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Determinants of Banking Profitability in Angola: A Panel Data Analysis with Dynamic GMM Estimation

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Abstract

This study aims to analyze the determinants of bank profitability in Angola by employing panel data econometric models, specifically, the Generalized Method of Moments (GMM), to assess the impact of internal and external factors on the financial indicators ROE, ROA, and NIM for the period 2016 to 2023. The results reveal that credit risk, operational efficiency, and liquidity are critical determinants of banking performance. Effective credit risk management and cost optimization are essential for the sector's stability. Banking concentration presents mixed effects, enhancing net interest income while potentially undermining efficiency. Economic growth supports profitability, whereas inflation exerts a negative influence. The COVID-19 pandemic worsened asset quality, increased credit risk, and led to a rise in non-performing loans and provisions. Reforms implemented by the National Bank of Angola have contributed to strengthening the banking system's resilience through restructuring and regulatory improvements. The rise of digitalization and fintech presents opportunities to enhance financial inclusion and efficiency, although their success relies on advancing financial literacy. This study contributes to the literature by providing updated empirical evidence on the factors influencing bank profitability within an emerging economy's distinctive institutional and economic context.

Keywords: bank profitability; Angolan banking sector; panel data analysis; financial performance; banking sector economics; emerging markets

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1. Introduction

The banking sector plays a key role in financing the economy, providing essential financial services to businesses and households, and driving economic growth (Gržeta et al. 2023). Furthermore, with the advancement of financial technology, the sector has gained even more importance in the Angolan economy (Garcia and Trindade 2019; Gržeta et al. 2023).

The evolution of the banking system in Angola has been characterized by significant structural transformations, ranging from its formation in the colonial period to liberalization and subsequent development, especially since the 1990s, with the opening up to private and foreign investment (Jungo and Canguende-Valentim 2025; Garcia and Trindade 2019; Ferreira and Soares de Oliveira 2019). After the end of the Civil War and the political

stability achieved in the early 2000s, the banking sector experienced strong growth, with an increase in the number of banks and the introduction of new practices and regulations. However, the Angolan economy has continued to face external challenges, such as volatile oil prices, which have a direct impact on the banking sector and are reflected in the profitability of financial institutions, along with crises such as the COVID-19 pandemic.

The evolution of the Angolan banking system can be divided into three periods: colonial, post-independence and from the 1990s onwards (Bonin and Valério 2016).

After independence in 1975, the banking sector was nationalized, becoming a state monopoly, which resulted in inefficiency and bankruptcies due to a lack of supervision and experience in bank management (Ferreira and Soares de Oliveira 2019; Valério and Fontoura 1994; Garcia and Trindade 2019). The Civil War (1975–2002) further aggravated the economic situation, leading the government to liberalize the sector and seek international support from 1989 onwards (International Monetary Fund 1994; Ferreira and Soares de Oliveira 2019; Gonçalves 2010).

Between 2002 and 2022, the banking sector experienced significant growth with the approval of Law No. 5/91, which allowed the entry of private and foreign capital (Garcia and Trindade 2019; Jungo et al. 2022). The number of banks increased from 9 in 2002 to 27 in 2015, driven by high oil prices and post-war economic stability (Ferreira and Soares de Oliveira 2019). However, falling oil prices and new minimum capital requirements resulted in the sector shrinking to 23 institutions by 2022 (Banco Nacional de Angola 2022). Intense competition led to bank mergers, as the diversification of services offered was not enough to increase the sector's efficiency.

Banking sector concentration refers to how market share is distributed among the leading banks within a particular country. In general, the greater the concentration, the less competition there is between banks, which can lead to higher interest rates for consumers and fewer financial service options, as is the case in Angola (Ferreira and Soares de Oliveira 2019).

Regarding banking concentration, Angola has seen a trend towards the dominance of the five to ten largest banks from 2002 to 2022. According to data from the National Bank of Angola (Banco Nacional de Angola 2022) and Ferreira and Soares de Oliveira (2019), the five largest banks held around 63% of the banking sector's total assets in 2022, a decrease from previous years, as in 2015, when they held around 78%. This phenomenon reflects a gradual change in the distribution of assets, with the ten largest banks, which in 2005 controlled around 80% of assets, holding approximately 88% in 2010. Concentration decreased to 85% in 2015, fell to 84% in 2020, and recovered to 88% in 2021, consolidating the dominance of the largest players in the sector (Banco Nacional de Angola 2022; Ferreira and Soares de Oliveira 2019).

The literature on bank profitability in Angola is scarce (Garcia and Trindade 2019; Jungo and Canguende-Valentim 2025; Jungo et al. 2022) and focused on developed economies (Berger and Bouwman 2013; Dietrich and Wanzenried 2011; Athanasoglou et al. 2008; Ding and Sickles 2018; Bouzgarrou et al. 2018; Dia et al. 2020; Adelopo et al. 2022; Laporšek et al. 2024).

This study addresses a gap in the literature by empirically examining the determinants of bank profitability in Angola over the period 2016–2023, using a dynamic panel data approach based on the Generalized Method of Moments (GMM). Specifically, it investigates the impact of internal factors, such as operational efficiency, credit risk, and macroeconomic variables, including market concentration and inflation. The study contributes to the existing body of knowledge by focusing on a relatively underexplored and institutionally distinctive context. Angola's banking sector operates under conditions of pronounced macroeconomic volatility, ongoing structural reforms, and a shifting regulatory landscape,

which together create a setting where the relationships observed in more stable economies may not hold. By analyzing these dynamics, the research provides novel insights into the applicability and limitations of conventional profitability models in fragile and transitional economic environments.

The results highlight the importance of competition, innovation, and robust supervision. Digitalization and fintech firms impose regulatory challenges. The study provides insights for investors, managers, and policymakers, contributing to the stability and efficiency of the banking sector. This paper is structured as follows: It begins with an introduction, followed by a literature review and the formulation of hypotheses. It then presents the methodology and a description of the sample used. The results are presented, followed by a discussion. The last section is dedicated to the study's conclusions.

2. Literature Review

2.1. The Size of the Bank

The relationship between bank size and profitability has been widely discussed in the literature, and it is an indicator of income-generating capacity (Athanasoglou et al. 2008; Molla et al. 2023; Yakubu and Bunyaminu 2024). The size of the bank is a determining factor in operational efficiency, as it allows for the exploitation of economies of scale and reduces operating costs, increasing the production of loans and financial assets (Gupta and Mahakud 2020; Molla et al. 2023). This effect favors investments in technology and improved banking processes, resulting in more attractive financial products. However, challenges such as risk management, the coordination of large teams, and excessive bureaucracy can compromise this efficiency (Labban and Roussel 2025; Gupta and Mahakud 2020; Ding and Sickles 2018). Studies on public banks indicate that the correct sizing of operations enhances competitive advantages over domestic and foreign private banks, promoting a reduction in operating costs (Rakshit 2023).

