, particularly if the analysis relies solely on comparing key performance indicators before and during the pandemic. To address these issues, regression analysis was employed, allowing a more rigorous approach by controlling for other influencing factors and incorporating lag variables to better identify the effects of the Central Bank's intervention policies.

ROE, ROA, NPM, and stock returns, serve as dependent variables in the regression models. The primary independent variables are dummy variables representing the three central bank policy groups (see Table 1). To account for other factors influencing bank performance, bank-specific characteristics and macroeconomic variables were also included.

Our sample comprised all commercial banks listed in the SET, totaling 11 institutions. Data on ROE and ROA were collected from the BOT website (Bank of Thailand, 2022), while stock prices were retrieved from the SET (Stock Exchange of Thailand, 2022). Stock returns were subsequently computed from year-end figures. Macroeconomic data covering both the pre-pandemic and pandemic periods were gathered from the World Bank (2022).

The dataset was structured as panel data, estimating several regression specifications, with the representative model expressed as:

$$perf_{it} = \alpha + \beta_1 \cdot PG1_{it} + \beta_2 \cdot PG2_{it} + \beta_3 \cdot PG3_{it} + \sum_j \gamma_j \cdot Z_{ijt} + \sum_m \theta_m \cdot E_{mt} + \sum_i \delta_i \cdot D_i + \varepsilon_{it}$$

where $perf_{it}$ is bank i's performance measure in year t. $PG1_{it}$ is a dummy variable indicating whether bank i adopted the Central Bank's policy group 1 in year t. $PG2_{it}$ indicates adoption of policy group 2 in year t, and $PG3_{it}$ denotes adoption of policy group 3 in year t. We also include Z_{ijt}, which captures bank i's characteristic j in year t, and E_{tm}, which represents macroeconomic condition m in year t, to account for the influences of these variables on bank performance. Additionally, bank dummies (D_i) were added, to control for idiosyncratic differences in performance across banks. The disturbance term is ε_{it}.

The decision of whether, when, and which policy to adopt lies at the discretion of each bank. This introduces a potential endogeneity concern, as causality may run in the reverse direction—that is, from performance to policy adoption. Moreover, the effects of policy adoption on bank performance may take time to materialize and be reflected in performance measures. To address these concerns, lagged dummy variables of policy adoption were incorporated in the regression model. The revised specification is written as:

$$perf_{it} = \alpha + \beta_1 \cdot PG1_{it-1} + \beta_2 \cdot PG2_{it-1} + \beta_3 \cdot PG3_{it-1} + \sum_j \gamma_j \cdot Z_{ijt} + \sum_m \theta_m \cdot E_{mt} + \sum_i \delta_i \cdot D_i + \varepsilon_{it}$$

where $PG1_{it-1}$ is a dummy variable indicating if bank i adopted the Central Bank's policy group 1 in year $t-1$. $PG2_{it-1}$ indicates adoption of policy group 2 in year $t-1$, and $PG3_{it-1}$ denotes adoption of policy group 3 in year $t-1$.

RESEARCH RESULTS AND DISCUSSION

Mean Difference Comparison

Table 2 reports the results of the mean difference comparisons for the financial ratios and stock returns of the 11 commercial banks between the pre-pandemic period (2017-2018) and the first two years of the pandemic (2019-2020). The findings reveal statistically significant changes in ROE, NPM, and stock returns across the periods.

The average ROE before the pandemic (M = 10.34, SD = 4.38) was significantly higher than during the pandemic (M = 8.11, SD = 4.38) with a t-statistic of -2.6357 and a p-value of 0.0271. Similarly, NPM also declined from its pre-pandemic level (M = 26.98, SD = 10.85) to the pandemic period (M = 23.37, SD = 7.53), yielding a t-statistic of -1.9921 and a p-value of 0.0775. Furthermore, stock returns decreased significantly from a pre-pandemic average of 1.93% (SD = 1.35%) to -14.96% (SD = 1.16%) during the pandemic, with a t-statistic of - 3.3528 and a p-value of 0.0085.

However, ROA shows no statistically significant difference between the two periods, despite a slight increase in the mean from 2.96 (SD = 0.76) to 3.00 (SD = 0.89) during the pandemic (t-statistic = 0.2551 and p-value = 0.8044).

