

Examining the Impact of Macroeconomic Factors and Non-Performing Loans on Banking Sector Profitability: A Panel Data Analysis for East Africa Using the ARDL Model

Emmanuel Ezekiel Mwanjilinjil^{1*}, Fei-Ming Huang²

University of Dar es Salaam, and Jiangxi University of Finance and Economics
Jiangxi University of Finance and Economics

Corresponding Author: ezekiel.emmanuel@udsm.ac.tz,

mwanjilinjiemmanuel@yahoo.com;

ORCID: [0000-0001-7983-4566](https://orcid.org/0000-0001-7983-4566)¹

huangfeiming@jxufe.edu.cn

Article Information:

Received: 23 March 2025, Accepted: 14 April 2025, Published: 21 May 2025

Abstract:

Can the profitability of banks in East Africa withstand the dual challenges of non-performing loans (NPLs) and volatile macroeconomic conditions? This study examines the interplay between NPLs, macroeconomic factors (money supply, GDP, inflation) and banking sector performance in Tanzania, Kenya, and Uganda over the period 2000-2022. Using panel data and the Autoregressive Distributed Lag (ARDL) model, we uncover nuanced relationships between these variables. Cointegration analysis confirms a long-term equilibrium relationship, while the Pooled Mean Group (PMG) regression results reveal a rapid adjustment to equilibrium. The findings highlight that NPLs exert a significant negative long-term impact on profitability metrics; Return on Assets (ROA) and Return on Equity (ROE), underscoring the importance of robust credit risk management. Interestingly, short-term dynamics suggest that inflation can temporarily enhance profitability, while NPLs immediately diminish ROE. These insights provide valuable guidance for policymakers and banking executives seeking to bolster the resilience and growth of the East African banking sector. Future research should broaden this analysis to include political and global economic variables for a more comprehensive understanding of banking profitability in emerging markets.

Keywords: Banking Sector Profitability, Macroeconomic Factors, Non-performing Loans (NPLs), Panel Data Analysis, ARDL Model.

1. Introduction

Published by:

In recent decades, the banking sector has emerged as a crucial component of economic development and stability across the globe ([El-Ansary and Rashwan, 2020](#); [Vrotslavskyy and Dropa, 2024](#); [Korneev et al., 2023](#)). By serving as financial intermediaries, banks allocate resources efficiently, facilitate economic transactions, and promote growth ([Levine, 1999](#); [Molyneux and Thornton, 1992](#); [Rusydiana and Ikhwan, 2024](#)). As a cornerstone of financial systems, understanding the determinants of the banking sector profitability has garnered significant attention from policymakers, researchers, and practitioners alike ([Berger and Humphrey, 1997](#); [Dietrich and Wanzenried, 2011](#)). This interest is driven by the sector's pivotal contribution to economic resilience, financial innovation, and sustainable development ([Chen et al., 2024](#); [Forcadell et al., 2019](#)).

In the global context, challenges such as economic volatility ([Fernández et al., 2016](#); [Neanidis, 2019](#)), technological disruptions ([Arenas et al., 2023](#); [Phan et al., 2020](#); [Wicaksono, et al., 2020](#)), and regulatory dynamics ([Hassan, 2019](#); [Vives, 2019](#)), have heightened the need for a nuanced understanding of banking sector performance. In particular, emerging economies face distinct pressures, including underdeveloped financial markets ([Caballero and Krishnamurthy, 2006](#); [Ndang, 2019](#); [Smith and Valderrama, 2008](#)), fluctuating macroeconomic conditions ([Akinci, 2013](#); [Lane, 2003](#); [Yildirim, 2016](#)), and structural vulnerabilities ([Hawkins and Klau, 2000](#); [Lepers and Serrano, 2020](#); [Moreno-Brid et al., 2023](#); [Ruch, 2020](#)). These factors underscore the importance of examining bank profitability within specific regional contexts, where unique socio-economic characteristics shape both opportunities and risks.

East Africa presents a compelling case for investigation, having undergone significant economic growth and financial development over the decades ([Urgaia, 2016](#)). This progress has been fueled by financial liberalization, technological advancements, and regional integration initiatives ([Beck and Cull, 2014](#); Claessens et al., 2001). Since the 1980s, the region's banking sector, particularly in countries like Tanzania, has experienced market-driven transformations, with financial sector reforms playing a central role in broader structural adjustments ([Lwiza and Nwankwo, 2002](#)). Moreover, financial inclusion has emerged as a key policy priority in economies such as Kenya, Uganda, and Tanzania, with economic growth driving improved financial access ([Thomi and Mose, 2021](#)). These developments have positioned banks as crucial drivers of economic progress, enabling savings mobilization, financing key sectors, and supporting investment in agriculture, manufacturing, trade, and infrastructure.

The East African banking sector features a diverse range of institutions, including prominent domestic players such as Kenya Commercial Bank (KCB), Equity Bank, and Cooperative Bank, alongside regional and international institutions that contribute to competition and innovation ([Beck and Cull, 2014](#)). Regulatory oversight, led by national central banks and harmonization efforts within the East African Community (EAC), aims to enhance stability, transparency, and cross-border coordination ([Quintyn and Masciandaro, 2009](#)). Moreover, innovative platforms like Kenya's M-Pesa and Uganda's MTN Mobile Money have revolutionized financial accessibility, bringing millions into the formal financial system ([Suri and Jack, 2016](#)).

Published by:

Despite these achievements, East Africa's banking sector continues to grapple with challenges such as high levels of non-performing loans (NPLs), regulatory compliance demands, and cybersecurity risks ([World Bank, 2020](#)). Concurrently, the region presents vast opportunities for growth, driven by favorable demographics, increasing urbanization, and regional integration initiatives like the East African Monetary Union (EAMU) and the African Continental Free Trade Area (AfCFTA) ([Hattingh et al., 2017](#)).

While prior research has extensively explored the determinants of bank profitability, including internal factors like size, capitalization, and efficiency ([Berger and Bouwman, 2013](#); [Goddard et al., 2004](#)), the influence of macroeconomic conditions on bank performance remains a subject of ongoing debate ([Athanasoglou et al., 2008](#); [Dietrich and Wanzenried, 2011](#)). The East African context, characterized by diverse economic structures, varying levels of financial development, and active regional integration, offers a unique lens through which to examine these dynamics.

This study aims to investigate the impact of key macroeconomic factors (money supply, GDP, inflation rates) and NPLs on the banking sector profitability in East Africa, focusing on Tanzania, Kenya, and Uganda. Using panel data analysis and the Autoregressive distributed lag (ARDL) model, the research examines both short-term and long-term dynamics influencing profitability metrics; Return on Assets (ROA) and Return on Equity (ROE). By addressing the region's unique economic and financial challenges, the study provides valuable insights for policymakers, regulators, and banking executives to enhance the stability and growth of the banking sector. Furthermore, it contributes to the literature by offering empirical evidence from the understudied East African context, serving as a foundation for future research on the interplay between macroeconomic conditions, NPLs, and bank performance in developing economies.

The remainder of the study is structured as follows: Section 2 covers the literature review and hypothesis development. Section 3 outlines the data and methodology. Section 4 presents the data analysis and discussion, and Section 5 provides the conclusion, implication, suggestion, and limitations.

