

# “The impact of increased liquidity on profitability: Insights from Cambodian commercial banks”

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# THE IMPACT OF INCREASED LIQUIDITY ON PROFITABILITY: INSIGHTS FROM CAMBODIAN COMMERCIAL BANKS

## Abstract

This study examines the important but underexplored link between liquidity levels and profitability in commercial banks in Cambodia, a topic of great relevance for both bank managers and policymakers seeking to bolster financial stability. By analyzing data spanning 12 years (2011 to 2022) from 22 banks, the study applies a variety of panel data models, such as pooled ordinary least squares (OLS), fixed effects (FE), random effects (RE), and the one-step generalized method of moments (GMM). The findings reveal a statistically significant negative impact of liquidity on profitability across all static panel data models, with coefficients of  $-1.3005$  (pooled OLS),  $-0.9786$  (FE), and  $-0.9966$  (RE), each statistically significant at varying levels. The dynamic panel data model (one-step GMM) further confirmed this negative relationship, showing a coefficient of  $-0.3588$ . It also highlighted a robust positive effect of lagged profitability, with a coefficient of  $0.7491$ . Interestingly, the study found that only bank-specific factors, such as operating expenses and net interest margin, consistently influenced profitability across both static and dynamic panel models. On the other hand, macroeconomic factors like inflation were shown to negatively affect profitability, underscoring the need for sound bank management practices and well-designed regulatory policies.

## Keywords

liquidity, profitability, commercial banks, panel data analysis, Cambodia, financial performance, macroeconomic factors, banking sector

## JEL Classification

G21, G20, G30, M41

## INTRODUCTION

Over the past two decades, Cambodia's banking sector has undergone significant transformations, driven by rapid economic growth and strategic policy reforms. Commercial banks have played a crucial role in strengthening the industry's resilience, even in the face of global economic uncertainties. However, one key scientific challenge remains unresolved: understanding the complex and multifaceted relationship between increased liquidity and the profitability of Cambodian commercial banks. This issue is vital to the broader financial landscape, as effective liquidity management is essential for maintaining stability while achieving profitability.

While existing research extensively examines the liquidity-profitability relationship using various empirical methodologies, such as static panel data models (including pooled ordinary least squares (OLS), fixed effects (FE), and random effects (RE)), and dynamic panel data models like the one-step generalized method of moments (GMM), a direct focus on how increased liquidity influences profitability in Cambodian banks is notably absent. Previous studies have explored topics ranging from non-performing loans and corporate governance to cost efficiency and intellectual capital management; however, this research gap leaves an important question unanswered. This study

aims to fill that gap by investigating the effects of increased liquidity on bank profitability and identifying the most effective methodologies to analyze this intricate relationship. In doing so, it seeks to contribute significantly to academic discourse while offering actionable insights for refining financial strategies and regulatory frameworks.

The study specifically investigates whether there is a statistically significant relationship between the liquidity levels of Cambodian commercial banks and their profitability. It also examines the impact of operating expenses on profitability, providing practical insights into cost management strategies within the sector. Additionally, the research analyzes the role of net interest margin (NIM) in shaping financial outcomes, emphasizing the importance of core banking activities. Furthermore, it considers the influence of macroeconomic variables, such as the money supply and inflation rates, on the profitability of Cambodian commercial banks. By addressing these hypotheses, the study aims to deepen the understanding of key factors that influence bank profitability and to provide guidance for effective liquidity management in Cambodia's banking sector.

To address the evolving dynamics of the banking industry, this study employs a combination of static panel data models (pooled OLS, FE, and RE) and the one-step GMM dynamic panel data model. By integrating both static and dynamic panel data models, the research ensures adherence to the rigorous methodologies often used in international studies. This comprehensive approach accounts for time-sensitive factors and bank-specific characteristics, delivering a more robust and insightful analysis.

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## 1. LITERATURE REVIEW AND HYPOTHESES

Banks play a vital role in economic development by providing the financial resources needed for the growth of businesses, governmental bodies, and individuals. Their ability to redistribute capital is fundamental to the effective functioning of market economies. By attracting deposits and offering loans, banks create conditions that stimulate investment and foster economic growth (Vrotslavskyy & Dropa, 2024). Additionally, their role as intermediaries between surplus and deficit units ensures financial stability and promotes economic advancement (Gözkonan et al., 2024). Globally, the impact of the banking system is significant, but it is particularly pronounced in developing economies such as Cambodia, where financial markets are less developed, and banks play a crucial role in financing trade and driving growth (Vrotslavskyy & Dropa, 2024).