Table 2 Results of the Mean Difference Comparison

	ROE		ROA		NPM		Stock Return	
Period	Before	During	Before	During	Before	During	Before	During
Mean	10.34	8.11	2.96	3.00	26.98	23.37	1.93%	-14.96%
Standard Deviation	4.38	4.38	0.76	0.89	10.85	7.53	1.35%	1.16%
Pearson Correlation	0.8272		0.8763		0.8665		-0.0114	
t-Statistic	-2.6357		0.2551		-1.9921		-3.3528	
P (T ≤ t) two-tail	0.0271**		0.8044		0.0775*		0.0085***	

Note: *10% significance level, **5% significance level, ***1% significance level. The critical value for the two-tailed test is 2.2622.

The mean difference test highlights a shift in bank performance between the pre-pandemic and pandemic periods. Indicators such as ROE, NPM, and stock returns, exhibit significant changes. These shifts are closely associated with variations in net interest income, overall earnings, and equity value.

ROE, which gauges a bank's net income relative to total equity, is particularly sensitive to changes in net interest income. As the pandemic led to a substantial drop in this income stream, ROE inevitably deteriorated. The drop in ROE during the pandemic also parallels the decline observed in NPM.

A key factor influencing net income is the provision for loan losses (PLL)—funds set aside to cover potential losses from NPLs. Soaring PLL levels can significantly reduce a bank's reported net income. During the pandemic, elevated uncertainty surrounding economic recovery, vaccine effectiveness, and the extent of governmental support, combined with borrowers' financial hardships, contributed to weaker loan demand. This, in turn, further constrained bank revenues and negatively affected earnings performance. As a result, investor confidence in the banking sector weakened following the onset of the pandemic. This is reflected in the marked deterioration in stock returns between the two periods.

Regression Analysis and Results

Regression analysis was conducted to examine the relationship between ROE and the three central bank policy groups. Table 3 presents the results. Column 1 reports estimation results from the fixed-effects model, while Column 2 presents results from the random-effects model. Both specifications incorporate a key bank-specific characteristic, bank size (measured by the natural logarithm of total assets), and two macroeconomic indicators, (1) nominal gross domestic product (NGDP), measured in current Thai baht value; and (2) inflation, measured by changes in the consumer price index. In addition, both models control for bank-specific effects through bank dummies and include a constant term.

The results shown in Columns 1 and 2 reveal a statistically significant negative coefficient on the natural logarithm of total assets, suggesting that larger banks tend to have lower ROE. To determine which regression model best fits the data, a Hausman test was performed, yielding a chi-square statistic of 8.63. This result supports the use of the fixed-effects model over the random-effects model at the 5% significance level.

Table 3 Regression Results Evaluating Bank Performance via ROE

Model Variable	(1) FE[a] ROE	(2) RE[b] ROE	(3) FE ROE	(4) FE ROE	(5) FE ROE	(6) RE ROE	(7) FE ROE	(8) FE ROE
PG1			3.90** (1.54)	-3.12** (1.40)			-4.02* (2.07)	-2.54 (1.95)
PG2			0.41 (1.01)	-0.91 (1.27)			0.23 (1.33)	0.48 (1.35)
PG3			0.64 (1.60)	2.24 (1.64)			0.67 (2.07)	0.79 (1.96)
Bank size	-8.10*** (2.03)	-2.85** (1.15)	-0.45 (2.51)	-6.64** (3.06)	-5.67** (2.51)	-1.85 (1.14)	-0.90 (2.86)	-5.92* (3.20)
NPLs/total loans				-6.99 (7.17)				-1.83 (7.34)
Deposits/liabilities				-8.90 (6.32)				-4.88 (8.43)
NGDP	1.02* (0.57)	0.80 (0.61)	0.24 (0.51)	1.21** (0.54)	2.82*** (0.86)	3.24*** (0.84)	0.97 (0.96)	2.11** (0.96)
Inflation	0.46 (0.39)	0.58 (0.42)	0.00 (0.35)	-0.31 (0.32)	-0.23 (0.45)	-0.37 (0.46)	1.27* (0.62)	0.16 (0.69)
Constant	160.55*** (41.69)	55.09** (25.16)	15.86 (49.63)	143.00** (62.40)	80.83 (58.01)	-5.16 (28.89)	12.03 (59.55)	110.02 (66.24)
Bank dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	54	54	54	54	43	43	43	43
R-Squared	0.38		0.59	0.71	0.50		0.64	0.74

[a]FE refers to fixed effects. [b]RE refers to random effects.
Note: Standard errors are in parentheses. *10% significance level, **5% significance level, ***1% significance level.