Large banks, by having access to funding sources with more advantageous rates due to their reputation, can maintain low levels of capitalization, increasing their aggressiveness in exploring business opportunities (Jreisat et al. 2022; Satyagraha et al. 2022; Yakubu and Bunyaminu 2024; Ding and Sickles 2018). However, inefficient management of these resources can result in high labor costs, indicating a growing need for investments in technology to optimize the banking operation (Fukuyama and Tan 2022; Yakubu and Bunyaminu 2024; Rakshit 2023).

2.2. Credit Risk

Credit risk in the banking sector is an external variable that determines profitability. The excessive pursuit of short-term profit has led the banking sector to neglect important aspects of business sustainability, with particular emphasis on excessive risk-taking, the adoption of inadequate financial practices, and irresponsible lending (Zhou et al. 2019). The lack of efficient management of this risk is evidenced by banking institutions' preference for investments in securities and high levels of liquidity, to the detriment of granting productive credit (Ferreira and Soares de Oliveira 2019; Garcia and Trindade 2019; DePrince et al. 2011). This negligence has had devastating consequences for the sustainability of the banking sector and the economy as a whole. However, an adequate capacity to identify and evaluate borrowers makes it possible to mitigate the devastating effects on bank performance (Dia et al. 2020). Although bank profitability is the performance indicator most appreciated by users, it does not always reflect the proper management of risks and operating costs due to managers' strategies focused on revenue generation, ignoring the control of operating expenses and risks, (Olson and Zoubi 2011; Zhou et al. 2019; Dia et al. 2020). High interest rates reflect high credit risk, aggravated by the absence of collateral,

adequate financial statements, and specialized courts to resolve credit-related disputes (Yin 2021). This situation can be attributed to excessive operating costs, inadequate allocation of resources, and failures to assess borrowers, resulting in a high volume of non-performing loans (Maghyereh et al. 2022).

Banking regulation and supervision play a key role in mitigating credit risk, promoting a more stable and reliable environment for depositors and investors (Jungo and Canguende-Valentim 2025). In addition, a favorable business environment can strengthen the financial capacity of borrowers and reduce defaults (Dia et al. 2020). Thus, effective credit risk management is essential to ensure the stability of the banking system, requiring adequate regulation, operational efficiency, and prudent strategies for granting and monitoring loans.

In this sense, an increase in credit risk is generally associated with a deterioration in asset quality. It can also be associated with higher impairment losses. These can reduce bank profitability. The following hypothesis was formulated as a result:

H1: *Bank profitability and credit risk are negatively correlated.*

2.3. Liquidity Risk

The loan-to-deposit ratio (LOTD) is a key indicator of liquidity risk in banking, reflecting the banks' ability to turn deposits into loans (Oredegbe 2020; Wang et al. 2021). A high LOTD can indicate vulnerabilities, especially in times of economic instability, when unexpected withdrawals compromise the liquidity of banking institutions, requiring costly external financing (Wang et al. 2021; Almaqtari et al. 2019). Low liquidity, in turn, can raise operating costs and reduce banks' efficiency (Oredegbe 2020; Sakouvogui and Shaik 2020).

The impact of the COVID-19 pandemic crisis has accentuated liquidity challenges, requiring banking institutions to be more efficient in asset management (Elnahass et al. 2021; Puspitasari et al. 2021). The unfavorable economic climate has also contributed to an increase in problem loans and the need for additional provisions for losses (Oredegbe 2020). In Angola, the fall in oil prices led to economic recession, impacting the banking sector and reducing the availability of foreign currency, which aggravated the country's financial fragility (Ferreira and Soares de Oliveira 2019).

High banking concentration and insufficient investment in digitalization hinder financial inclusion, limiting the sector's ability to drive economic growth (Elnahass et al. 2021; Puspitasari et al. 2021). The preference for investing in debt securities and maintaining high levels of liquidity, to the detriment of granting credit, indicates the banking sector's risk aversion, restricting the financing of the economy (Sari et al. 2022; Ferreira and Soares de Oliveira 2019).

Although high liquidity reduces the need to sell assets at reduced prices to cover unexpected withdrawals (Obadire et al. 2022), maintaining it excessively can result in lower operational efficiency and lower profitability for banks (Sakouvogui and Shaik 2020). Regulation is key to balancing liquidity management, minimizing emergency costs, and encouraging more profitable investments (Berger and Bouwman 2013; Adelopo et al. 2022).

The ability of banks to efficiently manage their liquidity directly influences financial stability and the confidence of depositors and investors (Obadire et al. 2022; Almaqtari et al. 2019; Ebenezer et al. 2017). The search for a balance between liquidity and profitability is essential for the sustainable development of the banking sector and the overall economy.

The literature suggests that higher loan-to-deposit ratios could be a sign of increased liquidity risk, which could limit the bank's capacity to handle unexpected financing needs. We therefore formulated the following second hypothesis:

H2: *There is a negative relationship between liquidity risk and bank profitability.*

2.4. Operational Efficiency

Competition and market structure significantly influence the banking sector's operational efficiency, promoting cost reduction and improved risk management, which results in greater financial stability (Dia et al. 2020; Almeida and Sousa 2025). However, external factors such as excessive liquidity and inadequate regulation can negatively impact on this efficiency, restricting credit expansion and increasing operational risks (Sari et al. 2022).

Banks with adequate capitalization invest in financial technology, enabling innovations that improve operational management and customer relations, positively impacting operational efficiency (Sari et al. 2022; Gupta and Mahakud 2020). The cost-to-income ratio reflects this efficiency, demonstrating the bank's ability to control costs when converting deposits into financial products (Belas et al. 2019).

Inadequate credit management, such as a reduction in borrower screening criteria, can lead to inefficient allocation of funds, jeopardizing asset quality and increasing operating costs with the recovery of problem loans (Sari et al. 2022). Moreover, challenges in managing operational costs are evident in banks that expand rapidly without efficient structures, resulting in excessive bureaucracy and increased operational complexity (Fukuyama and Tan 2022).