To achieve sustainable growth and stability, banks must carefully balance profitability and liquidity. Profitability is critical for long-term growth, while sufficient liquidity is essential for meeting obligations and preventing insolvency. However, managing the trade-off between lending profits and liquidity risks presents a complex challenge (Bianchi

& Bigio, 2022). Empirical studies have highlighted the substantial impact of liquidity management on bank profitability, demonstrating that different liquidity ratios influence metrics such as return on assets (ROA) and return on equity (ROE) (Ajayi & Lawal, 2021; Think et al., 2022). This relationship is particularly important in emerging economies, where banks face unique challenges related to growth dynamics and constrained financial markets. Policymakers and bankers must examine these relationships closely to enhance the stability of the banking sector, improve efficiency, and drive broader economic development (Abbas et al., 2023; El-Chaarani et al., 2023).

In commercial banking, liquidity refers to a bank's ability to swiftly convert its assets into cash at minimal cost, ensuring the fulfillment of short-term obligations. High liquidity implies that assets can be efficiently converted into cash with minimal loss of value, which is vital for operational stability (Sapand et al., 2022). Profitability, on the other hand, represents a bank's capacity to generate income from its assets, indicating its potential for sustainable growth and long-term financial performance (Sapand et al., 2022).

The relationship between liquidity and profitability is complex and requires careful balancing.

While liquidity is crucial for meeting immediate obligations, excessive liquidity may reduce profitability due to the opportunity cost of holding non-income-generating assets. Conversely, an overemphasis on profitability can lead to liquidity shortages, jeopardizing the bank's financial health (Qaysi & BenMabrouk, 2024; Rodriguez et al., 2024). Maintaining this balance is essential for ensuring both financial performance and stability (Qaysi & BenMabrouk, 2024). Empirical studies provide mixed findings: some indicate a weak yet positive correlation between liquidity and profitability (Sapand et al., 2022; Tinh et al., 2022), while others highlight the influence of external factors, such as economic crises, which can significantly affect this relationship (Tinh et al., 2022). Additionally, the impact of liquidity on profitability varies depending on the type of bank and economic environment, with some institutions requiring higher levels of liquid assets to maximize profitability under specific circumstances (Mohammad & Khan, 2024).

Despite the extensive research conducted, notable gaps remain, particularly in longitudinal and cross-country analyses, which limit the understanding of liquidity and profitability dynamics across diverse economic contexts (Rodriguez et al., 2024). In Cambodia, where financial markets are underdeveloped, there is a scarcity of research exploring how local economic conditions and regulatory frameworks influence the liquidity-profitability relationship. Addressing these gaps could provide valuable insights into sector-specific dynamics and aid in developing more effective financial management practices, especially in emerging economies like Cambodia (Qaysi & BenMabrouk, 2024; Rodriguez et al., 2024).

Operating expenses of banks refer to the costs incurred in daily operations, including salaries, rent, utilities, depreciation, and administrative expenses. These expenses are a critical indicator of a bank's operational efficiency (Riwayati et al., 2023), which is fundamental to enhancing profitability. Studies have demonstrated that reducing operating expenses relative to income improves profit margins. For example, research on Nepalese commercial banks found that higher operating expenses negatively affect ROA and ROE, highlighting the importance of effective cost management

for profitability (Khatiwada et al., 2024). Similarly, a study on Indonesian state-owned banks revealed a significant negative relationship between operating expenses and profitability, emphasizing the need to control costs to enhance financial performance (Riwayati et al., 2023). Additionally, findings from Nigerian banks indicated that operating expenses significantly influence net profit, further strengthening the link between cost management and profitability (Onaolapo & Olanrewaju, 2024).

NIM is a critical financial metric in banking, capturing the difference between interest income from loans and interest paid to lenders, relative to a bank's interest-earning assets. As an indicator of the profitability of core banking activities like lending and borrowing, NIM reflects a bank's ability to manage interest rate risks and optimize interest income, a key component of overall profitability (Cruz-García et al., 2020; De Silva et al., 2020). A strong NIM is foundational for sustainable financial performance, enabling banks to navigate competitive and dynamic environments effectively.

