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# The impact of bank specific and macroeconomic factors on banks' risk and return: A comparative study between Egypt and Saudi Arabia

Hatem Ramadan[1*], Baher Abdelaziz[2]

[1]*Head of Finance Department, Giza Higher Institute for Managerial Sciences, Giza, Egypt.*
[2]*COO & Partner Facelift Consulting, Master in Finance and Investment, University of Nottingham, Nottingham, UK.*

Corresponding author: Hatem Ramadan (*Email: hatem-eladly@hotmail.com*)

## Abstract

This paper investigates the impact of bank-specific and macroeconomic factors on banks' risk and return in Egypt and Saudi Arabia, the purpose of this paper is to conclude the risk and return sensitivity to macroeconomic factors and bank-specific in different economic environment; utilizing a panel dataset of largest 20 banks in Egypt and Saudi Arabia over the period 2008–2024. This research methodology employing System Generalized Method of Moments (GMM) to address endogeneity and dynamic relationships, the research measured bank-specific factor by capital adequacy, bank size, loan-to-deposit ratio, and operational efficiency; as well as external macroeconomic factors by Gross Domestic Product (GDP) growth, Inflation, and Interbank rates. The credit risk measured by non-performing loans (NPLs) and its provisioning, while return measured by return on assets (ROA), return on equity (ROE), and net interest margin (NIM). The findings highlight that there is significant impact of bank-specific and macroeconomic factor on risk for Egypt and Saudi Arabia except capital adequacy ratio and gross domestic product (GDP) for Egypt in addition, interbank rate and size were insignificant for Saudi Arabia banks. Moreover, the research pointed out significant impact of bank's capital adequacy ratio, interbank rate, loan to deposit ratio and operation efficiency on bank return in Egypt; in addition, the return influenced significantly by capital adequacy ratio and operation efficiency only in Saudi Arabia while, macroeconomic factors have insignificant impact on Bank's return in Saudi Arabia. Egyptian banks risk and return show sensitivity to bank-specific and macroeconomic factors, while Saudi banks exhibit greater stability and resilience against macroeconomic shocks and less sensitivity to internal factor.

**Keywords:** Bank specific, Banks' return, Banks' risk, GMM, Macroeconomic factors.

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## 1. Introduction

The banking sector plays a pivotal role in fostering economic development, ensuring financial stability, and facilitating the efficient allocation of resources within an economy. As key intermediaries, banks are exposed to a multitude of risks and are expected to generate sustainable returns to remain resilient amidst dynamic macroeconomic environments. Understanding the internal and external determinants of banks' risk and return is therefore essential for policymakers, regulators, and banking managers aiming to strengthen financial stability and enhance operational efficiency.

This paper offers a comparative analysis of the banking sectors in Egypt and Saudi Arabia, two prominent emerging markets within the Middle East and North Africa (MENA) region. despite their geographic proximity and shared developmental aspirations, these countries exhibit distinct banking structures, regulatory frameworks, and macroeconomic conditions. For instance, Egypt's banking sector has historically faced challenges related to credit risk, inflation volatility, and economic fluctuations, whereas Saudi Arabia's banking landscape benefits from stable macroeconomic conditions, significant oil revenues, and large-scale financial institutions.

Analyzing the impact of bank-specific factors including capital adequacy, size, loan-to-deposit ratio, and operational efficiency and macroeconomic variables such as GDP growth, inflation, and interbank rates reveals their influence on key banking performance indicators. These include non-performing loans, provisioning behavior, return measures (ROA and ROE), and net interest margin within the contexts of Egypt and Saudi Arabia. By employing the System Generalized Method of Moments (GMM), the paper examines the dynamic relationships among these variables while effectively addressing potential endogeneity issues common in panel data analysis. The findings aim to provide a comprehensive understanding of how macroeconomic shocks and internal bank characteristics impact both risk and return, shedding light on factors that influence banking stability and profitability in the two countries.

The contribution of this paper lies in its cross-country comparison within the emerging markets, offering insights into the differential impacts of macroeconomic shocks and bank-specific characteristics on financial stability and performance. Furthermore, this study utilizes recent data covering the period from 2008 to 2024, capturing the effects of recent regulatory reforms, economic fluctuations, and global financial trends. By doing so, it provides timely and relevant insights into the evolving risks and returns faced by banks in these emerging markets, thereby contributing valuable policy implications for enhancing banking resilience and promoting sustainable growth.