Banks that are able to balance economies of scale and product diversification achieve better operational efficiency, reducing costs and increasing their attractiveness to customers (Rakshit 2023; Gupta and Mahakud 2020). This efficiency also drives additional investments in technology and operational improvements, consolidating their market position (Dia et al. 2020; Jreisat et al. 2022).

Regulatory flexibilization can increase efficiency by allowing banks to adapt quickly to market dynamics and reformulate their financial products (Jungo and Canguende-Valentim 2025). Operational efficiency is also directly related to risk management capacity, with more efficient banks being able to balance returns and minimize risks (Tavares and Almeida 2024).

A lower level of efficiency is usually a sign that there is a higher proportion of costs in relation to revenue. This can have a negative impact on profitability. This led us to formulate the following hypothesis:

H3: *There is a negative relationship between operational efficiency and bank profitability.*

2.5. The Quality of Assets

Studies show that bank asset quality is a critical sector metric, directly affected by non-performing loans, compromising the efficiency and financial stability of institutions (Satyagraha et al. 2022; Sari et al. 2022; Puspitasari et al. 2021). In oil-rich emerging markets, falling oil prices exacerbate the deterioration in asset quality due to rising non-performing loans, especially affecting banks most exposed to the oil sector (Ferreira and Soares de Oliveira 2019; Maghyereh et al. 2022). Rising defaults driven by the recession, inadequate borrower assessment, excessive credit concentration in specific areas, and unexpected inflation intensify credit risk and provision costs, negatively impacting banks' operational efficiency (Chen et al. 2023; Rakshit 2023; Puspitasari et al. 2021; Ding and Sickles 2018; Fukuyama and Tan 2022).

Investments in employee training have been shown to improve risk management and operational efficiency, contributing to the preservation of bank asset quality (Kashian and Drago 2024; Maji and Saha 2024). Also, high capital requirements can force banks to adopt more prudent practices, improving asset quality and financial stability (Danisman and Demirel 2019). That said, dominant institutions in the market are able to pass on costs to

customers through high spreads, preserving profitability and stability at the expense of consumers (Tavares 2002; Dutra et al. 2024; Almeida and Sousa 2025).

A higher ratio may reflect greater exposure to risk. But it may also be associated with the bank's core business. This could contribute positively to returns.

H4: *There is a positive relationship between asset quality and bank profitability.*

2.6. The Capital Ratio

Bank capital, represented by the ratio between total equity and total assets, acts as an essential financial cushion to absorb unexpected losses and mitigate systemic risks in the banking sector (Gupta and Mahakud 2020; Belas et al. 2019). Banks with high capital demonstrate greater resilience to internal and external shocks, reducing dependence on external financing and strengthening their reputation among depositors and shareholders (Belas et al. 2019; Sari et al. 2022). This strength allows them to obtain financing at more favorable rates, promoting operational efficiency and financial stability (Belas et al. 2019).

Regulators closely monitor bank capital to promote stability in the sector and reduce the likelihood of financial crises (Sari et al. 2022; Molla et al. 2023). However, requiring high capital levels can reduce the banks' ability to grant credit and explore investment opportunities, affecting profitability and cost efficiency (Sakouvogui and Shaik 2020; Fukuyama and Tan 2022). Although high capital increases financial security and facilitates the management of troubled assets, excess capital can limit the growth and efficiency of the banking sector (Satyagraha et al. 2022; Dia et al. 2020; Ding and Sickles 2018; Fukuyama and Tan 2022).

Research by Rakshit (2023), Sakouvogui and Shaik (2020), and Gupta and Mahakud (2020) suggests a negative relationship between capitalization and bank profitability, indicating that the challenge lies in balancing financial security with maximizing returns. Furthermore, risk management capacity and efficiency in resource allocation determine the impact of capitalization on bank performance (Rebić et al. 2022; Satyagraha et al. 2022; Konara et al. 2019). In contexts of dynamic financial markets, the search for the ideal level of capital becomes crucial to sustain the sector (Konara et al. 2019; Dia et al. 2020).

The capitalization ratio also influences operational efficiency. Highly capitalized banks have more autonomy to invest in technological innovation and staff qualification, improving risk management and their offering of financial products (Sari et al. 2022; Kashian and Drago 2024; Iosifidi et al. 2021; Maji and Saha 2024). Nevertheless, high capital levels can result in inefficient use of resources and less pressure to optimize operations, reducing the bank's competitiveness (Konara et al. 2019; Fukuyama and Tan 2022).

Banks with greater capitalization tend to be more resilient. They benefit from less financial risk. This can contribute to greater profitability in the long term.

H5: *There is a positive relationship between the capital ratio and bank profitability.*

2.7. The Market Concentration Index

Market concentration in the banking sector is a critical determinant of competition dynamics and sector efficiency. Highly competitive markets, characterized by an increased number of operators, may lead to weakened credit assessment criteria and insufficient borrower information sharing, thereby elevating default risk (Sari et al. 2022). This environment necessitates greater efforts in asset monitoring and recovery, negatively impacting operational efficiency (Berger et al. 2017). The rising presence of fintech firms and economic crises further intensify competitive pressures, prompting reductions in interest rates that may jeopardize sector sustainability if stable funding sources are lacking (Iosifidi et al. 2021; Maity and Sahu 2022).

Conversely, less competitive markets tend to foster stringent credit screening practices, thereby reducing default risk, while simultaneously consolidating market power that enables banks to command higher margins, potentially at the expense of customers' purchasing power (Mateev et al. 2024; Gerek and Tuncez 2023). Operational efficiency is also influenced by the level of competition; highly competitive environments may increase marketing expenditures and encourage relaxed lending standards, leading to greater financial losses (Kozak and Wierzbowska 2021). Moreover, competition based primarily on price may limit technological investments crucial for optimizing operations and customer retention (Konara et al. 2019).

Balanced competition promotes efficient resource utilization, cost control, and business volume expansion by exploiting economies of scale (Cristian et al. 2020). Effective financial risk management and monetary policy, which influences interest rates, are pivotal factors affecting bank profitability (Dia et al. 2020). While profitability remains the primary performance metric, cost efficiency is equally important for ensuring the banking sector's long-term sustainability (Olson and Zoubi 2011). This evidence has led us to formulate the following hypothesis:

H6: *There is a positive relationship between banking market concentration and bank profitability.*

2.8. Property Type

The competitive dynamics between domestic and foreign banks are shaped by structural differences in ownership and governance, with implications for efficiency, competitiveness, and profitability (Berger et al. 2017; Gupta and Mahakud 2020; Rakshit and Bardhan 2022). Domestic banks often leverage their superior knowledge of the local regulatory and economic environment to capitalize on investment opportunities and cultivate strategic institutional relationships (Berger et al. 2017; Bouzgarrou et al. 2018).