2. Literature Review and Hypothesis Development

The literature suggests a complex relationship between macroeconomic factors, NPLs, and bank profitability. Studies indicate that the money supply significantly influences bank profitability, as demonstrated by metrics such as ROA ([Aulia and Nur Aisyah, 2023](#); [Hafidh and Burhan, 2021](#); [Utami and Sihotang, 2024](#)); ROE ([Noorani, 2020](#)); and net interest margin (NIM) ([Helhel, 2014](#)). This assertion is supported by [Abedin and Dawan \(2016\)](#), [Sihotang et al. \(2022\)](#), and [Omankhanlen et al. \(2021\)](#) who found a positive correlation between broad money supply growth and bank profitability, proposing that an increase in money supply could elevate profits for banks. However, the impact of money supply is nuanced, as its control through monetary policy indirectly affects profitability by influencing macroeconomic variables like inflation and exchange rates ([Okaro, 2016](#)). While money supply alone may not

significantly impact profitability, its interaction with other factors such as financing and inflation collectively shapes profitability outcomes. ([Aulia and Nur Aisyah, 2023](#)).

Overall, the discussions as mentioned earlier suggest that growth in money supply positively correlates with bank profitability, as it can enhance ROA and NIM. However, the relationship is complex and may also be influenced by other macroeconomic variables like inflation and exchange rates. Thus, the first hypothesis is stated as follows:

Hypothesis 1: *An increase in money supply has a positive impact on banking sector profitability in East Africa.*

Conversely, GDP growth has variable effects on bank profitability across different regions. In the UK, GDP growth negatively correlates with bank profitability, suggesting a decline in profitability as GDP increases ([Islam, 2023](#); [Saeed, 2014](#)). This trend contrasts with findings from Nepal and India, where GDP growth positively influences the profitability of commercial banks, suggesting that higher GDP growth rates can lead to enhanced bank performance ([Acharya and Vyas, 2022](#); [Singh, 2010](#)). Additionally, the ratio of banking sector deposits to GDP demonstrates a significantly positive effect on bank profitability in India, indicating that a greater proportion of banking sector deposits relative to GDP can bolster bank profitability ([Brahmaiah and Ranajee, 2018](#)). Also, [Athanasoglou et al. \(2008\)](#) and [Dietrich and Wanzenried \(2011\)](#) supports this positive relationship after finding that GDP growth enhances bank profitability by fostering a favorable business environment and reducing credit risk.

Furthermore, [Singh \(2010\)](#) emphasizes that macroeconomic variables, including GDP, exhibit varied effects on different bank types, with foreign banks in India being less impacted by GDP changes compared to domestic banks. In the realm of Islamic banking in Indonesia, GDP exerts a significant effect on profitability, although the precise direction of this relationship remains unspecified ([Hidayat et al., 2020](#)). Meanwhile, in India, the performance of the banking sector, as indicated by variables such as domestic credit and capital adequacy ratio, correlates with GDP growth, suggesting that a robust banking sector can contribute positively to economic growth ([Reddy et al., 2023](#)).

While the impact of GDP growth on bank profitability varies across regions, evidence from some developing economies suggests that higher GDP growth rates are associated with improved bank performance. Therefore, the second hypothesis tests whether similar trends hold true in the East African context, and states as follows:

Hypothesis 2: *GDP growth has a positive impact on banking sector profitability in East Africa.*

Inflation also plays a critical role in shaping bank performance, exhibiting a complex relationship that varies by economic context. While [Boyd et al. \(2001\)](#) and [Khue and Lai \(2020\)](#) observed a negative impact of inflation on banking sector development, particularly when inflation exceeds a certain threshold, other studies like [Tan and Floros \(2012\)](#) and [Tan \(2016\)](#) found a positive correlation between inflation and bank profitability in China. This variability persists in different economies; for instance, higher inflation rates in Malaysia contribute positively to bank profitability, whereas in South Asia, inflation's impact on profitability is negligible, shifting the focus to bank-specific characteristics ([Sufian, 2009, 2012](#)).

Published by:

Additionally, [Katircioglu et al. \(2020\)](#) highlight that inflation indirectly affects bank profitability through changes in oil prices in Turkey, with direct negative impacts stemming from reduced lending to oil-related businesses. Moreover, studies by [Fofack \(2005\)](#) and [Aydemir and Demirhan \(2009\)](#) indicate that inflation's impact on bank profitability can be significant, often eroding profit margins and increasing uncertainty in financial markets. The literature indicates that inflation can have both positive and negative effects on bank profitability, depending on the economic context. Thus, the third hypothesis explores the nature of the relationship between inflation and bank profitability in East Africa, whether it is positive, negative, or context-dependent, and states as follows:

Hypothesis 3: *The inflation rate has a significant impact on banking sector profitability in East Africa.*

NPLs are another critical factor affecting bank profitability and stability. They represent loans that are in default or close to default, and their management is a significant concern for financial institutions. Higher levels of NPLs are associated with reduced profitability in banks due to the negative impact on NIM and ROE, as well as the need for increased loan loss provisioning which can further strain bank earnings ([Bhattarai, 2020](#); [Islam, 2018](#)). Notably, banks characterized by greater capitalization and profitability tend to exhibit lower NPL ratios, suggesting that well-capitalized banks are better equipped to manage credit risks and absorb potential losses ([Ghosh, 2015](#); [Rachman et al., 2018](#)).

Empirical research consistently shows a negative relationship between NPLs and profitability, as highlighted in studies by [Fofack \(2005\)](#) and [Afriyie \(2022\)](#) who have examined credit risk management in Sub-Saharan Africa. Therefore, the fourth hypothesis will test this relationship in the East African banking sector as stated below:

Hypothesis 4: *An increase in NPLs has a negative impact on banking sector profitability in East Africa.*

Despite extensive research exploring the relationship between macroeconomic factors, NPLs, and banking sector profitability, there remains a notable gap in the literature regarding the East African context. Specifically, the existing studies predominantly focus on individual macroeconomic variables, banking systems (e.g., conventional vs. Islamic banking) or specific regions such as South Asia, the UK, and India, without a comprehensive examination of how these factors collectively influence banking profitability in East Africa. Moreover, while the critical role of NPLs in influencing bank profitability is well-documented, there is limited empirical evidence on how NPLs interact with macroeconomic factors in the East African banking sector. Additionally, the ARDL model, which is effective for analyzing dynamic relationships between variables, has not been widely applied in studies focused on this region. This gap highlights the need for research that addresses these specific issues within the East African context.

By conducting a panel data analysis for the East African region using the ARDL model, this research aims to provide a more comprehensive understanding of the complex interplay between macroeconomic factors, NPLs, and banking sector profitability in this specific

Published by:

economic and financial context. This approach will contribute to filling the research gap and offer valuable insights for policymakers, regulators, and bank managers in the East African banking sector.

3. Data and Methodology

3.1 Data and Variables

The study utilizes annual secondary data spanning from 2000 to 2022, sourced from authoritative databases including central banks, the World Development Indicators (WDI), and the World Economic Outlook (WEO) databases. The data encompass several key variables relevant to the banking sector's performance, such as profitability metrics (ROA and ROE), money supply, GDP, inflation rate, and non-performing loans (NPLs). This comprehensive dataset allows for a detailed analysis of the factors influencing banking sector profitability over an extended period. Table 1 presents the variables used, their descriptions, and the data sources for each variable.