Empirical studies confirm a positive link between NIM and profitability. Research on Indonesian and Sri Lankan banks underscores NIM's role in enhancing financial performance and maximizing profits (De Silva et al., 2020; Putra et al., 2020). Similarly, studies reveal that NIM mediates the impact of loan-to-deposit ratios on profitability, while prudent financial strategies help maintain profitability even under compressed NIM caused by low policy interest rates (Campmas, 2020; Rahagi et al., 2023). Liquidity and credit risk management, operational efficiency, and factors like non-performing loans and capital adequacy further shape NIM's impact on profitability. Larger banks, however, may face diminishing returns due to rising administrative costs, emphasizing the complexity of managing NIM across different contexts (Rathnayake et al., 2022).

The profitability of banks is intricately connected to macroeconomic factors such as money supply and inflation rate, which influence liquidity, lending capacity, interest rates, operating costs, and asset values. An increase in money supply typically boosts liquidity, enabling banks to issue more loans and thereby potentially enhancing profitabil-

ity. Conversely, a reduction in money supply can limit lending opportunities and negatively affect profits (Rathnasiri, 2024). While macroeconomic stability, including a steady money supply, has been found to positively impact bank profitability, some studies indicate that internal factors such as liquidity and credit ratios may play a more significant role in certain contexts (Ayub et al., 2024).

Inflation also plays a critical role in shaping bank profitability through its effects on interest rates, operating costs, and asset values. Higher inflation can drive up interest rates, increasing banks' interest income and boosting profitability; however, it can simultaneously elevate operating costs and diminish asset values, potentially offsetting these gains (De Leon, 2020; Rathnasiri, 2024). Regional studies reveal varying outcomes: inflation positively affects ROE in the ASEAN region and ROA in South Asian countries, suggesting that certain banks may benefit from inflationary pressures (De Leon, 2020; Yuan et al., 2022). However, in Pakistan, inflation negatively impacts profitability, demonstrating the context-dependent nature of this relationship (Sultan et al., 2020). While inflation has minimal influence on bank profitability in the UK, it significantly affects financial performance in the U.S., highlighting how macroeconomic factors vary across different regions (Islam, 2023; Chukwuogor et al., 2021).

Static panel data models, such as pooled OLS, FE, and RE, are commonly used in banking research to examine factors influencing bank performance and profitability. Pooled OLS is often employed as an initial tool for cross-sectional analysis, as demonstrated in studies investigating the impact of digitization on bank profitability in India (Lolemo & Pandya, 2023) and the profitability of Shariah-based banks in Bangladesh (Gazi et al., 2024) and Kenya (Oseko et al., 2024). FE models are particularly effective at capturing individual-specific characteristics over time, as highlighted by studies of U.S. regional banks (Umeorah et al., 2024) and city commercial banks in China (Jigeer & Koroleva, 2023). RE models, on the other hand, are suitable when variations across entities are assumed to be random and uncorrelated with explanatory variables, as shown in research on Islamic rural banks in Indonesia (Sudarsono et al., 2024).

Dynamic panel data models are essential for analyzing data that vary across time and entities, effectively capturing changing dynamics and interdependencies between variables while addressing unobserved heterogeneity and endogeneity issues. These models are widely utilized in economics to estimate causal effects in the presence of time-varying and individual-specific factors, offering flexibility for different data types and dependency structures (Helske & Tikka, 2024). Among these methodologies, the GMM is particularly notable for its ability to handle endogeneity and provide consistent results where traditional methods may fail (Carrasco & Nayihouba, 2024). GMM has been extensively applied in financial studies, including research on the Pakistani banking sector, which revealed that while capital adequacy positively influences profitability, liquidity risks can lower returns due to increased default risks (Rahman et al., 2020).

Existing research on Cambodian banks has addressed various topics, including the impact of non-performing loans (Maáji et al., 2023), the role of corporate governance (Maáji et al., 2021), the connection between board capital and bank efficiency (Kontesa & Kyee, 2018), cost efficiency (Aiba & Hidenobu, 2021), and the significance of intellectual capital management (Lim et al., 2024). Despite these contributions, a notable gap persists in the literature: the direct relationship between increased liquidity and the profitability of Cambodian commercial banks remains unexplored.