Despite these obstacles, foreign banks contribute to greater sectoral efficiency and innovation, drawing on advanced technologies, global risk management expertise, and privileged access to capital markets (Ferreira and Soares de Oliveira 2019; Rakshit and Bardhan 2022). These advantages support their expansion, particularly in emerging markets with weaker regulatory constraints and lower domestic competition (Berger et al. 2017).

Moreover, foreign banks' investment in research and development enhances managerial practices and operational performance (Blomström et al. 2003; Konara et al. 2019). Their ability to diversify geographically mitigates risks and allows them to tap into high-growth segments often underserved by local banks (Stulz 2022). Nonetheless, operational inefficiencies may arise from the costs of adapting to local market conditions and consumer behavior (Fukuyama and Tan 2022).

Overall, the internationalization of banking is driven by foreign banks' capacity to mobilize capital, apply advanced financial technologies, and optimize performance across varied fiscal and regulatory environments (García-Herrero and Vazquez 2013).

2.9. Macroeconomic Variables

Gross Domestic Product (GDP) is a fundamental macroeconomic indicator that exerts a direct influence on the profitability of the banking sector. Periods of economic expansion generally stimulate demand for financial services, particularly credit, thereby encouraging banks to scale up operations and benefit from economies of scale, factors that positively affect profitability (Iosifidi et al. 2021; Chen and Lu 2021). A favorable macroeconomic environment also reduces default rates, as households and firms are better positioned to fulfill their financial obligations, enhancing asset quality and overall bank performance (Isik and Uygur 2021; Molla et al. 2023).

The study by Ozili (2023) explicitly incorporates macroeconomic variables into the regression model to examine the impact of the Sustainable Development Goals (SDGs) on bank profitability, with particular emphasis on per capita GDP growth (GDP per capita), which is used as an indicator of a country's level of economic development. Iqbal and Nosheen (2023) employ an economic, social, and environmental (ESE) index to assess banks' adoption of the Sustainable Development Goals (SDGs), focusing on the relationship between SDGs, non-performing loans (NPLs), and financial performance. While the study considers macroeconomic, social, and environmental indicators to evaluate sustainability, it does not explicitly disclose the specific macroeconomic variables used.

Nonetheless, sustained economic growth may also promote excessive credit expansion, especially in countries with underdeveloped financial systems. In such contexts, the relaxation of lending standards can result in inefficient resource allocation, deteriorating asset quality, and higher credit risk, ultimately impairing operational efficiency and future profitability (Sari et al. 2022; Maji and Saha 2024).

By contrast, periods of economic downturn and financial crisis intensify systemic vulnerabilities. A contraction in GDP typically leads to an increase in non-performing loans, a decline in asset values, and mounting credit risk, which jointly erode bank profitability (Rebić et al. 2022). Additionally, recessionary conditions may provoke large-scale deposit withdrawals, constraining liquidity and weakening banks' ability to provide credit to the real economy (Rebić et al. 2022; Kashian and Drago 2024).

The COVID-19 pandemic introduced a profound and exogenous shock to global economic activity, with far-reaching effects on banking institutions. The sudden drop in GDP and heightened uncertainty significantly increased credit risk, non-performing loans, and provisioning requirements. This scenario was particularly critical in less resilient banking systems, where profitability was already constrained (Alabbad and Schertler 2022). In the United States, the operational efficiency of community banks was notably impaired, underscoring the susceptibility of smaller institutions to systemic shocks. The pandemic also triggered widespread loan restructuring, compressed net interest margins, and escalated the need for risk management measures. Despite regulatory forbearance and expansionary monetary policies, the short-term financial performance of banks deteriorated sharply due to these compounded pressures.

Inflation is another critical macroeconomic variable influencing bank profitability. Elevated inflation rates typically reduce credit demand, as rising interest rates increase borrowing costs. Moreover, unanticipated inflation diminishes the real value of repayments and undermines borrowers' ability to meet obligations, leading to higher loan defaults and increased provisioning costs (Rakshit 2023). However, if banks can successfully adjust lending rates to incorporate inflation expectations, they may preserve or even enhance profitability margins (Iosifidi et al. 2021). This evidence has led us to formulate the following hypotheses:

H7: *There is a positive relationship between GDP growth and bank profitability.*

H8: *Inflation has a negative impact on bank profitability.*

H9: *The impact of the pandemic on bank profitability is negative.*

2.10. Dependent Variables—ROA/ROE/NIM

The main bank performance indicators identified in the literature include return on average assets (ROA), return on average equity (ROE), and net interest margin (NIM) (Athanasoglou et al. 2008; Molla et al. 2023). ROA measures management efficiency by indicating the profit obtained per monetary unit of invested assets and is widely used to as-

sess bank profitability (Dietrich and Wanzenried 2011; Garcia and Guerreiro 2016). ROE, in turn, represents the owner's return on invested capital, without considering the impacts of leverage and regulation (Garcia and Guerreiro 2016). The NIM expresses the profit margin generated by the bank's main activity, calculated by the ratio between interest income and expenses over total assets (Danisman and Demirel 2019; Garcia and Guerreiro 2016).

The banking performance assessment, especially through ROA, ROE, and NIM, is crucial for managerial and strategic decisions. According to Bhatia and Gulati (2024), both parametric methods, which involve functional specifications and regressions, and nonparametric methods, which use mathematical programming, are used globally to measure the efficiency of financial institutions. Consequently, the literature underscores the significance of these metrics in analyzing the banking sector, emphasizing the need for suitable methodologies to accurately reflect their dynamics and effects.

Table 1 provides a description of the variables employed in the study, grounded in the literature review, with the aim of analyzing the factors influencing the profitability of Angolan banks.

Table 1. Variables used in the study.