Table 1. Variable Description

Variable	Description	Source
<i>Dependent variables</i>		
<i>ROA</i>	Return on Assets (in percentage)	BSAR
<i>ROE</i>	Return on Equity (in percentage)	BSAR
<i>Independent variables</i>		
<i>M2</i>	Money Supply (Broad money, % of GDP)	WDI
<i>GDP</i>	Gross Domestic Product (Current prices, USD)	WEO
<i>INF</i>	Inflation Rate (Average consumer prices, Percent change)	WEO
<i>NPLs</i>	Gross non-performing Loans to gross Loans (in percentage)	BSAR

Source: Author computations from Bank Supervision Annual Reports (BSAR), WDI, and WEO databases.

To ensure a comprehensive analysis of the banking sector in the East African region, data were collected from Tanzania, Kenya, and Uganda. The selection criteria focused on the availability of macroeconomic variables, non-performing loans (NPLs), and banking sector profitability metrics, specifically return on assets (ROA) and return on equity (ROE). These metrics were obtained from the annual reports of financial sector supervision authorities. This methodological approach guarantees that the selected countries represent a diverse yet thorough sample for the investigation. Tanzania, Kenya, and Uganda were chosen specifically because they had complete data for the stated period, leading to their inclusion in the study from among the eight partner states constituting the EAC.

3.2 Model Specification

The purpose of research is to examine the impact of macroeconomic factors (*M2*, *GDP*, *INF*) and *NPLs* on banking sector profitability in East Africa. This study involves deriving a mathematical and econometric model to serve as the basis for estimation, enabling the measurement of economic relationships between these variables. The mathematical model is specified as follows:

Published by:

$$Profitability = f(M2, GDP, INF, NPLs)$$

Based on the above functional relationship, where profitability is the dependent variable while $M2, GDP, INF$ and $NPLs$ are the independent variables. The following multiple regression equation can be formulated:

$$\ln(Y_{it}) = \alpha + \beta_1 \ln(M2_{it}) + \beta_2 \ln(GDP_{it}) + \beta_3 \ln(INF_{it}) + \beta_4 \ln(NPLs_{it}) + \varepsilon_{it}$$

Where Y_{it} is the profitability, $M2$ is money supply, GDP is Gross domestic product, the INF is the inflation rate, $NPLs$ are non-performing loans, ε_{it} represents an error term, while $\beta_1, \beta_2, \beta_3, \beta_4$ are the factors to be estimated.

The equation captures the logarithmic relationships between the dependent variable and the independent variables over time for each country in the panel data. Using the logarithmic form for both the dependent and independent variables ensures constant variance in the data series, which is crucial for obtaining reliable regression results (Gujarati and Porter, 2009). The logarithmic version of our dependent variable, profitability $[\ln(Y_{it})]$ is compared to the independent variables; $M2, GDP, INF$ and $NPLs$ (Wooldridge, 2013).

3.3 Econometric Framework

This study employs an econometric framework to investigate the long-run and short-run relationships between banking sector profitability, and key macroeconomic factors, including $M2, GDP, INF$, and $NPLs$. The analysis is conducted using the ARDL model, which is particularly suitable for panel data as it accommodates both stationary and non-stationary variables and allows for the estimation of short-term and long-term dynamics (Pesaran et al., 2001; Pesaran and Shin, 1999). The general ARDL model is specified as:

$$Y_{it} = \alpha + \sum_{j=1}^p \beta_j Y_{i,t-j} + \sum_{k=0}^q \gamma_k X_{i,t-k} + \delta D_t + \varepsilon_{it}$$

Where Y_{it} represents the dependent variable for country i at time t ; $X_{i,t-k}$ denotes the independent variables for country i at time $t-k$; α is the constant term, β_j are the coefficients for the lagged dependent variable, γ_k are the coefficients for the lagged independent variables, D_t represents the time dummy variables to control for any structural changes over time, and ε_{it} is the error term.

In this study, the specific panel ARDL model for banking sector profitability is represented as:

$$\begin{aligned} \ln(Y_{it}) = & \alpha + \sum_{j=1}^p \beta_j \ln(Y_{i,t-j}) \\ & + \sum_{k=0}^q [\gamma_{1k} \ln(M2_{i,t-k}) + \gamma_{2k} \ln(GDP_{i,t-k}) + \gamma_{3k} \ln(INF_{i,t-k}) \\ & + \gamma_{4k} \ln(NPLs_{i,t-k})] + \delta D_t + \varepsilon_{it} \end{aligned}$$

Where $\ln(Y_{it})$ is the natural logarithm of the profitability metric, and the independent variables are also in their logarithmic forms.

To capture the short-run dynamics and the adjustment to the long-run equilibrium, the error correction model (ECM) derived from the ARDL model is specified as:

$$\Delta \ln(Y_{it}) = \alpha + \sum_{j=1}^p \beta_j \Delta \ln(Y_{i,t-j}) + \sum_{k=0}^q [\gamma_{1k} \Delta \ln(M2_{i,t-k}) + \gamma_{2k} \Delta \ln(GDP_{i,t-k}) + \gamma_{3k} \Delta \ln(INF_{i,t-k}) + \gamma_{4k} \Delta \ln(NPLs_{i,t-k})] + \phi ECM_{i,t-1} + \delta D_t + \varepsilon_{it}$$

Where $\Delta \ln(Y_{it})$ represents the first difference of the natural logarithm of the profitability metric, $ECM_{i,t-1}$ is the error correction term from the long-run relationship, and ϕ is the coefficient of the error correction term, which indicates the speed of adjustment to the long-run equilibrium. This study assumes cross-sectional homogeneity across the countries included in the panel. This assumption implies that the relationships between profitability and the independent variables are consistent across countries. Specifically, the long-run coefficients ($\gamma_{1k}, \gamma_{2k}, \gamma_{3k}, \gamma_{4k}$) and the error correction term (ϕ) are assumed to be identical for all countries. This aligns with the Pooled Mean Group (PMG) estimator used in the ARDL framework, which allows for heterogeneity in short-term dynamics while constraining long-term coefficients to be homogenous. By adopting this approach, the study aims to capture common structural patterns among the East African countries while accounting for individual short-run variations.

4. Results and Discussion

4.1 Descriptive Statistics

As shown in Table 2, the descriptive statistics indicate moderate variability in ROA, with some banks experiencing negative returns while others achieved significant profitability. ROE shows a higher mean and slightly greater variability, indicating a broader range of outcomes for bank equity holders.

Regarding macroeconomic factors, the money supply exhibited relatively low variability during the study period, suggesting stability in this economic indicator across East Africa. Economic growth, as reflected by GDP, displayed moderate variability, indicating fluctuations in the region's economic performance over time. Inflation levels showed some variability, reflecting changes in the economic environment throughout the study period.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
$\ln(ROA)$	69	0.9469986	0.391308	-0.5108256	1.547563
$\ln(ROE)$	69	2.907145	0.5220619	1.05779	3.92888
$\ln(M2)$	69	3.198368	0.3326534	2.569163	3.756991
$\ln(GDP)$	69	3.467889	0.6802164	2.048467	4.733572
$\ln(INF)$	69	1.97924	0.4882791	0	2.99368
$\ln(NPLs)$	69	2.009356	0.6688807	0.7521757	3.555348

Source: The computed data

4.2 Correlation Analysis

Published by:

Table 3 presents the correlation results, highlighting the negative impact of NPLs on bank profitability. This underscores the detrimental impact that NPLs have on bank profitability, highlighting the importance of credit risk management in maintaining financial health within the banking sector. The positive correlation between GDP and money supply supports the notion that an expansion in the money supply typically accompanies economic growth.