This study aims to bridge that gap by investigating how increased liquidity influences bank profitability. Acknowledging the dynamic and evolving nature of the banking industry, the research utilizes both static and dynamic panel data models to provide a thorough and comprehensive analysis of the empirical results. Specifically, the study will test the following hypotheses:

- H1: There is a statistically significant relationship between the liquidity of commercial banks and their profitability in Cambodia.*
- H2: The profitability of Cambodian commercial banks is significantly affected by their operating expenses.*

H3: *There is a statistically significant relationship between the NIM of commercial banks and their profitability in Cambodia.*

H4: *The profit of Cambodian commercial banks is significantly influenced by the money supply.*

H5: *The inflation rate has a statistically significant impact on the profits of Cambodian commercial banks.*

## 2. METHODOLOGY

This study utilizes a comprehensive dataset from the National Bank of Cambodia covering the financial years 2011 to 2022. The dataset includes variables such as net profit, liquid assets, operating expenses, and NIM and encompasses 22 commercial banks, resulting in a total of 264 observations. Banks with incomplete datasets or those affected by mergers and acquisitions were excluded. To analyze the impact of macroeconomic conditions on bank profitability, additional indicators, such as broad money supply and inflation rates, were sourced from the Asian Development Bank database.

Net profit was selected as the primary measure of profitability due to its direct representation of financial performance, providing clarity by avoiding the complexities of metrics like ROA and ROE. This metric emphasizes operational efficiency by demonstrating how effectively banks manage revenues and expenses, making it a crucial indicator for stakeholders.

The study employs a pooled OLS regression model as described in Equation (1):

$$PROFIT_{it} = a_0 + a_1LIQ_{it} + a_2OPE_{it} + a_3NIM_{it} + a_4M2_{it} + a_5INF_{it} + \varepsilon_{it}, \quad (1)$$

where  $PROFIT_{it}$  represents net profit for bank  $i$  at time  $t$ , and  $LIQ_{it}$ ,  $OPE_{it}$ ,  $NIM_{it}$ ,  $M2_{it}$ , and  $INF_{it}$  are the independent variables, which encompass liquidity, operating expenses, and NIM, along with macroeconomic control variables. The coefficients  $a_j$  (where  $j = 0, 1, \dots, 5$ ) need to be estimated. The residual term is indicated as  $\varepsilon$ .

A critical feature of panel data is its ability to address omitted variable bias. The model integrates a composite error term,  $v_{it}$ , which represents unobserved factors correlated with the independent variables, assumed to behave as a white noise process.

To further mitigate the risk of endogeneity, the FE model is applied as shown in Equation (2):

$$PROFIT_{it} = a_0 + a_1LIQ_{it} + a_2OPE_{it} + a_3NIM_{it} + a_4M2_{it} + a_5INF_{it} + v_{it}. \quad (2)$$

In this formulation, if  $\mu_i$  (part of the error term) is correlated with the independent variables, traditional OLS estimation may produce biased results due to endogeneity (Baltagi, 2020; Wooldridge, 2020).

The error term is described in Equation (3):

$$v_{it} = \mu_i + \varepsilon_{it}. \quad (3)$$

In this representation,  $\mu_i$  accounts for time-invariant characteristics unique to each bank, while  $\varepsilon_{it}$  captures the idiosyncratic residuals.

The RE model is alternatively specified in Equation (4), enabling us to efficiently tackle the structure of the error term:

$$PROFIT_{it} - \hat{\lambda}PROFIT_i = a_0(1 - \hat{\lambda}) + a_1(LIQ_{it} - \hat{\lambda}LIQ_i) + a_2(OPE_{it} - \hat{\lambda}OPE_i) + a_3(NIM_{it} - \hat{\lambda}NIM_i) + a_4(M2_{it} - \hat{\lambda}M2_i) + a_5(INF_{it} - \hat{\lambda}INF_i) + (v_{it} - \hat{\lambda}v_i), \quad (4)$$

where:

$$v_{it} = (1 - \hat{\lambda})\mu_i + (\varepsilon_{it} - \hat{\lambda}\varepsilon_i) \quad (5)$$

And the independent and identically distributed (*i.i.d*) variable is defined as:

$$\lambda = 1 - \left[ \frac{\sigma_\varepsilon}{\sqrt{(\sigma_\varepsilon^2 + T\sigma_\mu^2)}} \right] \quad (6)$$

A  $\lambda$  value of 1 indicates only the FE estimator is utilized, while a value of 0 indicates solely the

OLS estimator is used. The relative importance of the unobserved effect's variance determines the model's alignment with FE or OLS (Baltagi, 2020; Wooldridge, 2020).