### *1.1. Bank-Specific Factors Development*

This paper is analyzing key indicators such as capital adequacy, size, asset quality, profitability, and operational efficiency, the research highlights the similarities and differences in how banks in these two emerging markets have evolved in response to macroeconomic conditions, regulatory reforms, and global financial trends. The comparative approach offers valuable insights into the strategic behaviors, risk management practices, and resilience of banks within distinct economic environments, shedding light on the factors that influence banking stability and growth in these rapidly developing economies.

A thorough examination of the evolution of key banking indicators over the period 2008–2024 reveals notable differences and similarities between the two countries. In Egypt, the average capital adequacy ratio (CAR) has fluctuated slightly from 14.8% in 2008 to 22.5% in 2024, reflecting a steady strengthening of capital buffers following regulatory reforms and Basel iii implementation. Conversely, Saudi Arabia has maintained a relatively higher and stable car, averaging around 19.6% in 2008 and fluctuating narrowly between 19.2% and 19.8%, indicating a consistently strong capital position.

In terms of size, Egyptian banks experienced a gradual increase in total assets, with an average size index rising from 20.95 in 2008 to 24.50 in 2024. Meanwhile, Saudi banks were larger overall, with their size index increasing from 24.32 to 26.49 during the same period. The loan-to-deposit ratio (LDR) decreased in Egypt from 57.0% in 2008 to 43.0% in 2024, suggesting a shift toward more conservative lending practices or increased deposit accumulation. Contrarily, Saudi banks maintained a high and stable LDR, averaging between 81.4% and 94.8%, reflecting a reliance on loans relative to deposits and a steady credit expansion strategy. These contrasting trends reflect differing risk appetites and macroeconomic influences shaping lending behaviors.

Operational efficiency also diverged between the two countries. Egypt's operational efficiency improved significantly, with the average ratio declining from 48.0% in 2008 to 24.8% in 2024, indicative of better cost management and internal controls. Conversely, Saudi Arabia's efficiency ratios remained relatively stable, fluctuating around 52.5% to 55.5%, without notable improvements. Such differences in operational performance are crucial for understanding internal risk management and profitability dynamics.

### *1.2. Macroeconomic Factors Development*

Macroeconomic stability further distinguishes the two economies. Egypt's inflation rate was notably high, starting at 18.3% in 2008, peaking at 33.9% in 2023, before declining slightly, indicating periods of inflation volatility. In contrast, Saudi Arabia experienced much lower and stable inflation rates, generally below 3.5%, highlighting a controlled inflation environment. Correspondingly, Egypt's GDP growth was volatile, beginning at 7.2% in 2008, declining to 1.8% in 2011, and recovering to around 6.6% in 2022, signaling economic fluctuations. Saudi Arabia's GDP growth remained more stable, averaging between 1.7% and 12.0%, reflecting steady macroeconomic performance.

The divergence extends to the interbank rate environment. Egypt's average interbank rate increased from 9.3% in 2008 to 26.8% in 2024, indicating rising borrowing costs and heightened interbank rate risk exposure. Meanwhile, Saudi

Arabia's interbank rate remained low initially, rising gradually from 3.3% to 6.0%, underscoring a relatively stable and low-interest environment. These conditions influence banks' asset-liability management strategies and risk profiles.

*1.3. Banks Risk and Return Development*

In asset quality and credit risk management, Egypt's non-performing loans (NPLs) declined sharply from 0.199 to 0.037, driven by regulatory reforms and economic stabilization efforts, signaling significant improvements in credit risk mitigation. Saudi banks maintained consistently low NPLs, ranging between 0.010 and 0.035, reflecting a mature, risk-averse banking sector.

Profitability trends further highlight differences. Egypt experienced a dramatic rise in return on assets (ROA) and return on equity (ROE) during 2023–2024, primarily due to strategic asset reallocations into higher-yield instruments like treasury bills amid rising interest rates. In contrast, Saudi banks maintained steady but comparatively lower profitability margins, emphasizing stability over aggressive asset growth. These patterns underscore the impact of macroeconomic conditions and internal asset management strategies on bank performance.

The regulatory frameworks in Saudi Arabia and Egypt have evolved to bolster banking resilience. Both adopted Basel ii during 2008–2009, with Egypt implementing Basel iii between 2014 and 2016, which significantly increased capital buffers and enhanced risk management frameworks. Saudi Arabia also maintained strong capital positions, ensuring stability and confidence in its banking system.

The influence of the interbank rate environment is also noteworthy. Rising overnight rates from 2023–2024 prompted Egyptian banks to increase holdings in high-rate treasury bills, boosting profitability but exposing them to interbank rate risk. Saudi banks, benefiting from a stable interest rate environment, avoided significant asset reallocation, maintaining steady performance.