Table 3. Correlation Analysis, ROA

	$\ln(ROA)$	$\ln(M2)$	$\ln(GDP)$	$\ln(INF)$	$\ln(NPLs)$
$\ln(ROA)$	1.0000				
$\ln(M2)$	0.0201	1.0000			
$\ln(GDP)$	0.0458	0.5513	1.0000		
$\ln(INF)$	0.1591	0.2248	0.1415	1.0000	
$\ln(NPLs)$	-0.5856	0.5187	0.1722	0.0751	1.0000

Source: The computed data

On the other hand, the analysis in Table 4 indicates that an increase in money supply positively influences ROE, likely due to enhanced liquidity that enables more lending and higher returns on equity. However, the inverse relationship between GDP growth and profitability suggests that economic expansion may bring challenges such as increased competition or rising costs, which could offset the gains from higher economic activity. The negative correlation between NPLs and profitability highlights the critical impact of bad loans on banks' financial health, as these loans tend to erode profit margins.

Table 4. Correlation Analysis, ROE

	$\ln(ROE)$	$\ln(M2)$	$\ln(GDP)$	$\ln(INF)$	$\ln(NPLs)$
$\ln(ROE)$	1.0000				
$\ln(M2)$	0.1614	1.0000			
$\ln(GDP)$	-0.2828	0.5513	1.0000		
$\ln(INF)$	0.1465	0.2248	0.1415	1.0000	
$\ln(NPLs)$	-0.2984	0.5187	0.1722	0.0751	1.0000

Source: The computed data

4.3 Unit Root Tests and Optimal Lag Selection

Table 5 summarizes the Im, [Pesaran, and Shin \(1999\)](#) (IPS) unit root test results at both level and first difference to explain the stationarity of the variables.

Table 5. Panel Unit Root Results

Variables	Level		1st Difference	
	Statistic	p-value	Statistic	p-value
$\ln(ROA)$	-1.8200	0.0344**	-4.2506	0.0000***
$\ln(ROE)$	-1.4386	0.0751*	-4.2113	0.0000***
$\ln(M2)$	-1.3673	0.0858*	-4.3283	0.0000***
$\ln(GDP)$	0.4001	0.6554	-2.2392	0.0126**
$\ln(INF)$	-2.4470	0.0072***	-7.9016	0.0000***

Published by:

$\ln(NPLs)$ -1.7302 0.0418** -3.5015 0.0002***

Note: The symbols ***, **, and * indicate the statistical significance at 1%, 5% and 10% respectively.

Source: The computed data

From the 'Level' column, it is clear that for the original data (without differencing), all variables have p-values above 0.05, except $\ln(ROA)$, $\ln(INF)$ and $\ln(NPLs)$, which indicates we cannot reject the null hypothesis of unit roots at a conventional significance level. $\ln(ROA)$, $\ln(INF)$ and $\ln(NPLs)$ are the only variables that indicate stationarity at the level, suggesting that for these variables, there is enough evidence to suggest that some panels are stationary.

After taking the first difference of the data, all variables show p-values at or very close to 0.0000, except $\ln(GDP)$, which has a p-value of 0.0126. Despite this being slightly higher than the others, it is still below the conventional 0.05 threshold, allowing to reject the null hypothesis of unit roots. This suggests that once differenced, all variables become stationary in at least some panels.

Table 6 presents the optimal lag lengths for each variable (p, q, q, q, q) across the sampled East African countries. The lag lengths were determined based on the Bayesian Information Criterion (BIC). For the dependent variables [$\ln(ROA)$ and $\ln(ROE)$] the most common and optimal lag was 1. However, for the independent variables; $\ln(M2)$, $\ln(GDP)$, $\ln(INF)$ and $\ln(NPLs)$ the optimal and most frequent lag was 0.

Table 6. Optimal Lag (1, 0, 0, 0, 0)

Country	$\ln(ROA)$	$\ln(M2)$	$\ln(GDP)$	$\ln(INF)$	$\ln(NPLs)$
Tanzania	1	0	0	0	0
Kenya	1	0	1	0	0
Uganda	1	0	0	0	0
Mode	1	0	0	0	0
Country	$\ln(ROE)$	$\ln(M2)$	$\ln(GDP)$	$\ln(INF)$	$\ln(NPLs)$
Tanzania	1	1	0	0	0
Kenya	1	0	1	0	0
Uganda	1	0	0	0	0
Mode	1	0	0	0	0

Source: The computed data

4.4 Cointegration Test and Hausman Test

Table 7 presents the cointegration test results for both ROA and ROE. For the ROA case, the panel t -statistic and group t -statistic show significant negative values, both of which are significant at the 1% level. These significant t -statistics indicate strong evidence against the null hypothesis of no cointegration, suggesting that there exists a long-run equilibrium relationship between the variables in the panel. On the other hand, the panel ρ -statistic and group ρ -statistic do not show significance at the 1% level, with the group ρ -statistic even

Published by:

having a positive value. The *adf*-statistic for the panel is slightly negative but not significant at the 1% level, while the group *adf*-statistic is positive and also not significant. The significant panel *t*-statistic and group *t*-statistic suggest the presence of cointegration, indicating that the variables may move together in the long run.

Table 7. Cointegration Test Results

Test Stats.	ROA		ROE	
	Panel	Group	Panel	Group
<i>v</i>	-0.1363	.	-0.3257	.
<i>rho</i>	-0.354	0.3159	0.02152	0.7127
<i>t</i>	-4.076***	-4.494***	-3.243***	-3.56***
<i>adf</i>	-1.913	0.5153	-1.56	-0.599

Note: The symbols *** indicate the statistical significance at 1% level.

Source: The computed data

Pedroni's cointegration tests (for the ROE case) shows the significant negative *t*-statistics for both the panel and group dimensions indicate a rejection of the null hypothesis of no cointegration at the 1% significance level. This suggests that there is some evidence of a long-run relationship among the variables in the model. However, the *rho*-statistics for both the panel and group dimensions are positive and not significant at the 1% level. Additionally, the *adf*-statistics for both the panel and group dimensions are negative but not significant at the 1% level. This emphasizes the mixed nature of the findings, indicating that while some tests provide evidence for a long-run equilibrium relationship, others do not conclusively confirm it. Overall, from the Pedroni cointegration tests above, there is evidence of a long-term relationship among the variables based on the *t*-statistic results, which are significant at the 1% level for both the panel and group tests in both cases, ROA and ROE. This suggests that the variables are likely cointegrated.

The Hausman test yielded a chi-squared value of 3.49 and a p-value of 0.2370, exceeding the significance level. Thus, we fail to reject the null hypothesis, indicating the PMG estimator is preferred for this analysis.

$$\begin{aligned}
 \chi^2(4) &= (b - B)'[(V_b - V_B)^{-1}](b - B) \\
 &= 3.49 \\
 Prob > \chi^2 &= 0.2370
 \end{aligned}$$

The PMG model assumes homogeneity in long-run relationships across the panel while permitting heterogeneity in short-run dynamics. This suggests that, in this study, assuming a uniform long-run relationship between the independent variables (*M2*, *GDP*, *INF* and *NPLs*) and banking sector profitability is reasonable for the east African countries analyzed.