Three primary dummy variables—PG1, PG2, and PG3—were incorporated as shown in Columns 3 and 4. PG1 captures the adoption of measures aimed at reducing credit risk or facilitating debt restructuring. PG2 corresponds to liquidity-enhancing initiatives, while PG3 reflects the implementation of debt repayment holidays. These variables were applied contemporaneously (in the current year), reflecting the timing of policy adoption and the assumed materialization of their effects within the current year.

Column 4 refines the specification presented in Column 3 by including two additional bank characteristics—the NPL ratio (NPLs to total loans) and the deposit ratio (deposits to total liabilities), which serve to control for their respective effects on ROE. Both columns yield a negative coefficient on PG1, indicating a consistent negative relationship between the credit risk reduction policy and ROE. In contrast, the coefficients for PG2 and PG3 were not statistically significant, suggesting that these policy groups did not have a discernable impact on ROE.

To address the concerns about potential endogeneity arising from banks' discretionary adoption and the possibility of a time lag between policy implementation and its impact on performance, lagged policy dummy variables were introduced in Columns 5 through 8. These models follow the same structure as the regression specifications presented in Columns 1 to 4. In both Columns 7 and 8, the lagged credit risk mitigation policy (PG1) continues to generate a negative estimated coefficient, further reinforcing the observed negative relationship between PG1 and ROE.

An important point to note from Table 1 is that the dataset used in the regression analysis includes observations from the year 2021. However, the total number of observations is 54 in Columns 1 to 4 and 43 in Columns 5 to 8, rather than the expected 55 or 44. This discrepancy is due to the 2021 merger between TMB Bank and the banking subsidiary of Thanachart

Capital, which resulted in the consolidation of their financial data for that year.

Table 4 examines the impact of policy variables on ROA, extending the analysis presented in Table 3 by including an additional independent variable—the equity to assets ratio—in Columns 4 and 8. This variable is introduced to control for capital structure, as equity is not directly related to the dependent variable in the context of ROA. To determine the appropriate model specification, Hausman tests were conducted to compare Columns 1 and 2, which employed contemporaneous policy variables, as well as Columns 5 and 6, which used lagged policy variables. The results of these tests support the use of the fixed-effects model over the random-effects alternative.

Table 4 Regression Results Evaluating Bank Performance via ROA

Model Variable	(1) FE ROA	(2) RE ROA	(3) FE ROA	(4) FE ROA	(5) FE ROA	(6) RE ROA	(7) FE ROA	(8) FE ROA
PG1			-0.95 (0.72)	-0.85 (0.77)			-0.25 (1.18)	-0.10 (1.25)
PG2			-0.07 (0.48)	-0.40 (0.70)			-0.43 (0.76)	-0.98 (0.87)
PG3			0.18 (0.75)	0.45 (0.90)			0.24 (1.18)	0.77 (1.26)
Bank size	-3.41*** (0.83)	-0.59** (0.25)	-1.48 (1.18)	-1.81 (1.68)	-3.85*** (1.23)	0.50** (0.24)	-3.74** (1.63)	-4.44** (2.05)
NPLs/total loans				-1.30 (3.94)				-3.55 (4.70)
Equity/ assets				3.49 (8.84)				-3.34 (14.15)
Deposits/ liabilities				-2.20 (3.47)				-6.53 (5.40)
NGDP	0.19 (0.23)	0.07 (0.26)	-0.02 (0.24)	0.01 (0.30)	0.13 (0.42)	0.52 (0.44)	-0.03 (0.55)	-0.04 (0.61)
Inflation	-0.12 (0.16)	-0.06 (0.18)	-0.24 (0.16)	-0.22 (0.17)	-0.10 (0.22)	-0.24 (0.24)	0.02 (0.36)	-0.14 (0.44)
Constant	70.55*** (17.12)	13.85** (6.44)	34.12 (23.28)	41.81 (34.26)	80.49*** (28.38)	4.74 (8.89)	80.89** (33.98)	101.47** (42.42)
Bank dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	54	54	54	54	43	43	43	43
R-Square	0.28		0.40	0.42	0.29		0.30	0.36

Note: See Table 3. The Hausman tests for Columns 1 and 2 yielded a chi-square of 11.20, favoring the fixed-effects model at the 1% significance level. For Columns 5 and 6, the chi-square was 8.11, also supporting the fixed-effects model at the 5% significance level.

Strikingly, neither the contemporaneous nor the lagged policy dummy variables yielded a statistically significant coefficient, suggesting that the three policy groups had no significant influence on ROA. The regressions also revealed a negative relationship between bank size and ROA, confirming the commonly observed pattern that larger banks tend to be less effective in utilizing their total assets to generate net income compared to their smaller counterparts.