In addition to static panel data models, a one-step GMM dynamic panel data model is implemented, as illustrated in Equation (7):

$$\begin{aligned} PROFIT_{it} = & a_0 + a_1PROFIT_{it-1} \\ & + a_2LIQ_{it} + a_3OPE_{it} + a_4NIM_{it} \\ & + a_5M2_{it} + a_6INF_{it} + u_{it} \end{aligned} \quad (7)$$

where  $i = 1, \dots, N$  and  $t = 1, \dots, T$ ;  $a_0, a_1, a_2, a_3, a_4, a_5, a_6$  are the parameters to be estimated.  $u_{it} = \mu_i + \varepsilon_{it}$  and  $\varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$ .  $\mu_i$  represent panel-level effects that might be correlated with the covariates, while  $\varepsilon_{it}$  are the *i.i.d* variables. across the entire sample with a variance of  $\sigma_\varepsilon^2$ .  $\mu_i$  and  $\varepsilon_{it}$  are assumed to be independent for each  $i$  over all  $t$ .

This GMM approach addresses the correlation between lagged dependent variables and the unobserved effects  $\mu_i$ , which would otherwise lead to biased estimates. First-differencing estimators are applied to eliminate these effects, and moment conditions are constructed with relevant instruments. The one-step GMM method, as advocated by Arellano and Bond (1991) and Holtz-Eakin et al. (1988), is utilized for the analysis of dynamic panel data.

### 3. RESULTS

The calculation of summary statistics, as detailed in Table 1, was undertaken to provide a comprehensive overview of the characteristics and variability within the Cambodian commercial banking sector during the study period. Subsequently, a correlation analysis was conducted to prelimi-

narily examine the relationships among the variables involved in the study. Through this analysis, the strength and direction of associations between the dependent variable (profitability) and the independent variables (liquidity, operating expenses, NIM, broad money supply, and inflation rate) were quantified.

Cambodian commercial banks show significant disparities in financial performance, with profitability (PROFIT) ranging from -98.358 to 879.990 and a high standard deviation of 137.299. While some banks achieve remarkable profits, others face severe losses. Liquidity (LIQ) averages at 40.869, with moderate variability, reflecting differing asset-liability management strategies. Operating expenses (OPE) exhibit an average of 2.060, suggesting effective cost management overall, though variability highlights differences in efficiency. NIM averages at 1.168, with some banks managing profitability even under negative margins – a finding that merits further investigation.

Macroeconomic factors such as money supply (M2) and inflation rate (INF) also influence bank performance. The average M2 stands at 20.199, with moderate fluctuations, while INF averages at 3.212, reflecting inflationary pressures that could affect the cost of funds and pricing strategies. Correlation analysis, as shown in Table 2, reveals weak relationships among variables, such as an insignificant negative correlation between profitability and liquidity. While profitability has weak negative correlations with OPE and M2, it shows a weak positive correlation with NIM, emphasizing NIM's role in core banking activities. These findings illustrate the complex interplay of factors affecting bank performance and profitability in Cambodia.

Interestingly, a moderate negative correlation is observed between M2 and INF, indicating that an

**Table 1.** Summary statistics

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
PROFIT	264	76.528	137.299	-98.358	879.990
LIQ	264	40.869	13.613	13.943	85.614
OPE	264	2.060	1.116	0.343	6.146
NIM	264	1.168	1.129	-2.967	6.130
M2	264	20.199	9.194	3.938	39.410
INF	264	3.212	1.182	1.211	5.477

**Table 2.** Correlation matrix

Variable	PROFIT	LIQ	OPE	NIM	M2	INF
PROFIT	1	–	–	–	–	–
LIQ	–0.0957	1	–	–	–	–
OPE	–0.0379	–0.1206	1	–	–	–
NIM	0.1037	0.1032	0.4669	1	–	–
M2	–0.0832	0.0765	–0.0478	–0.111	1	–
INF	–0.0197	–0.0634	0.0151	0.0856	–0.4419	1

increase in money supply in Cambodia may be associated with a slight reduction in inflation. This phenomenon is explained by the principle that higher money supply can enhance liquidity within the financial system, thereby exerting downward pressure on inflation. However, the strength of this correlation is not considered robust, suggesting that additional variables may influence the relationship between money supply and inflation.