4.5 Interpretation and Discussion of Results

In the long run, only *NPLs* exhibit a highly significant and negative coefficient, as shown in Table 8. This suggests that an increase in *NPLs* has a substantially detrimental effect on banking profitability.

Table 8. Pooled Mean Group Regression Results, ROA

Published by:

Selected Model: ARDL (1, 0, 0, 0, 0)

D. <i>ln</i> (ROA)	Coefficient	Std. err.	z	P> z	[95% conf. interval]
Long-run					
<i>ln</i> (M2)	0.4840199	0.5272357	0.92	0.359	[-0.5493431, 1.517383]
<i>ln</i> (GDP)	0.0373948	0.0727783	0.51	0.607	[-0.105248, 0.1800376]
<i>ln</i> (INF)	0.070713	0.1113547	0.64	0.525	[-0.1475381, 0.2889642]
<i>ln</i> (NPLs)	-0.4416113	0.0671837	-6.57	0.000***	[-0.5732889, -0.3099337]
Short-run					
ECT	-0.7560607	0.1701552	-4.44	0.000***	[-1.089559, -0.4225625]
<i>ln</i> (M2)					
D1.	-0.3341243	0.5495634	-0.61	0.543	[-1.411249, 0.7430002]
<i>ln</i> (GDP)					
D1.	0.9573705	0.5345691	1.79	0.073*	[-0.0903656, 2.005107]
<i>ln</i> (INF)					
D1.	0.132167	0.0477371	2.77	0.006***	[0.038639, 0.2257301]
<i>ln</i> (NPLs)					
D1.	-0.0753681	0.0399168	-1.89	0.059*	[-0.1536036, -0.002867]
_cons	-0.0669289	0.0431901	-1.55	0.121	[-0.15158 to 0.0177221]

Note: The symbols ***, **, and * indicate the statistical significance at 1%, 5% and 10% respectively.

Source: The computed data

The short-run dynamics of the model are captured by the coefficients of the ECT and the first differences of the explanatory variables. The ECT has a coefficient of -0.7560607 ($p = 0.000$), which is negative as expected and signifies the speed at which the system returns to equilibrium after a shock. The significant coefficient implies that a substantial proportion of any disequilibrium is corrected relatively quickly, about 75.6% within one period. Inflation shows a positive short-run relationship with ROA, which could be due to inflation increasing nominal interest margins in the short run.

On the other hand, the results from the PMG regression shown in Table 9 provide an analysis of the factors influencing bank profitability, measured by changes in the natural logarithm of ROE across the three East African countries.

Table 9. Pooled Mean Group Regression Results, ROE

Selected Model: ARDL (1, 0, 0, 0, 0)

D. <i>ln</i> (ROE)	Coefficient	Std. err.	z	P> z	[95% conf. interval]
Long-run					
<i>ln</i> (M2)	0.1992872	0.6295445	0.32	0.752	[-1.034597, 1.433172]
<i>ln</i> (GDP)	-0.062573	0.073232	-0.85	0.393	[-0.206105, 0.080959]
<i>ln</i> (INF)	0.111463	0.1229081	0.91	0.364	[-0.1294326, 0.3523585]
<i>ln</i> (NPLs)	-0.2593074	0.0645212	-4.02	0.000***	[-0.3857666, -0.1328482]

Published by:

Short-run

ECT	-0.582446	0.2101881	-2.77	0.006***	[-0.9944072, -0.1704848]
<i>ln(M2)</i>					
D1.	0.1627791	0.8925372	0.18	0.855	[-1.586562, 1.91212]
<i>ln(GDP)</i>					
D1.	0.9916911	0.5892422	1.68	0.092*	[-0.1632024, 2.146585]
<i>ln(INF)</i>					
D1.	0.1806963	0.0671075	2.69	0.007***	[0.049168, 0.3122246]
<i>ln(NPLs)</i>					
D1.	-0.205874	0.0268582	-7.67	0.000***	[-0.2585152, -0.1532328]
_cons	1.567981	0.690441	2.27	0.023**	[0.2147412, 2.92122]

Note: The symbols ***, **, and * indicate the statistical significance at 1%, 5% and 10% respectively.

Source: The computed data

In the long-run results, the coefficient for NPLs is significant and negative, suggesting that an increase in NPLs will decrease ROE over time. However, other variables like Money Supply, GDP and Inflation do not show significant long-term impacts on ROE, as indicated by their p-values (greater than 0.05), suggesting their effects on bank profitability may be more subtle or complex.

In the short-run coefficients, the ECT is negative and significant, indicating a strong and rapid adjustment towards long-run equilibrium following deviations. This suggests that the East African banking sector adjusts quickly to shocks, with about 58.24% of disequilibrium corrected each period, a rapid speed of adjustment. Interestingly, short-term fluctuations in inflation have a positive and significant impact on ROE, suggesting that inflation may enhance bank profitability in the short run, potentially through the expansion of interest margins. Conversely, NPLs exert a significant negative effect in the short term, highlighting the immediate adverse consequences of loan defaults on bank profitability. Additionally, the model's constant term is significant, indicating the average change in ROE that is not accounted for by the other variables.

The findings of this study align with prior literature regarding the influence of macroeconomic variables and NPLs on banking sector profitability. For instance, the significant negative long-term impact of NPLs on profitability metrics like ROA and ROE corroborates the results of [Bhattarai \(2020\)](#) in Nepal, [Mondal and Mim \(2024\)](#) in Bangladesh, [Bhowmik and Sarker \(2024\)](#) in South Asian countries, and [Ghosh \(2015\)](#) in U.S. states, who emphasized the detrimental effects of credit risk on financial performance. These studies argue that higher NPL levels reduce net interest margins and necessitate higher provisioning, eroding profitability in developing and developed countries.

Interestingly, the study highlights a short-term positive relationship between inflation and profitability. This finding resonates with [Tan and Floros \(2012\)](#), and [Doğan and Yildiz \(2023\)](#), who noted similar effects in the Chinese banking sector and the Turkish banking sector

Published by:

respectively. However, this contrasts with [Boyd et al. \(2001\)](#), who observed that excessive inflation diminishes banking development by increasing uncertainty and reducing real returns on loans.

Regarding GDP growth, this study finds a non-significant impact on profitability in the East African context. This diverges from evidence in India and Nepal ([Acharya and Vyas, 2022](#); [Brahmaiah and Ranajee, 2018](#)), where robust GDP growth was positively correlated with banking performance. The discrepancy may stem from structural differences in banking systems or variations in economic resilience across regions.

Additionally, the nuanced effect of money supply, which lacks statistical significance in both short- and long-term models, contrasts with findings from [Sihotang et al. \(2022\)](#) of Islamic commercial banks in Indonesia, [Shrestha \(2023\)](#) and [Ghimire et al. \(2024\)](#) of commercial banks operating in Nepal, as well as [Hafidh and Burhan \(2021\)](#) in Zanzibar, Tanzania, who reported a positive correlation between broad money growth and bank profitability. This divergence may reflect differing monetary policy environments or the indirect effects of money supply through inflation and credit availability.