Variables	Acronym	Expected Signal	Proxy
Dependent variables			
Return on Assets	ROA		Operating result/Total assets
Return on Equity	ROE		Net profit/Equity
Net Interest Margin	NIM		Net interest income/Average income-generating assets
Internal variables for banks			
Credit Risk	RCRED	−	Credit/Total assets
Liquidity Risk	RLIQ	+	Loans/deposits
Asset Quality	QA	+	Loans/Total assets
Operational Efficiency	EFC	−	Operating costs/Operating revenues
Capital Ratio	RC	+	Equity/Total assets
External variables			
Market Concentration Index	HHI	+	This index is an indicator of the degree of competition in the banking system
Economic Growth	GPIB	+	GDP variation, compared to the previous year
Inflation Rate	INF	−	The inflation rate for the year
Pandemic Crisis—COVID-19	COVID	−	Dummy with value 1 for the pandemic period; 0 for the non-pandemic period
Control variables			
Size	SIZE	+/−	Ln (Total assets)
Nationality	NAC	+	Dummy with value 1 if it is an Angolan bank and 0 otherwise

3. Methodology

3.1. Sample and Data Collection

This study covers the period from 2016 to 2023 and includes all banks that operated and remained active in Angola throughout this interval, enabling a comprehensive and representative analysis of the national banking sector. This period is characterized by significant structural reforms initiated in 2017 aimed at economic diversification, strengthening governance, and enhancing regulatory stability within the financial sector.

In 2018, the official devaluation of the kwanza impacted inflation and purchasing power, reflecting the local macroeconomic volatility. The COVID-19 pandemic (2020–2021) further exacerbated sectoral challenges, affecting credit quality and banking liquidity. The

gradual economic recovery observed in 2022–2023 occurred amid persistent structural challenges and a continued heavy reliance on the oil sector. Consequently, this study contributes to understanding the determinants of bank profitability within a complex and transitional economic and institutional environment.

3.2. Methodology

In this study, we used panel data modeling, a widely used methodology (Almeida et al. 2015; Menicucci and Paolucci 2023). In this specific case, the approach enables the examination of both cross-bank and temporal variations, capturing the dynamic behavior of banking institutions in relation to the independent variables. Moreover, panel data modeling allows for the control of unobserved heterogeneity across observation units, providing a more robust analysis of the factors influencing bank profitability (Molla et al. 2023; Bhatia and Gulati 2024).

The literature reinforces the relevance of panel data modeling in research into the banking sector, highlighting its ability to control unobservable individual effects and analyze the evolution of variables over time (Menicucci and Paolucci 2023).

Although traditional panel data models with fixed or random effects allow modeling individual and temporal differences, estimates were made using the dynamic GMM model, due to its ability to deal with problems of endogeneity and autocorrelation in the errors (Wintoki et al. 2012; Molla et al. 2023; Ullah et al. 2018). These problems can arise when the independent variables are correlated with the error terms or when the dependent variables exhibit temporal dependence, as noted by authors such as Eklemet et al. (2024), Khoza et al. (2024), Wintoki et al. (2012), among others.

Standard errors were estimated using a heteroskedasticity- and autocorrelation-consistent covariance matrix, clustered at the cross-sectional unit level (banks), as recommended for dynamic panel data models estimated via the System GMM approach. This procedure ensures consistent statistical inference by accounting for potential temporal correlation and unobserved heterogeneity within entities, as outlined by Arellano and Bover (1995).

While traditional models assume the exogeneity of explanatory variables, GMM uses lagged instruments to resolve these distortions, providing more consistent and reliable estimates (Wintoki et al. 2012; Molla et al. 2023; Ullah et al. 2018). The dynamic GMM model is particularly relevant because it allows for capturing the temporal relationships between variables, incorporating the dynamic dependence of dependent variables over time (Wintoki et al. 2012; Pham et al. 2020). Additionally, it simultaneously controls endogeneity and autocorrelation, ensuring robust and consistent estimates (Arellano and Bond 1991; Arellano and Bover 1995). The use of dynamic GMM is therefore essential for analyzing the relationship between the dependent and independent variables, taking into account the effect of the dependent variables in the previous period and adjusting for possible distortions caused by endogeneity and autocorrelation in the data (Wintoki et al. 2012; Pham et al. 2020; Ullah et al. 2018).

The generalized form of the dynamic model can be expressed as follows:

$$Y_{it} = \alpha Y_{it-1} + \beta X_{it} + \gamma Z_{it} + \mu_i + \varepsilon_{it}$$

where

Y_{it} is the dependent variable of bank i at time t;
Y_{it-1} is the lagged value of the dependent variable (dynamic term);
X_{it} are the independent variables;
γZ_{it} are the instruments used to deal with endogeneity;
μ_i captures individual effects (fixed or random effects);

ε_{it} is the random error.

The dependence of the dependent variable on previous periods allows the model to capture the effects of temporal persistence and dynamism in the behavior of the variables over time. The use of lagged Y_{it} instruments allows solving endogeneity problems, which is an essential characteristic of the dynamic GMM model (Molla et al. 2023; Pham et al. 2020). To analyze the relationship between Angolan banking profitability(PROF) measures and the different internal and external determinants, a model was estimated, as presented below, in three different estimations, in order to analyze the impact of the variables separately on ROA, ROE and NIM:

$$PROF_{i,t} = \alpha + \beta_1 RCRED_{i,t} + \beta_2 RLIQ_{i,t} + \beta_3 QA_{i,t} + \beta_4 EFC_{i,t} + \beta_5 RC_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 NAC_{i,t} + \beta_8 HHI_{i,t} + \beta_9 GPIB_{i,t} + \beta_{10} COVID_{i,t} + \varepsilon_{I,T}$$

3.3. Model Validation Tests

Following the estimation of the various models, and consistent with previous studies (e.g., Eklemet et al. 2024; Laporšek et al. 2024), the following tests were performed to prove the consistency of the GMM estimator and validate the adoption of the GMM system method. The Hansen Over-identification Test (J Test) was used to assess the validity of the instruments used in the GMM model. This test verifies whether the instruments are exogenous, i.e., that they are not correlated with the model's residuals (Hansen 1982). The null hypothesis of the Hansen test is that the instruments are valid, that is, they are not correlated with the errors, and therefore, the over-identification of the model is adequate. If the value of the Hansen test is significant, the null hypothesis is rejected, suggesting that the instruments are not valid, and the model may be subject to endogeneity problems.

The autocorrelation test of residuals is essential to assess whether observations are independent over time, a critical assumption for validating dynamic panel data models. The Arellano–Bond test is commonly used to test for the presence of first-order autocorrelation (AR(1)) and second-order autocorrelation (AR(2)) in the residuals. The presence of first-order autocorrelation is expected in dynamic models, but second-order autocorrelation should be absent to ensure that lagged instruments are valid.

The Wald test is used to test hypotheses about the parameters of the model, i.e., the homogeneity of the coefficients in the model. In the context of GMM, the Wald test assesses the joint significance of a set of parameters, and tests the relevance and impact of specific variables in the model, such as the relationship between the dependent and independent variables.