The results shown in Table 5, indicate the assessment of bank performance using the NPM metric. Based on the Hausman tests conducted for Columns 1 and 2 as well as Columns 5 and 6, the random-effects model is rejected in favor of the fixed-effects model. The pattern of results shown in this table closely resembles that reported in Table 4. The estimated coefficients for the contemporaneous policy variables (Columns 3 and 4) and their lagged counterparts (Columns 7 and 8) are not significantly different from zero, suggesting that the three policy groups did not have a significant impact on NPM.

Table 5 Regression Results Evaluating Bank Performance via NPM

Model Variable	(1) FE NPM	(2) RE NPM	(3) FE NPM	(4) FE NPM	(5) FE NPM	(6) RE NPM	(7) FE NPM	(8) FE NPM
PG1			0.45 (25.30)	0.70 (27.08)			3.70 (35.13)	0.61 (38.66)
PG2			3.07 (16.66)	-0.51 (24.51)			7.59 (22.53)	10.48 (26.84)
PG3			-2.47 (26.23)	-0.29 (31.71)			-4.36 (35.11)	-7.71 (38.92)
Bank size	-8.82 (26.83)	-2.35 (3.81)	-6.96 (41.29)	-3.02 (59.28)	27.82 (36.28)	-2.31 (4.70)	27.06 (48.60)	38.39 (63.36)
NPLs/ total loans				-32.22 (138.80)				-0.18 (145.49)
Equity/ assets				156.54 (311.71)				133.11 (438.14)
Deposits/ liabilities				-10.18 (122.34)				64.83 (167.09)
NGDP	13.36* (7.54)	13.93 (8.85)	13.24 (8.38)	11.89 (10.40)	23.38* (12.34)	25.57* (14.63)	25.85 (16.34)	23.91 (18.99)
Inflation	-0.90 (5.22)	-2.39 (6.13)	-0.91 (5.68)	-0.06 (6.11)	-4.22 (6.56)	-6.98 (8.02)	-5.99 (10.59)	-3.32 (13.74)
Constant	-2.0 (552)	-144.8 (160)	-38.8 (815)	-109.3 (1207)	-926.2 (837)	-344.3 (258)	-950.5 (1011)	-1223.6 (1313)
Bank dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	54	54	54	54	43	43	43	43
R-Squared	0.09		0.09	0.10	0.13		0.14	0.15

Note: See Table 3. The Hausman tests yielded significant chi-square values: 18.13 for Columns 1 and 2 and 18.39 for Columns 5 and 6, favoring the fixed-effects model at the 1% significance level. Constants are reported with one decimal point, while standard errors are rounded to whole numbers in all models.

Interestingly, the influence of bank size on NPM is less statistically pronounced than its influence on ROE and ROA. Nonetheless, this relationship remains consistently negative across all eight columns. In contrast, the regressions report a large and positive coefficient on NGDP, suggesting that national output is positively associated with NPM.

The results shown in Table 6 display the investigation of the impact of policy adoption on stock returns, which was calculated by comparing share prices at the beginning and end of the same year. Consequently, 2021 data were excluded, reducing the number of observations from 54 to 43. This data attrition prompted a refinement of the regression models. Notably, when applying the same regression frameworks as those in Tables 3, 4, and 5, the regression specifications in Column 1 and Column 5 were structurally identical, as are those in Columns 2 and 6. To avoid duplication, only six columns instead of eight are presented in Table 6. As in previous tables, the Hausman test, applied to Columns 1 and 2, supports the use of the fixed-effects model over the random-effects alternative.

The results shown in Columns 5 and 6 suggest that the credit risk reduction policy (PG1) may have exerted a mildly favorable influence on stock returns. The estimated coefficients for PG1 are positive and approach statistical significance at the 10% level, though they fall short of typical thresholds. In contrast, the estimated coefficients for PG2 and PG3 are not statistically distinguishable from zero, revealing no discernible effects on stock returns.

Interestingly, Columns 1 through 4 consistently report a statistically significant and positive association between inflation and stock returns, corroborating the widely observed pattern that stock prices tend to move in the same direction as the general price level in the economy.