The model selection process was initiated with the estimation of the FE model, followed by the application of the modified Wald test to assess group-wise heteroskedasticity. A Chi-square value of 20737.84 with a *p*-value of 0.0000 was obtained, confirming the presence of heteroskedasticity. Consequently, the FE model was re-estimated using robust standard errors.

Subsequently, the RE model was estimated, and the Hausman test (Hausman, 1978) was performed to compare the FE and RE models. The results of the Hausman test indicated a chi-square probability above the 5% significance level, suggesting that the RE model was preferred over the FE model.

To further validate the model selection, the Breusch and Pagan Lagrangian multiplier test for RE, developed by Breusch and Pagan (1980) and refined by Baltagi and Li (1990), was utilized. This test, as shown in Table 3, confirmed the significance of the RE model, indicating that it was favored over the pooled OLS model.

To enhance the robustness of the findings, the Chow test was employed to compare the pooled

OLS and FE models. The null hypothesis of the Chow test, which posits that the pooled OLS model is more suitable than the FE model (Chow, 1960), was rejected based on the chi-square test results provided in Table 3, with a probability value near zero, thus reinforcing the superiority of the FE model.

The analysis conducted across all static panel data models reveals that bank liquidity is found to have a statistically significant negative impact on profitability. As presented in Table 4, the estimated coefficients for liquidity are recorded as –1.3005 (pooled OLS), –0.9786 (FE), and –0.9966 (RE), each significant at the 5%, 10%, and 5% levels, respectively.

In the pooled OLS model, OPE and NIM are identified as significant determinants of profitability, though only at the 10% significance level. These findings are aligned with economic theory, which suggests that higher OPE reduces profitability, whereas higher NIM enhances it. Among the macroeconomic variables, weak significance is exhibited solely by M2. The *F*-statistic ( $F(5, 258) = 2.40$ ) confirms the overall explanatory power of the model, although the pooled OLS model is found to be less effective at explaining variations in profitability specific to individual banks.

The FE model is observed to capture a stronger impact of bank-specific factors on profitability, with both OPE and NIM showing significant influences at the 1% level, consistent with theoretical expectations. Furthermore, significant negative effects on profitability are shown by both M2 and INF, at

**Table 3.** Model selection tests

Breusch and Pagan Lagrangian multiplier test (OLS vs RE)	Chibar2(01) = 640.32	Prob > chibar2 = 0.0000
Chow test (OLS vs FE)	Chi2(5) = 28.37	Prob > chi2 = 0.0000
Hausman test (RE vs FE)	Chi2(5) = 0.11	Prob > chi2 = 0.9998

the 5% significance level. The  $F$ -statistic ( $F(5, 237) = 5.56$ ) validates the model's robustness. These findings, supported by the results of the Chow test, suggest that the FE model provides more detailed insights into bank profitability by accounting for individual heterogeneity among banks.

The RE model also yields valuable insights, with coefficients for OPE and NIM reported as  $-19.932$  and  $19.7094$ , respectively, both determined to be significant at the 1% level. In addition, significant negative impacts from both M2 and INF on profitability are identified. The joint significance of the explanatory variables is confirmed by the Wald chi-square statistic ( $Wald\ chi2(5) = 28.37$ ). Furthermore, the robustness of the RE model is affirmed through the Hausman test and the Breusch and Pagan Lagrangian multiplier test, positioning it as a reliable option within the static panel data framework.

Prior to the interpretation of results from the dynamic panel data model, the Arellano-Bond test was applied to verify the absence of serial correlation in the error terms, as shown in Table 5. The absence of second-order autocorrelation ( $z$ -statistic of  $-1.4094$ ,  $p$ -value of  $0.1587$ ) was confirmed, thereby validating the dynamic structure of the model.

**Table 5.** Arellano–Bond test for zero autocorrelation in first-differenced errors

Order	z	Prob > z
1	-2.0586	0.0395
2	-1.4094	0.1587

The findings from the one-step GMM dynamic panel data model, illustrated in Table 4, reveal that the lagged dependent variable is found to have a highly significant positive effect on profitability (coefficient =  $0.7491$ , significant at the 1% level), indicating a high degree of persistence in bank profitability over time. Consistent with the static panel data models, liquidity is shown to exert a negative impact on profitability (coefficient =  $-0.3588$ , significant at the 5% level). However, neither OPE nor NIM retain statistical significance within the dynamic panel data model, suggesting potential endogeneity concerns.