4. Results

4.1. Descriptive Statistics

According to Jadah et al. (2020), in the first phase of an empirical study, the statistics described must be determined to obtain an overview of the data used in the study. The estimated descriptive statistics are presented in Table 2.

The descriptive statistics table summarizes the main profitability metrics and their determinants. Return on Equity (ROE) recorded an average of 19.3%, presenting the greatest variability (S.D. = 0.703), reflecting significant differences between institutions. Return on Assets (ROA), at 2.69%, and the net interest margin (NIM), at 5.14%, suggest a relatively stable profitability structure, although the negative minimum values indicate operational challenges throughout the period analyzed.

Table 2. Descriptive statistics.

Profitability Measures	Obs	Average	Standard Deviation	Min	Max
ROE	184	0.193	0.703	−5.741	4.933
ROA	184	0.026	0.077	−0.427	0.196
NIM	183	0.051	0.029	−0.046	0.134
Determinants of Profitability	**Obs**	**Average**	**Standard Deviation**	**Min**	**Max**
RCRED	184	0.194	0.140	0.000	0.691
RLIQ	184	1.770	6.201	0.000	220,00
QA	184	0.340	0.534	0.000	3.140
EFC	184	0.322	2.5103	−14.610	25.900
RC	184	0.354	2.231	−0.866	30.201
HHI	184	0.044	0.054	0.000	0.257
GPIB	184	−0.007	0.0249	−0.056	0.030
INF	184	0.226	0.053	0.135	0.307
COVID	184	0.251	0.434	0	1
SIZE	184	5.417	0.688	3.640	6.660
NAC	184	0.217	0.414	0.000	1.000

Among the internal determinants, liquidity risk has an average of 177%, revealing that, on average, loans granted represent 1.77 times the resources raised, pointing to a strong dependence on external financing and high levels of leverage. Operational efficiency, measured by the cost-to-income ratio (32.2%), shows that around one third of bank revenues are consumed by operating costs, with a significant dispersion (SD = 2.51), reflecting differences between institutions. The capital ratio, with an average of 35.4% (SD = 2.23), indicates that 35% of bank assets are financed by equity, while 65% come from debt capital, suggesting volatility in the period. Asset quality, with an average of 34% and a standard deviation of 0.534, reflects differences in provision and risk management policies between institutions.

In terms of external variables, the Hirschman–Herfindahl Index has an average of 4.47%, suggesting a relatively competitive banking market, although the dispersion of values indicates variation in concentration. The macroeconomic context reveals significant challenges, with an average GDP contraction of −0.738% and an inflation rate of 22.61%, factors that potentially influence the profitability and stability of the Angolan banking sector.

4.2. Correlation Matrix

After performing descriptive statistics, it is essential to analyze the correlation coefficients between the other dependent and independent variables in order to find possible relationships between these variables (Laporšek et al. 2024). Additionally, the analysis of correlation coefficients allows us to assess whether there are multicollinearity problems between the variables under study (Khoza et al. 2024). As such, it is assumed, similar to Khoza et al. (2024) and Laporšek et al. (2024), that the correlation coefficients must be less than 0.8, so that there is no evidence of collinearity. The correlation matrix is presented in Table 3.

Correlation analysis reveals relevant relationships for bank profitability, although the relatively low coefficients suggest a weak isolated linear relationship. However, in dynamic models, weak correlations do not imply absence of causality. Authors such as Gujarati (2021) or Wooldridge (2016) point out that values below 0.8 are not indicative of variable rejection.

Table 3. Correlation matrix.

	ROE	ROA	NIM	SIZE	RCRED	RLIQ	QA	EFC	RC	HHI	GPIB	INF	NAC	COVID
ROE	1													
ROA	0.158	1												
NIM	−0.034	0.447	1											
SIZE	0.003	−0.121	−0.1896	1										
RCRED	−0.050	0.014	0.0286	0.340	1									
RLIQ	−0.046	−0.0587	−0.023	0.008	0.011	1								
QA	0.002	0.012	−0.0365	0.282	0.391	−0.019	1							
EFC	−0.090	0.025	0.0504	0.001	0.042	−0.0183	−0.0822	1						
RC	−0.026	0.053	0.0378	−0.118	−0.066	−0.0075	−0.0437	0.011	1					
HHI	−0.032	−0.143	−0.1598	0.516	0.180	−0.0225	0.092	−0.003	−0.084	1				
GPIB	−0.047	−0.000	0.0468	0.085	0.007	−0.0622	0.182	−0.002	0.056	−0.003	1			
INF	−0.145	0.028	−0.0066	−0.176	0.088	0.108	−0.434	0.130	0.043	−0.023	−0.221	1		
NAC	0.013	0.020	0.0956	0.162	0.034	0.1402	0.154	0.170	0.198	0.201	0.495	0.395	1	
COVID	−0.001	−0.022	0.0374	0.146	0.007	−0.0679	0.236	−0.030	0.065	−0.003	0.737	−0.233	0.0285	1

The positive correlation between net interest margin (NIM) and Return on Assets (ROA) (ρ = 0.4473) stands out, indicating that greater efficiency in financial intermediation favors profitability. In contrast, bank size presents a negative correlation with ROA (ρ = −0.1215), suggesting operational challenges in larger institutions (Kane et al. 2023).

Finally, the negative correlation between inflation and asset quality (ρ = −0.4345) indicates that inflationary pressures may compromise the credit portfolio, as evidenced by Reynard (2023) and Kwon et al. (2022).

4.3. Model Results

Table 4 presents the coefficients of the three estimated models, where the dependent variables are Return on Equity (ROE), Return on Assets (ROA), and net interest margin (NIM). Each model considers a set of explanatory variables related to the banks' internal characteristics and macroeconomic factors.

Table 4. The coefficients of the three estimated models.

	Model 1: ROE	**Model 2: ROA**	**Model 3: NIM**
L1.	0.025682 **	0.0614032 *	0.042175 *
RCRED	−0.241409 **	−0.033786 **	−0.085303 *
RLIQ	−0.001501 **	−0.000574 *	0.000129 **
QA	0.045767	0.013763	0.004083
EFC	−0.026237 ***	−0.000247 ***	−0.000122 **
RC	−0.005741	0.000080 **	0.000810 ***
HHI	−1.670330 *	−0.0907148	0.305157 *
GPIB	17.898301 *	2.345220 ***	0.234952 ***
INF	−1.122770 *	−0.366254 *	0.010628 *
COVID	−0.003110 *	−0.002100 **	−0.005000 ***
SIZE	−0.518617 **	−0.142193 ***	0.012677
NAC	0.014219	0.142193	0.219340
const	0.609259	−0.418253 ***	0.015881
Wald	197.58 ***	45.32 ***	37.40 ***
AR(1)	−1.87 ***	−2.07 ***	−1.51 ***
AR(2)	0.24	0.01	0.15
Hansen	18.34	14.52	14.35

Note: *, **, *** represent significance levels at 10%, 5%, and 1%, respectively.