These contrasts underscore the importance of regional and structural factors in shaping the dynamics of banking sector profitability. Further research incorporating political and global economic variables could provide a more comprehensive understanding of these relationships.

5. Conclusions

This research analyzed the impact of three macroeconomic factors (money supply, GDP, and inflation) and non-performing loans (NPLs) on the profitability of banks in East Africa. Utilizing annual data from three East African countries (Tanzania, Kenya, and Uganda) from 2000 to 2022, the study employed the panel ARDL technique to assess these influences. The findings reveal that only NPLs have a negative impact on both return on assets (ROA) and return on equity (ROE) in the long run, which is consistent with the broader financial literature that links poor loan performance to decreased profitability. Additionally, the responsiveness of banks to economic shocks, as indicated by the ECT, suggests that the banking sector can rapidly adjust to restore equilibrium, making it highly sensitive to immediate economic fluctuations. The findings imply that bank profitability in East Africa is significantly influenced by NPLs, alongside the capacity to adjust to economic changes rapidly. These results suggest that banks need to focus on managing credit risks to enhance profitability. The impact of inflation in the short run also indicates that banks could potentially leverage inflationary periods to improve their interest margins and overall profitability.

To optimize profitability and mitigate risks, banks should adopt several strategic measures. Firstly, enhancing risk management through the implementation of sophisticated risk assessment tools and stricter credit monitoring processes can significantly reduce the incidence and impact of NPLs. Also, considering the short-term positive impacts of inflation on profitability, banks ought to adjust their interest rates and lending practices to maximize earnings during inflationary periods. These strategies collectively could improve financial stability and enhance profit margins within the banking sector in East Africa.

Published by:

This study has limitations that may affect the broader applicability of its findings. It focuses on only three East African countries due to data constraints, limiting generalizability to other nations with different economic conditions. Additionally, factors such as political conditions, global economic shifts, and sector-specific developments were not included, and the analysis is restricted to a specific timeframe, potentially affecting the relevance of the results for future trends. Also, a multicollinearity between money supply and exchange rate posed challenges, leading to the exclusion of exchange rate from the model to enhance reliability. While this improved the stability of estimates, the exchange rate's influence may still be indirectly reflected through other variables like money supply and inflation, warranting further investigation in future research.

REFERENCES

- Abedin, Md. T., & Dawan, Md. M. (2016). A Panel Data Analysis for Evaluating the Profitability of the Banking Sector in Bangladesh. *Asian Journal of Economics and Empirical Research*, 3(2), 163–171. <https://doi.org/10.20448/journal.501/2016.3.2/501.2.163.171>
- Acharya, K. R., & Vyas, S. K. (2022). The Impact of Bank-Specific and Macroeconomic Variables on Commercial Banks Profitability in Nepal. *Patan Pragya*, 10(01), 74–85. <https://doi.org/10.3126/pragya.v10i01.50592>
- Afriyie, E. Y. (2022). Profitability Determinants of Commercial Banks: Empirical Evidence from Sub-Saharan Africa. *African Journal of Business and Economic Research*, 17(3), 7–25. <https://doi.org/10.31920/1750-4562/2022/v17n3a1>
- Akinci, O. (2013). Global Financial Conditions, Country Spreads and Macroeconomic Fluctuations in Emerging Countries. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2324277>
- Arenas, L., Gil-Lafuente, A. M., & Reverter, J. B. (2023). The Impact Of Disruptive Technology On Banking Under Switching Volatility Regimes. *Technological and Economic Development of Economy*, 29(4), 1264–1290. <https://doi.org/10.3846/tede.2023.18976>
- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money*, 121–136. <https://doi.org/10.1016/j.intfin.2006.07.001>
- Aulia, N. P., & Nur Aisyah, E. (2023). Analysis of The Influence of Financing, Inflation, and The Amount of Money Supply on The Profitability of Syariah Bank in Indonesia. *Perisai : Islamic Banking and Finance Journal*, 7(2), 278–292. <https://doi.org/10.21070/perisai.v7i2.1668>
- Aydemir, O., & Demirhan, E. (2009). *The Relationship between Stock Prices and Exchange Rates Evidence from Turkey*. 23. file:///C:/Users/User/Downloads/irjfe_23_161.pdf

- Beck, T., & Cull, R. (2014). SME Finance in Africa. *Journal of African Economies*, 23(5), 583–613. <https://doi.org/10.1093/jae/eju016>
- Berger, A. N., & Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crises? *Journal of Financial Economics*, 109(1), 146–176. <https://doi.org/10.1016/j.jfineco.2013.02.008>
- Berger, A. N., & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. *European Journal of Operational Research*, 98(2), 175–212. [https://doi.org/10.1016/S0377-2217\(96\)00342-6](https://doi.org/10.1016/S0377-2217(96)00342-6)
- Bhattarai, B. P. (2020). Effects of Non-Performing Loan on Profitability of Commercial Banks in Nepal. *Itihas- The Journal Of Indian Management*, 10(4), 15–22. <https://doi.org/10.5958/2456-7302.2020.00011.7>
- Bhowmik, P. K., & Sarker, N. (2024). Non-performing loans (NPLs) and non-performance: Evidence from South Asian banks. *International Journal of Research in Business and Social Science (2147- 4478)*, 13(2), 197–206. <https://doi.org/10.20525/ijrbs.v13i2.3235>
- Boyd, J. H., Levine, R., & Smith, B. D. (2001). The impact of inflation on financial sector performance. *Journal of Monetary Economics*, 47(2), 221–248. [https://doi.org/10.1016/S0304-3932\(01\)00049-6](https://doi.org/10.1016/S0304-3932(01)00049-6)
- Brahmaiah, B., & Ranajee. (2018). Factors Influencing Profitability of Banks in India. *Theoretical Economics Letters*, 08(14), 3046–3061. <https://doi.org/10.4236/tel.2018.814189>
- Caballero, R. J., & Krishnamurthy, A. (2006). Bubbles and capital flow volatility: Causes and risk management. *Journal of Monetary Economics*, 53(1), 35–53. <https://doi.org/10.1016/j.jmoneco.2005.10.005>
- Chen, Y., Lin, T., Chiu, Y., & Yang, C. (2024). An exploration of operational efficiency, market efficiency, and sustainable development in the banking industry. *Corporate Social Responsibility and Environmental Management*, 31(5), 4819–4848. <https://doi.org/10.1002/csr.2823>
- Claessens, S., Demirgüç-Kunt, A., & Huizinga, H. (2001). How does foreign entry affect domestic banking markets? *Journal of Banking & Finance*, 25(5), 891–911. [https://doi.org/10.1016/S0378-4266\(00\)00102-3](https://doi.org/10.1016/S0378-4266(00)00102-3)
- Dietrich, A., & Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money*, 21(3), 307–327. <https://doi.org/10.1016/j.intfin.2010.11.002>
- Doğan, M., & Yildiz, F. (2023). Testing the Factors that Determine the Profitability of Banks with a Dynamic Approach: Evidence from Turkey. *Journal of Central Banking Theory and Practice*, 12(1), 225–248. <https://doi.org/10.2478/jcbtp-2023-0010>
- El-Ansary, O., & Rashwan, M. M. (2020). Introducing financial inclusion to MENA Islamic-banks profitability determinants. *Corporate Ownership and Control*, 18(1, Special Issue), 242–260. <https://doi.org/10.22495/cocv18i1siart2>