Within the dynamic panel data model, no significant impact of M2 on profitability is observed. However, the negative influence of INF is shown to remain strongly significant (coefficient =  $-7.6554$ ,  $t$ -test value =  $-2.92$ ). Additionally, the joint significance of the model's explanatory variables is confirmed by the Wald chi-squared statistic ( $620.43$ ), with a  $p$ -value below the 1% threshold.

**Table 4.** Empirical results of static and dynamic panel data models

Variable	GMM	Pooled OLS	FE	RE
PROFIT(-1)	0.7491*** (7.10)	–	–	–
LIQ	-0.3588** (-1.97)	-1.3005** (-2.58)	-0.9786* (-1.96)	-0.9966** (-2.04)
OPE	-1.9528 (-0.37)	-17.281* (-1.90)	-20.112*** (-3.24)	-19.932*** (-3.26)
NIM	-1.901 (-0.22)	21.7570* (1.78)	19.6422*** (3.41)	19.7094*** (3.47)
M2	-0.1043 (-0.27)	-1.4534* (-1.95)	-1.5233** (-2.59)	-1.5198*** (-2.59)
INF	-7.6554*** (-2.92)	-9.7645 (-1.31)	-9.5565** (-2.10)	-9.5658** (-2.11)
Constant	72.5375*** (-2.73)	200.598*** (4.44)	196.487*** (5.72)	196.733*** (4.64)
–	Wald chi2(6) = 620.43	F(5, 258) = 2.40	F(5, 237) = 5.56	Wald chi2(5) = 28.37
–	Prob > chi2 = 0.0000	Prob > F = 0.0380	Prob > F = 0.0001	Prob > chi2 = 0.0000
Observations	264	264	264	264
Groups	22	22	22	22
R-squared	–	0.0460	0.1050	0.1050

Note: The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.  $t$ -statistics are in parentheses.

The results from the dynamic panel data model serve to reinforce findings derived from the static panel data models while effectively addressing concerns of endogeneity. This leads to a comprehensive analysis of the liquidity-profitability relationship within banks. The consistency of findings across both static and dynamic panel data models is considered to significantly enhance the robustness and reliability of the study.

*H1* is supported by the study's findings, revealing a statistically significant negative relationship between the liquidity of commercial banks and their profitability. Static panel data models revealed coefficients of  $-1.3005$  (pooled OLS),  $-0.9786$  (FE), and  $-0.9966$  (RE), all significant at various levels. The dynamic panel data model confirmed this relationship with a coefficient of  $-0.3588$ , significant at the 5% level.

*H2* highlights the adverse effect of operating expenses on the profitability of Cambodian commercial banks. Substantial negative coefficients were observed in the FE and RE models ( $-20.112$  and  $-19.932$ , respectively), both determined to be significant at the 1% level. However, significance is not demonstrated in the dynamic panel data model, indicating potential endogeneity concerns and necessitating caution in the generalization of these results.

The relationship between NIM and profitability, explored in *H3*, was found to have significant positive effects in the FE and RE models ( $19.6422$  and  $19.7094$ , respectively, both significant at the 1% level). No significant relationship is reported in the dynamic panel data model, warranting further scrutiny of these findings.

Mixed results were obtained for *H4*, which examines the relationship between money supply and profitability. Weak significance was identified in the pooled OLS model, while the RE model reported negative coefficients significant at the 5% level. However, no significance was observed in the dynamic panel data model. Consequently, evidence for *H4* is deemed inconclusive, leading to a cautious rejection of the hypothesis due to inconsistencies.

*H5* is accepted, demonstrating a statistically significant negative effect of the inflation rate on the profits of Cambodian commercial banks. Static

panel data models (FE and RE) reported negative impacts significant at the 5% level, while the dynamic panel data model revealed a stronger negative coefficient of  $-7.6554$ , significant at less than the 1% level. These results underline the substantial negative influence of inflation on bank profitability.