Finally, macroeconomic conditions and growth prospects differ substantially. Egypt's economic reforms and macroeconomic stability, coupled with strengthened capital bases, support positive trends in profitability and asset quality, indicating potential for ongoing recovery and growth. On the other hand, Saudi Arabia benefits from steady oil revenues and diversification efforts, maintaining a stable but cautious banking sector focused on stability rather than rapid expansion.

## 2. Literature Review

The economic and financial literature dealing with this subject is very rich. Several studies have focused on the determinants of bank profitability. Some studies investigate the influence of internal factors on banks credit risk and liquidity risks and other studies explore the impact of external factor on banks credit risk and liquidity risks. Most of these studies have focused on the cases of industrialized countries, but few studies have analyzed the risk and return of banks in relation to bank-specifics and macroeconomic factors in emerging countries especially Egypt and KSA. On another word, there are no study examine the impact of bank-specifics and macroeconomic factor on risk and return for banking industry in Egypt and Saudi Arabia.

Islam [1] examines the impact of macroeconomic variables on the profitability of UK commercial banks from 2015 to 2019. The study finds that real GDP growth significantly negatively affects profitability, while other macroeconomic factors do not have a significant impact.

Derbali [2] investigates the key determinants of Moroccan banks' performance from 1997 to 2018, analyzing internal, systemic, and macroeconomic factors. Study finds that bank size positively influences profitability, while inflation and banking system size have insignificant effects. Other study Bushashe [3] found that macroeconomic factors influence the performance of private banks in Ethiopia, as well as inflation rate and exchange rate significantly negatively impact bank performance.

Additional study examines how internal factors and external factors influence the profitability of Jordanian commercial banks; study found positive impacts of bank size and diversification, while capital risk (equity to total assets), and leverage risk (debt to equity), and market concentration negatively affect profitability. External factors such as financial development and inflation enhance profits, whereas market volatility and refugee crises diminish them. Bekhet, et al. [4].

One more pioneer study that focused on Chinese listed banks, finds that larger asset size, higher capital adequacy ratio, and greater profitability (ROE) significantly reduce liquidity risk Li, et al. [5]. Conversely, higher non-performing loan ratios, GDP growth, and inflation (CPI) are associated with increased liquidity risk. Overall, strengthening asset quality, risk management, and macroeconomic stability are key to mitigating liquidity risks in Chinese banks.

Pioneer study analyzes Tunisian banks' performance (1998-2017). Key ratios such as capital adequacy (CAR) and ownership (OWN) positively influence profitability, while larger size negatively impacts it. Macroeconomic ratios, such as GDP growth and inflation significantly affect banks performance, emphasizing the role of internal efficiency and external factors Hammami and Smida [6].

Khan [7] examines internal and external factors influencing the profitability of banks in GCC countries from 2011 to 2017. it finds that larger banks and higher GDP growth are positively associated with profitability measures such as return of assets (ROA) and return on equity (ROE). Conversely, variables such as capital adequacy, asset quality, operational efficiency, and financial risk tend to negatively impact bank profitability. The results highlight the importance of bank size, portfolio management, and macroeconomic stability for enhancing bank performance in the region.

Farag [8] investigates the factors affecting both retail and corporate credit risks in Egyptian banks from 2013 to 2020. It examines how macroeconomic and bank-specific variables influence the non-performing loan (NPL) ratios in these segments. the study uses panel data analysis with fixed and random effects regression models, based on data collected from 26 Egyptian banks and macroeconomic indicators provided by the central bank of Egypt. the findings reveal that corporate

NPLs are influenced by both macroeconomic and bank-specific factors, while retail NPLs are affected only by macroeconomic variables.

Abdou and Alarabi [9] examine the factors influencing the profitability of private banks in Egypt from 2013 to 2022. Using panel data and multiple regression analysis, it finds that capital adequacy, economic growth, bank size, and inflation positively affect profitability, while non-performing loans, liquidity, and credit risk have negative impacts.

Abdelzaher [10] examines how macroeconomic and bank-specific factors affected the profitability of Egyptian Islamic and commercial banks from 2003 to 2019. The results show that bank type negatively impacts profitability, while factors like GDP, deposit growth, and reinvestment rate significantly influence bank performance.

Abobaker [11] examines Egyptian banks' profitability from 2006 to 2015, using data from 26 banks and GMM estimation. The study finds that larger banks, higher capital, and operating income boost profitability, while high non-interest income and inflation reduce it. Economic growth and low inflation positively influence bank performance, providing key insights for policymakers and managers.