The robustness of the estimates was assessed through common specification tests in GMM models. The Wald test indicates the joint significance of the explanatory variables, confirming the general adequacy of the estimated models. The Arellano–Bond autocorrelation test (AR1 and AR2) makes it possible to check for serial correlation in the first and second residuals.

The presence of first-order autocorrelation (AR1) is expected in GMM models, while the absence of second-order autocorrelation (AR2) suggests that the instruments used are appropriate. The results obtained indicate that first-order autocorrelation is present, but second-order autocorrelation is not significant, validating the consistency of the estimators.

The Hansen test assesses the validity of the instruments used in the model. A high *p*-value in this test indicates that the instruments are adequate and are not correlated with the model errors. The results demonstrate that the instruments are valid and do not present over-identification problems, reinforcing the reliability of the estimates obtained.

The estimated coefficients indicate that credit risk (RCRED) negatively affects all profitability indicators, with statistical significance in all models (H1). This result indicates that higher credit exposure, if not supported by stringent risk management policies, can lead to a decline in financial margin as well as returns on assets and equity, primarily due to increased loss provisions (Yin 2021; Saif-Alyousfi 2022).

Operational efficiency (EFC) also demonstrates a consistent and highly significant negative impact on profitability, reinforcing the idea that high operating costs compress margins and reduce the banks' ability to generate profits. This evidence shows the importance of efficient resource management and cost containment to improve financial performance (H3) (Sari et al. 2022).

The results indicate that liquidity risk has a negative and statistically significant relationship with ROA and ROE, but a positive and significant relationship with NIM, suggesting that a greater reliance on deposit funding may compromise the bank's overall profitability, while boosting the net interest margin. This evidence is in line with recent studies (e.g., Sari et al. 2022; Wang et al. 2021), which demonstrate that banks with lower liquidity face higher financing costs and lower operational efficiency, negatively affecting overall performance. However, to compensate for the increased liquidity risk, banks tend to apply higher spreads on loans, resulting in an increase in the net interest margin. Thus, effective liquidity management proves to be essential to balance operational profitability and the sustainability of the banking intermediation business model (H2).

The capital ratio has a positive and significant relationship with ROA and NIM, suggesting that more capitalized banks have higher profitability and financial margin, reflecting a greater capacity to absorb risks and finance operations at a lower cost (Sakouvogui and Shaik 2020; Satyagraha et al. 2022; Saif-Alyousfi 2022; Edin et al. 2025).

The analysis of macroeconomic variables reveals that economic growth has a positive and statistically significant impact on all three models, suggesting that economic expansion boosts bank profitability, whether through increased credit granting, reduced defaults or growth in financial activity in general (Iosifidi et al. 2021; Isik and Uygur 2021; Saif-Alyousfi 2022). Inflation, on the other hand, has a negative effect on ROE and ROA, indicating that the generalized increase in prices can deteriorate banks' operational efficiency and increase financing costs, which contradicts the studies by Saif-Alyousfi (2022).

The pandemic crisis had a statistically significant negative impact on all profitability indicators, with more pronounced effects on net interest income. This result confirms that the pandemic had adverse repercussions on the Angolan banking sector, possibly due to the increased risk of default and the deterioration of economic activity during the period under analysis (Rebić et al. 2022; Isik and Uygur 2021).

The market structure, measured by the Market Concentration Index (HHI), presents mixed results. The negative effect on ROE suggests that higher concentration may reduce shareholder profitability, possibly due to internal inefficiencies or lower competition that discourages innovation and efficiency (Mateev et al. 2024; Nyangu et al. 2022). Nevertheless, the positive relationship between the HHI and net interest income (NIM) suggests that in

less competitive markets, banks may have greater pricing power, benefiting their financial intermediation capacity (Mateev et al. 2024; Saif-Alyousfi 2022; Nyangu et al. 2022).

The analysis of the capital ratio allows us to verify a positive impact on ROA and NIM, although not significant for ROE. This result suggests that banks with greater equity tend to present better indicators of operating profitability and better financial margin, possibly due to less dependence on external financing and increased financial strength (Saif-Alyousfi 2022; O'Connell 2022).

Size reveals a significant negative effect on ROE and ROA, indicating that larger banks may face management difficulties or operational inefficiencies, which compromise their profitability (Edin et al. 2025; Adelopo et al. 2022; O'Connell 2022). The non-significant effect on NIM suggests that size does not directly influence banks' ability to generate financial margins (Ozili and Ndah 2024). Bank nationality (NAC) did not show statistical significance, suggesting that profitability does not differ significantly between Angolan and foreign banks in the period analyzed (Bouzidi and Nefzi 2024; Yin 2021; Maity and Sahu 2022).

The evidence found suggests that the implementation of policies that promote better risk management and control of operating costs can contribute to improving the banks' profitability. Moreover, the positive effect of economic growth underscores the influence of the macroeconomic environment on the banking sector's performance (Saif-Alyousfi 2022; Adelopo et al. 2022). The validation of the models through statistical tests confirms the adequacy of the methodology used, ensuring that the results presented are robust and reliable.

The results obtained provide relevant evidence for different economic agents, including investors, bank managers, and public policymakers. For investors, the evidence suggests that credit risk is a critical factor to consider when assessing bank profitability.

The evidence also points out that banks with a higher exposure to credit, when not accompanied by rigorous risk management policies, jeopardize their financial performance. It suggests that investors should favor institutions that adopt robust credit risk mitigation practices, namely by diversifying their loan portfolio and adopting prudential criteria for granting finance.

For bank managers and policymakers, the results indicate that operational efficiency reinforces the importance of efficient resource management, cost containment, and digitalization of services, promoting process optimization and improved profitability. Financial literacy becomes crucial in the adoption of digital technologies and in the expansion of the banking network to all regions of Angola, ensuring financial inclusion and efficiency in the sector, in line with the conclusions of Almeida et al. (2024) and Jungo et al. (2023).