- Fernández, A. I., González, F., & Suárez, N. (2016). Banking stability, competition, and economic volatility. *Journal of Financial Stability*, 22, 101–120. <https://doi.org/10.1016/j.jfs.2016.01.005>
- Fofack, H. L. (2005). *Nonperforming Loans In Sub-Saharan Africa: Causal Analysis And Macroeconomic Implications*. The World Bank. <https://doi.org/10.1596/1813-9450-3769>
- Forcadell, F. J., Aracil, E., & Úbeda, F. (2019). The Influence of Innovation on Corporate Sustainability in the International Banking Industry. *Sustainability*, 11(11), 3210. <https://doi.org/10.3390/su11113210>
- Ghimire, S. R., Aryal, N. P., & Basnet, A. (2024). Impact of Monetary Policy on the Profitability of Nepalese Commercial Banks. *Interdisciplinary Journal of Management and Social Sciences*, 5(1), 147–157. <https://doi.org/10.3126/ijmss.v5i1.62671>
- Ghosh, A. (2015). Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. *Journal of Financial Stability*, 20, 93–104. <https://doi.org/10.1016/j.jfs.2015.08.004>
- Goddard, J., Molyneux, P., & Wilson, J. O. S. (2004). The profitability of european banks: A cross-sectional and dynamic panel analysis. *The Manchester School*, 72(3), 363–381. <https://doi.org/10.1111/j.1467-9957.2004.00397.x>
- Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed). McGraw-Hill Irwin. https://ucanapplym.s3.ap-south-1.amazonaws.com/RGU/notifications/E_learning/Online_study/Basic-Econometrics-5th-Ed-Gujarati-and-P.pdf
- Hafidh, H. A., & Burhan, J. (2021). Effect of Macroeconomic Factors on Islamic Banking Profitability: A Case Study of Islamic Division People's Bank of Zanzibar. *Kuwait Chapter of Arabian Journal of Business and Management Review*, 10(1), 1–9. <https://doi.org/10.12816/0059045>
- Hassan, M. (2019). How bank regulations impact efficiency and performance? *Journal of Financial Economic Policy*, 12(4), 545–575. <https://doi.org/10.1108/JFEP-06-2019-0119>
- Hattingh, D., Leke, A., & Russo, B. (2017). Growth in Africa's consumer sector. *On the Move*, 6. https://www.mckinsey.com/~/_media/mckinsey/industries/consumer%20packaged%20goods/our%20insights/lions%20still%20on%20the%20move%20growth%20in%20africas%20consumer%20sector/lions-still-on-the-move-growth-in-africas-consumer-sector.pdf
- Hawkins, J., & Klau, M. (2000). Measuring Potential Vulnerabilities in Emerging Market Economies. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.849258>
- Helhel, Y. (2014). Evaluating The Performance of the Commercial Banks In Georgia. *Research Journal of Finance and Accounting*. <file:///C:/Users/User/Downloads/CommercialBanksInGeorgia.pdf>

Published by:

- Hidayat, I., Alwahidin, A., & Aspiani, T. (2020). The Effect Of Inflation, Interest Rate, And Gross Domestic Products On The Profitability Of Sharia Banking In Indonesia (Sharia Banking Financial Reports 2014-2018). *Journal of Industrial Engineering & Management Research*, 1(4), 59-66. <https://doi.org/10.7777/jiemar.v1i4.102>
- Islam, F. T. (2018). Evaluating Loan Loss Provisioning for Non-Performing Loans and Its Impact on the Profitability of Commercial Banks in Bangladesh. *Asian Finance & Banking Review*, 2(2), 33–41. <https://doi.org/10.46281/asfbr.v2i2.222>
- Islam, M. R. (2023). The Impact of Macroeconomic Factors on Profitability of Commercial Bank in the UK. *International Journal For Multidisciplinary Research*, 5(1), 1406. <https://doi.org/10.36948/ijfmr.2023.v05i01.1406>
- Katırcıoğlu, S., Ozatac, N., & Taspınar, N. (2020). The role of oil prices, growth and inflation in bank profitability. *The Service Industries Journal*, 40(7–8), 565–584. <https://doi.org/10.1080/02642069.2018.1460359>
- Khue, N. N. D., & Lai, Y.-W. (2020). Threshold Effects Of Inflation On The Banking Sector Performance In The Asean-6 Countries. *Romanian Journal of Economic Forecasting*. https://ipe.ro/new/rjef/rjef1_20/rjef1_2020p117-133.pdf
- Korneev, V., Dziubliuk, O., Tymkiv, A., Antkiv, V., & Kucherenko, N. (2023). Banking Sector Stability and Economic Development: Assessment of Risks and Efficiency. *Economic Affairs*, 68(3). <https://doi.org/10.46852/0424-2513.3.2023.33>
- Lane, P. R. (2003). Business Cycles and Macroeconomic Policy in Emerging Market Economies. *International Finance*, 6(1), 89–108. <https://doi.org/10.1111/1468-2362.00109>
- Lepers, E., & Serrano, A. S. (2020). Decomposing financial (in)stability in emerging economies. *Research in International Business and Finance*, 51, 101068. <https://doi.org/10.1016/j.ribaf.2019.101068>
- Levine, R. (1999). *Financial Development and Economic Growth: Views and Agenda*. The World Bank. <https://doi.org/10.1596/1813-9450-1678>
- Lwiza, D. R. B., & Nwankwo, S. (2002). Market-driven transformation of the banking sector in Tanzania. *International Journal of Bank Marketing*, 20(1), 38–49. <https://doi.org/10.1108/02652320210415971>
- Molyneux, P., & Thornton, J. (1992). Determinants of European bank profitability: A note. *Journal of Banking & Finance*, 16(6), 1173–1178. [https://doi.org/10.1016/0378-4266\(92\)90065-8](https://doi.org/10.1016/0378-4266(92)90065-8)
- Mondal, T., & Mim, J. J. (2024). Nexus between Non-Performing Loan and Profitability: A Comprehensive Analysis of the Banking Industry of Chittagong Stock Exchange (CSE). *BUFT Journal of Business & Economics*, 5(1). <https://doi.org/10.58481/BJBE/2417>
- Moreno-Brid, J. C., Nalin, L., & Pérez-Medina, E. (2023). *Current External Challenges to the Economic Expansion of Emerging Markets: A Balance-of-Payments Constrained Growth Perspective*. Institute for New Economic Thinking Working Paper Series. <https://doi.org/10.36687/inetwp201>