Table 6 Regression Results Evaluating Bank Performance via Stock Return

Model	(1) FE	(2) RE	(3) FE	(4) FE	(5) FE	(6)FE
Variable	**SR[a]**	**SR**	**SR**	**SR**	**SR**	**SR**
PG1			10.92 (17.71)	13.45 (19.22)	25.40 (19.44)	27.14 (21.44)
PG2			8.04 (10.60)	0.39 (15.80)	13.16 (12.49)	13.13 (14.89)
PG3			6.08 (16.57)	13.66 (20.72)	-15.68 (19.43)	-15.25 (21.58)
Bank size	58.17** (22.04)	-1.47 (2.35)	28.17 (28.65)	14.30 (40.30)	40.22 (26.89)	34.05 (35.14)
NPLs/total loans				-47.28 (89.37)		-17.81 (80.69)
Equity/assets				-49.96 (229.76)		-64.29 (242.99)
Deposits/liabilities				-60.46 (109.15)		2.03 (92.67)
NGDP	-4.78 (7.50)	-11.25 (7.32)	11.65 (10.38)	13.62 (12.04)	6.08 (9.04)	7.18 (10.53)
Inflation	11.65*** (3.99)	13.77*** (4.01)	10.30** (3.81)	9.99* (4.26)	3.30 (5.86)	2.03 (7.62)
Constant	1146** (509)	198 (129)	-798 (564)	-487 (814)	-949 (559)	-832 (728)
Bank dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43	43	43	43	43	43
R-Squared	0.41		0.53	0.54	0.52	0.52

[a]SR stands for stock return.
Note: See Table 3. The Hausman test, comparing Columns 1 and 2, yields a chi-square value of 7.00, favoring the fixed-effects model at the 5% significance level. The estimated constant and standard error are rounded to whole numbers in all models.

In summary, the PG1 dummy, representing the credit risk reduction measure, exhibited a negative correlation with ROE and a mildly positive correlation with stock returns. In contrast, the liquidity enhancement measure (PG2) and the debt repayment holiday measure (PG3) had no discernible impact across all four examined bank performance metrics.

Beyond the scope of financial rehabilitation programs, our findings indicate that larger banks generally exhibited lower ROE and ROA, aligning with the commonly observed inverse relationship between bank size and equity and between bank size and asset-based profitability. Additionally, national output (NGDP) was positively associated with both ROE and NPM, reinforcing the link between macroeconomic activity and bank performance. As expected, inflation emerged as a key factor positively influencing stock returns.

FUTURE RESEARCH

While the present study offers initial empirical insights into the effects of central bank support measures on commercial bank performance, future exploration could strengthen causal identification by employing other advanced econometric strategies. In particular, adopting a two-stage least squares approach or substituting instrumental variables for policy dummy variables may help mitigate potential endogeneity concerns arising from policy self-selection or reverse causality between policy adoption and performance outcomes.

Additionally, future investigations could utilize a difference-in-differences (DiD) regression framework, a widely adopted method for evaluating the impact of policies. However, the applicability of this technique is constrained in the present study due to the near-universal adoption of at least one category of financial rehabilitation measures among Thai commercial banks, limiting the formation of a robust control group. Alternatively, scholars may consider employing propensity score matching to construct a pseudo-comparison between policy-adopting and non-adopting banks with comparable pre-intervention characteristics. Where sufficient temporal and cross-sectional variation exists, a DiD framework, potentially augmented by the matching method, could be implemented to generate credible counterfactuals and capture heterogeneous treatment effects across bank and policy types.

These methodological extensions would contribute to a more comprehensive understanding of the mechanisms through which central bank crisis-era interventions influence commercial bank behavior and performance, particularly in emerging market contexts.

CONCLUSION

This study assessed the performance of 11 Thai banks before and during the COVID-19 pandemic, examining the influence of central bank interventions. We observed changes in ROE, NPM, and stock returns, between the pre-pandemic and pandemic periods. Regression analysis revealed mixed outcomes regarding policy measures. Policies focused on credit risk reduction or debt restructuring (PG1) were found to influence banks' ROE and stock returns, although the direction of the effects varied across these performance metrics. In contrast, the other two policy groups—liquidity improvement (PG2) and debt repayment holidays (PG3)—showed limited impacts.

These findings highlight the importance of careful consideration by central banks in the design and mechanisms of intervention when responding to crises. Tailoring policy instruments to the specific vulnerabilities of commercial banks and the broader economy can enhance the effectiveness of these instruments in supporting the banking sector during economic downturns.

The results provide actionable insights for banks in formulating strategies to engage with central bank support programs during crises. Central bank policies targeting credit risk reduction and debt restructuring appear more effective in sustaining bank profitability and market performance. These findings are particularly relevant for emerging markets such as Thailand, where financial systems may be more susceptible to external shocks. Bank practitioners in these markets may draw on the evidence presented here to inform the selection and implementation of support programs that promote financial resilience and desirable performance outcomes.

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