The relationship between economic growth and bank profitability highlights the importance of macroeconomic stability, making inflation control and competitive balance in the sector essential (Saif-Alyousfi 2022; Adelopo et al. 2022). The pandemic crisis highlighted the importance of resilience mechanisms and support for bank solvency. Bank capitalization, on the other hand, proves to be decisive for profitability by enhancing risk absorption and reducing financing costs. In this context, the implementation of regulatory policies that reinforce the solidity of the sector is essential, as they are crucial for the stability and sustainable growth of the Angolan banking system.

4.4. Practical Implications of Results

The empirical evidence gathered in this study reveals significant implications for bank managers, investors, and policymakers, particularly when contextualized within Angola's economic and institutional framework. The negative relationship between credit risk and all bank profitability indicators reinforces the necessity for robust internal risk

assessment and mitigation policies. This is especially critical in Angola, a market historically characterized by information asymmetries, high sovereign risk exposure, and a client base vulnerable to economic shocks. For bank managers, it becomes imperative to adopt more stringent prudential practices, including the diversification of loan portfolios and the implementation of rigorous credit approval criteria, especially within a financial system still undergoing structural consolidation. Investors, in turn, should assess credit risk exposure as a core criterion when evaluating the soundness of financial institutions, favoring banks with stronger capital buffers and comprehensive risk management strategies, given their association with greater resilience and sustainable financial margins.

The observed negative impact of operational inefficiency on profitability highlights the adverse effect of elevated costs on banks' profit-generating capacity. In the Angolan context, this underscores the urgency of investing in digitalization, process optimization, and the rational expansion of financial service networks, particularly in underserved regions. Such measures align with the objectives of the National Strategy for Financial Inclusion and the government's broader agenda for modernizing the financial sector, contributing not only to enhanced profitability but also to systemic stability.

From a macroeconomic perspective, the positive influence of economic growth on bank profitability underscores the interdependence between the financial sector and aggregate economic performance. In an economy still heavily reliant on the oil sector and highly susceptible to external shocks, it is vital that public policies foster economic diversification, exchange rate stability, and macroeconomic predictability, thus creating an enabling environment for productive credit expansion and financial sector robustness. Conversely, the negative impact of inflation and the COVID-19 crisis on profitability indicators highlights the vulnerability of financial institutions to exogenous shocks. This reiterates the importance of institutional resilience mechanisms, such as capital buffers and liquidity support facilities, which should be implemented within a proactive and contextually tailored macroprudential policy framework.

Finally, the evidence indicating that better-capitalized banks achieve stronger net interest margins and operational profitability underscores the role of capital adequacy as a cornerstone of financial sustainability. Policymakers should therefore continue reinforcing capital regulatory requirements, in line with international standards such as the Basel Accords, but calibrated to the structure and maturity of Angola's financial system. Furthermore, the interaction between market structure, bank size, and profitability suggests that banking concentration, if not balanced by effective competition policies, may hinder sectoral efficiency. In this regard, policies that promote healthy competition, technological innovation, and equitable access to financial services may not only enhance sectoral profitability but also foster a more inclusive, resilient, and development-oriented financial system in Angola.

5. Conclusions

This research analyzed the determinants of bank profitability in Angola in the period between 2016 and 2023, based on an econometric panel data model. The results obtained showed that credit risk, operational efficiency, and liquidity are key drivers of the financial performance of Angolan banks. The analysis demonstrated that efficient credit risk management and the optimization of operating costs are essential to ensure the stability and profitability of the banking sector.

The results indicate that high bank concentration and the presence of large financial institutions have mixed implications for profitability, positively influencing net interest income but potentially compromising operational efficiency. Furthermore, economic growth has proven to be a driving factor for profitability, while inflation has had an adverse ef-

fect on the banks' financial indicators. The COVID-19 pandemic crisis, in turn, has had significant negative impacts, resulting in a deterioration in asset quality and a contraction in banking activity. The pandemic has exacerbated credit risk and reduced borrowers' repayment capacity, increasing non-performing loan levels and forcing banks to increase their loss provisions.

The political and regulatory context in Angola also played a crucial role in the evolution of bank profitability. The financial sector reforms implemented by the National Bank of Angola (BNA), particularly the enhancement of capital requirements and prudential supervision measures, played a crucial role in reinforcing the sector's resilience. The banking restructuring that took place, characterized by the closure and merging of some financial institutions, aimed at increasing the solidity of the banking system and improved the operational efficiency of the remaining institutions.

At the macroeconomic level, the Angolan economy's dependence on oil revenues continued to pose a structural challenge to financial stability, with oil price volatility directly impacting the liquidity and profitability of banking institutions. The implementation of economic diversification policies and increased transparency in the management of public financial resources could contribute to a more favorable environment for the development of the banking sector.

In terms of future directions, increasing digitalization and the advancement of fintechs represent trends that could reshape the Angolan banking sector, promoting greater efficiency in the provision of financial services and expanding the population's access to banking services. However, for these innovations to have a significant impact, it is essential that they are accompanied by effective financial literacy policies, empowering the population to make informed decisions and reducing financial exclusion.

Another potential future research and policy direction involves ensuring that the ongoing digital transformation of the Angolan banking sector is accompanied by an effective integration of environmental, social, and governance (ESG) principles. This alignment is crucial to guarantee that technological advancements not only enhance efficiency and financial inclusion but also make a meaningful contribution to sustainable development, economic resilience, and social equity.

Despite the contributions of this study, some limitations should be acknowledged. The analysis was based on historical data that may not fully capture the effects of future shocks on the banking sector. Moreover, the availability and quality of financial data in Angola still pose a challenge for more in-depth econometric studies. For future research, it is suggested to explore the impact of new regulations on financial stability, as well as assess the effect of adopting emerging technologies, such as artificial intelligence and blockchain, on banking efficiency. Comparative analysis between Angola and other emerging markets could also provide additional insights into best practices to promote banking sector sustainability.

Finally, the results of this research highlight the need for strategic policies that promote greater banking competition, the adoption of innovative technologies and the implementation of effective risk management mechanisms. Strengthening regulatory supervision and creating a stable macroeconomic environment will be key to ensuring greater sustainability and resilience of the Angolan banking sector in the coming years. Additionally, it is important to acknowledge that the results may not be fully generalizable to the entire Angolan banking system, given the heterogeneity among institutions and the limitations in data availability. Furthermore, the econometric model did not account for potential long-term structural effects. For policymakers and regulators, the findings highlight the urgency of promoting economic diversification, enhancing prudential supervision, and fostering financial literacy. Investors should remain alert to systemic risks associated with macroeconomic volatility. Future research could benefit from incorporating qualitative

approaches, exploring the role of digital financial inclusion, and evaluating the effectiveness of recent reforms in strengthening banking sector stability.

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