## 4. DISCUSSION

The study consistently identifies a negative relationship between liquidity and profitability across all panel data models – pooled OLS, FE, RE, and dynamic one-step GMM. This stands in contrast to some prior studies, which report a positive or less pronounced relationship (Sapand et al., 2022; Thinh et al., 2022). In Cambodia's developing economy, this negative relationship may stem from the opportunity cost associated with holding substantial liquid assets, potentially at the expense of investing in higher-yielding opportunities. To address this, policymakers could develop incentive structures that enable banks to allocate excess liquidity more effectively toward productive investments, such as extending credit to small and medium enterprises or funding priority sectors of the economy.

Further research should examine the composition of these liquid assets and the nature of the forgone returns from alternative investments. The confirmation of *H1* highlights the critical balance that policymakers and bank management must strike between ensuring financial stability and maximizing profitability. Policy measures such as differentiated liquidity requirements based on the risk profile of banks could provide greater flexibility while maintaining stability. The finding of a smaller negative coefficient in the dynamic panel data model suggests that the adverse short-term effects of liquidity may diminish over time. This provides an opportunity for regulators to explore policies that gradually guide banks toward optimal liquidity levels without abrupt interventions that disrupt operations.

The static panel data models (FE and RE) show a strong negative relationship between operating expenses and profitability, along with a robust positive relationship between NIM and profitability,

consistent with theoretical expectations (Riwayati et al., 2023; Cruz-García et al., 2020). However, the lack of significance in the dynamic panel data model points to potential endogeneity issues. This discrepancy underscores the importance of leveraging dynamic panel data models to address unobserved heterogeneity and simultaneity bias. Policymakers could consider incentivizing investments in technology and managerial training to improve operational efficiency, potentially reducing operating expenses and enhancing profitability. Additionally, promoting greater competition in the banking sector could drive innovation and managerial improvements, reducing endogeneity over time.

The mixed findings regarding the relationship between money supply and profitability (*H4*) suggest a complex dynamic influenced by Cambodia's financial system and level of development. Policymakers should explore how changes in broad money supply impact bank performance

through channels such as credit expansion or shifts in depositor behavior. Establishing clear guidelines for monetary policy interventions, coupled with targeted support for liquidity management, could help stabilize the banking sector's response to fluctuations in money supply.

Inflation consistently exhibits a negative impact on profitability (*H5*) across all panel data models, likely due to its effect on operating costs and asset values (De Leon, 2020; Rathnasiri, 2024). The stronger negative coefficient in the dynamic panel data model emphasizes the critical role of inflation control in maintaining bank profitability. This finding advocates for macroeconomic policies that prioritize inflation stability, such as maintaining disciplined fiscal policies and enhancing the capacity of the central bank to manage inflationary pressures effectively. Coordinated efforts between regulators and banks to develop inflation-hedging strategies could further safeguard profitability in the sector.

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## CONCLUSION

This study analyzed how increased liquidity influences the profitability of Cambodian commercial banks, while accounting for factors such as operating expenses, NIM, broad money supply, and inflation. The results reveal a complex relationship between liquidity and profitability, with a consistent negative correlation observed across both static (pooled OLS, FE, and RE) and dynamic (one-step GMM) panel data models. These findings suggest that while maintaining adequate liquidity is essential for financial stability, excessive liquidity may impede profitability in the Cambodian banking sector – likely due to missed opportunities for higher-yielding investments.

The static panel data models showed a clear negative impact of operating expenses and a positive impact of NIM on profitability. However, these relationships did not hold significance in the dynamic panel data model, pointing to potential endogeneity issues that require further investigation. The impact of money supply on profitability remains inconclusive, with inconsistent results across panel data models. Conversely, the study consistently found a significant negative relationship between inflation and bank profitability, underscoring the adverse effects inflationary pressures can have on the financial performance of Cambodian banks.

This study contributes to a deeper understanding of the determinants of bank profitability in a developing economy like Cambodia, filling a gap in existing literature. The findings on the liquidity-profitability trade-off highlight an important challenge for policymakers and bank management: balancing the need for sufficient liquidity with profit-maximizing strategies. Future research could explore the specific dynamics driving this negative relationship, such as the composition of liquid assets and the nature of alternative investment opportunities. Additionally, examining how bank-specific characteristics and comparing similar trends across other developing economies could offer valuable insights into the complexities shaping bank profitability in Cambodia and beyond.

## AUTHOR CONTRIBUTIONS

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