- Ndang, B. (2019). *The Effect of Corporate Bonds Spread Variability on Non- Financial Firms' Financing Structure: Further Evidence from Emerging Markets*.
<https://repository.mdx.ac.uk/download/f5b53e802e099b88750d8d2cb62755b8bd2a1946f468c315f63a50bf08e005cc/2377023/BNdang%20thesis%20EMBARGO.pdf>
- Neanidis, K. C. (2019). Volatile capital flows and economic growth: The role of banking supervision. *Journal of Financial Stability*, 40, 77–93.
<https://doi.org/10.1016/j.jfs.2018.05.002>
- Noorani, I. (2020). The Impact Of Macroeconomic Variables On The Profitability Of Commercial Banking In Pakistan. *Global Journal for Management and Administrative Sciences*, 1(1), 71–90. <https://doi.org/10.46568/gjmas.v1i1.24>
- Okaro, C. S. (2016). Monetary Policy , the Control of Money Supply and Its Effects on the Profitability of Deposit Money Banks in Nigeria (1999—2013). *NG-Journal of Social Development*, 5(5), 56–70. <https://doi.org/10.12816/0033190>
- Omankhanlen, A. E., Ilori, N., Isibor, A., & Okoye, L. U. (2021). Monetary Policies and the Achievement of Bank Profit Objective. *Journal of Central Banking Theory and Practice*, 10(2), 201–220. <https://doi.org/10.2478/jcbtp-2021-0020>
- Pesaran, M. H., & Shin, Y. (1999). An Autoregressive Distributed-Lag Modelling Approach to Cointegration Analysis. In S. Strom (Ed.), *Econometrics and Economic Theory in the 20th Century* (pp. 371–413). Cambridge University Press.
<https://doi.org/10.1017/CCOL521633230.011>
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326.
<https://doi.org/10.1002/jae.616>
- Phan, D. H. B., Narayan, P. K., Rahman, R. E., & Hutabarat, A. R. (2020). Do financial technology firms influence bank performance? *Pacific-Basin Finance Journal*, 62, 101210. <https://doi.org/10.1016/j.pacfin.2019.101210>
- Quintyn, M., & Masciandaro, D. (2009). Regulating the Regulators: The Changing Face of Financial Supervision Architectures before and after the Crisis. *European Company Law*, 6(Issue 5), 187–196. <https://doi.org/10.54648/EUCL2009038>
- Rachman, R. A., Kadarusman, Y. B., Anggriono, K., & Setiadi, R. (2018). Bank-specific Factors Affecting Non-performing Loans in Developing Countries: Case Study of Indonesia. *The Journal of Asian Finance, Economics and Business*, 5(2), 35–42.
<https://doi.org/10.13106/JAFEB.2018.VOL5.NO2.35>
- Reddy, K., Mubeen, S., Raju, K. H. H., Jalaja, V., & Mahabub Basha, S. (2023). *Does The Performance Of Banking Sector Promote Economic Growth? A Time Series Analysis*. 8(5).
file:///C:/Users/User/Downloads/Does_the_Performance_of_Banking_Sector_Promote_Eco.pdf

- Ruch, F. U. (2020). *Prospects, Risks, and Vulnerabilities in Emerging and Developing Economies: Lessons from the Past Decade*. World Bank, Washington, DC. <https://doi.org/10.1596/1813-9450-9181>
- Rusydiana, A. S., & Ikhwan, I. (2024). Bank Credit and Economic Growth: Evidence from OIC Countries. *Accounting and Sustainability*, 2(2). <https://doi.org/10.58968/as.v2i2.341>
- Saeed, M. S. (2014). Bank-related, Industry-related and Macroeconomic Factors Affecting Bank Profitability: A Case of the United Kingdom. *Research Journal of Finance and Accounting*. <https://core.ac.uk/download/pdf/234629777.pdf>
- Shrestha, P. M. (2023). Examining the Factors Affecting the Profitability of Commercial Banks. *Journal of Mathematics Instruction, Social Research and Opinion*, 2(2), 105–114. <https://doi.org/10.58421/misro.v2i2.86>
- Sihotang, M. K., Hasanah, U., & Hayati, I. (2022). Model of Sharia Bank Profitability Determination Factors by Measuring Internal and External Variables. *Indonesian Interdisciplinary Journal of Sharia Economics (IJSE)*, 5(1), 235–251. <https://doi.org/10.31538/ijse.v5i1.1949>
- Singh, Dr. D. (2010). Bank Specific And Macroeconomic Determinants Of Bank Profitability: The Indian Evidence. *Paradigm*, 14(1), 53–64. <https://doi.org/10.1177/0971890720100107>
- Smith, K. A., & Valderrama, D. (2008). *Why Do Emerging Economies Import Direct Investment and Export Savings? A Story of Financial Underdevelopment*. <https://scispace.com/pdf/why-do-emerging-economies-import-direct-investment-and-x1ez63sg2c.pdf>
- Sufian, F. (2009). Factors Influencing Bank Profitability in a Developing Economy: Empirical Evidence from Malaysia. *Global Business Review*, 10(2), 225–241. <https://doi.org/10.1177/097215090901000206>
- Sufian, F. (2012). Determinants of bank profitability in developing economies: Empirical evidence from the South Asian banking sectors. *Contemporary South Asia*, 20(3), 375–399. <https://doi.org/10.1080/09584935.2012.696089>
- Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science*, 354(6317), 1288–1292. <https://doi.org/10.1126/science.aah5309>
- Tan, Y. (2016). The impacts of risk and competition on bank profitability in China. *Journal of International Financial Markets, Institutions and Money*, 40, 85–110. <https://doi.org/10.1016/j.intfin.2015.09.003>
- Tan, Y., & Floros, C. (2012). Bank profitability and inflation: The case of China. *Journal of Economic Studies*, 39(6), 675–696. <https://doi.org/10.1108/01443581211274610>
- Thomi, J., & Mose, N. (2021). Financial Inclusion in East Africa: Does Economic Growth Matter? *Journal of Economics, Management and Trade*, 1–8. <https://doi.org/10.9734/jemt/2021/v27i230325>

- Urgaia, W. R. (2016). The Contribution of Financial Sector Development for Economic Growth in East Africa. *Applied Economics and Finance*, 3(2), 201–214. <https://doi.org/10.11114/aef.v3i2.1251>
- Utami, M., & Sihotang, M. K. (2024). Pengaruh Inflasi Dan Jumlah Uang Beredar Terhadap Profitabilitas Perbankan Syariah Di Indonesia. *Jurnal Manajemen Akuntansi (JUMSI)*, 4(3), 802–814. <https://doi.org/10.36987/jumsi.v4i3.4147>
- Vives, X. (2019). Digital Disruption in Banking. *Annual Review of Financial Economics*, 11(1), 243–272. <https://doi.org/10.1146/annurev-financial-100719-120854>
- Vrotslavskyy, D., & Dropa, Y. (2024). The Role Of The Banking System In Providing Financial Resources For The Development Of The Economy. *Grail of Science*, 40, 177–179. <https://doi.org/10.36074/grail-of-science.07.06.2024.021>
- Wicaksono, A., Gunawan, I. D., & Husin, Z. (2020). Analysis the Effect of Information Technology Capability, Business Innovation, Digital Disruption and Digital Disruption Reactions on Sustainable Banking Performance. *American Research Journal of Business and Management*, 6(1), 1–16. <https://doi.org/10.21694/2379-1047.20012>
- Wooldridge, J. M. (2013). *Introductory econometrics: A modern approach* (5th ed). South-Western, Cengage Learning. <http://dspace.kottakkalfarookcollege.edu.in:8001/jspui/bitstream/123456789/3869/1/Introductory%20econometrics.%20A%20modern%20approach%20%28%20PDFDrive%20%29%20%281%29.pdf>
- World Bank. (2020). *Global Financial Development Report 2019/2020: Bank Regulation and Supervision a Decade after the Global Financial Crisis*. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1447-1>
- Yildirim, Z. (2016). Global financial conditions and asset markets: Evidence from fragile emerging economies. *Economic Modelling*, 57, 208–220. <https://doi.org/10.1016/j.econmod.2016.04.018>

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>)