For Saudi banks significant positive relationships with profitability are observed for total investment to total assets ratio, total equity to assets ratio, and liquidity risk, while net credit facilities to total assets, net credit facilities to total deposits, cost income ratio, and bank size exhibit significant negative relationships. Conversely, Jordanian banks show significant positive effects of liquidity risk, net credit facilities to total assets, and total equity to assets on profitability, with negative significant relationships identified for total investment to total assets, cost income ratio, and bank size Almazari [12].

Al-Jafari, et al. [13] examines bank-specific, government-specific and macroeconomic determinants of profitability for banking sector of Saudi Arabia. In their study examines how bank-specific, government, and macroeconomic factors influence the profitability of Saudi banks from 2009 to 2018. it analyzes a sample of 12 banks using panel data regression techniques. Their findings indicate that bank-specific variables and government effectiveness positively impact profitability, while GDP growth and inflation negatively affect bank earnings.

Alsharif [14] analyzes the relationship between NPLs and variables such as capital, size, market concentration, inflation, and oil prices in Saudi banks (2003–2019). The results indicate that higher capital and bank size are associated with lower NPLs, while greater market concentration, inflation, and oil prices tend to increase NPLs. effects vary based on the banking model.

Chintha [15] examines how bank-specific and macroeconomic factors affect the profitability of Oman's commercial banks from 2007 to 2016. Using panel data and fixed effects regression on six banks, the study finds that asset size and non-interest income boost profitability, while deposits have a negative effect. Macroeconomic factors like GDP positively influence banks, whereas inflation and interest rates have a negative impact, highlighting the importance of economic stability and sound asset management.

## 3. Data and Research Methodology

### *3.1. Data Collection and Sample Size*

This paper used sample of twenty bank that were considered in 340 observations, divided into ten Egyptian banks with 170 observations, and ten Saudi Arabian banks with 170 observations; this research used annual data covering the period from 2008 to 2024. Sample selection was based on top 10 largest banks' assets in Egypt and Saudi Arabia. In obtaining the data, the necessary information was gathered from secondary data which is financial statements of the selected banks over the period of 2008 to 2024. As well as Macroeconomic factors were obtained from World Bank covering same period on annual base.

**Table 1.**
Summary of the Sample Size.

| **Egyptian Banks** | | **Saudi Arabia Banks** | |
|---|---|---|---|
| **No.** | **Bank Name** | **No.** | **Bank Name** |
| 1 | National Bank of Egypt | 1 | Saudi National Bank |
| 2 | Banque Misr | 2 | Riyad Bank |
| 3 | Commercial International Bank | 3 | Banque Saudi Fransi |
| 4 | Qatar National Bank Al Ahli | 4 | Arab National Bank |
| 5 | Bank of Alexandria | 5 | Saudi Awwal Bank |
| 6 | Housing & Development Bank | 6 | Bank Aljazira |
| 7 | Arab African International Bank | 7 | The Saudi Investment Bank |
| 8 | Faisal Islamic Bank of Egypt | 8 | Al Rajhi Bank |
| 9 | Banque du Caire | 9 | Bank Albilad |
| 10 | Abu Dhabi Islamic Bank-Egypt | 10 | Alinma Bank |

## 4. Measuring Variables and Developing Hypotheses

### *4.1. Measuring Variables*

This paper includes bank-specific (Internal) factors that have been measured via various indexes reflect banks characteristics which are Capital adequacy Ratio, Operation Efficiency, Loan to Deposit Ratio and Bank Size, on other

hand, this research addressed Macroeconomic (External) Factors that have been measured by each of GDP growth, Inflation, and Interbank ratios; mentioned indexes have been used as independent variables.

It worth to mention that dependent variables pointed out the banks' risks and return; Risk has been measured by each of Non-Performing Loans Ratio, and Provisions Non-Performing Loans Ratio, and Return has been measured by each of Return on Assets, Return on Equity and Net Interest Margin. Next table shows the variables measurement:

**Table 2.**
Measuring of Research Variables.

| Variable | Calculation | Abbreviation | Data Resource |
|---|---|---|---|
| **Independent Variables** | | | |
| Bank-Specific (Internal Factors) | | | |
| Capital Adequacy Ratio | Capital Base to Risk-Weighted Assets | CAR | Financial Statement |
| Operation Efficiency | Cost to Income | OER | |
| Loan to Deposit Ratio | Total Loans divided by Total Deposits | LDR | |
| Bank Size | Natural logarithm of total asset | Size | |
| **Macroeconomic (External Factors)** | | | |
| GDP | Annual Real GDP Growth Rate | GDP | World Bank |
| Inflation | Inflation, Consumer Price Annual | INF | |
| Interbank | Average Interbank | INTB | |
| **Dependent Variables** | | | |
| Risk | | | |
| Non-Performing Loans | Non-performing Loans to Total Loans | NPLS | Financial Statement |
| Provisions Non-Performing Loans | Loan Provisions to Non-performing Loans | LPNPLS | |
| **Return** | | | |
| Return on Assets | Net Income to Total Assets | ROA | Financial Statement |
| Return on Equity | Net Income to Total Equity | ROE | |
| Net Interest Margin | Net Interest Income to Average Earning Assets | NIM | |

**Source:** Data obtained from banks' annual reports and World Bank data.

*4.2. Independent Variables*

This paper addressed several variables to measure the impact of macroeconomic factor and bank-specifics factors on Banks' Risk and return; the bank specifics factors measured using different indexes that explain bank internal stability with adequate Capital base, banks' liquidity, operation efficiency and Banks size. On other side, study selected macroeconomic factors that may affect banks' risk and returns which measure gross domestic production growth, Inflation and Interbank rate.

The explanatory variable used in this paper as following:

*4.2.1. Bank Specific-Factors*

*4.2.1.1. Capital Adequacy Ratio*

Capital Adequacy ratio measures bank stability with sufficient capital buffer to absorb any losses; during research period Basel addressed three methods for Capital adequacy ratio calculation, Basel I placed groundwork for Capital Adequacy ratio Basel Committee on Banking Supervision [16] then Basel II and Basel III extended the outline to contain market risk**,** operational risk**,** and liquidity standards.

Basel II polished this method by including market risks and operational risks, constructing more sensitive risk framework Basel Committee on Banking Supervision [16]. Basel III additional bound the capital base by presenting capital buffers and leverage ratios to improve financial organizations resilience Basel Committee on Banking Supervision [16].

*4.2.1.2. Loan to Deposit Ratio*

The Loan to deposit ratio is proxy used in this paper to measure the liquidity position for the banks; Loan to Deposit ratio is a proxy of a bank's liquidity, showing deposits utilization to meet borrowing (loans) requests.

This ratio firstly introduced by Federal Reserve Bank of Philadelphia since 1980 which is liquidity soundness indicators with regulators till today date. As well as Central Bank of Egypt (CBE) mandate on banks to calculate LDR as part of its Financial Soundness Indicators CBE [17]. Moreover, Saudi Central Bank (SAMA) has clearly mandated the use of the Loan-to-Deposit Ratio as part of its liquidity soundness indicators SAMA [18].

*4.2.1.3. Operating Cost to Income Ratio*

This research used Operating cost to Income ratio as index for measuring the management efficiency for the banks in Egypt and Saudi Arabia; this proxy is a universal benchmark for cost efficiency comparison among banks as it is comparing the operating cost relativity to its income.

The International Monterey Fund has accentuated OER as a genuine proxy for banks efficiency and systemic risk in its working papers Xu, et al. [19] whereas the BIS has emphasized OER into its wider framework for measuring fundamental obstacles and banking stability globally Bank for International Settlements [20].

*4.2.1.4. Bank Size*

Banks diverge from each other by various internal characteristics, and one of the most important of these characteristics is the size of the bank. This paper uses the natural logarithm of total assets as a primary variable to measure bank size.

Tan and Floros [21] proof that capturing the economic and non-economic scale in banking industry would be effectively when addressing risk diversification and cost variation, and product specification. Jin and Wen [22] robust the usage of natural logarithm of total assets to measure bank size.

*4.2.2. Macroeconomic Factors*

*4.2.2.1. Gross Domestic Product Growth*

This research considers Gross Domestic Product (GDP) growth as a macroeconomic indicator reflecting the overall economic health and development, which can influence banking sector performance. GDP growth rates impact banks' lending capacity, asset quality, and profitability, thereby serving as a crucial variable in analyzing systemic stability and resilience in the banking industry.

*4.2.2.2. Inflation Rate*

Inflation rate is a vital macroeconomic variable used in this analysis to assess price stability and its effect on banking operations. Fluctuations in inflation influence interest rates, lending behavior, and deposit values, which in turn affect banks' profitability and liquidity positions. Monitoring inflation trends helps in understanding macroeconomic risks faced by banks in Egypt and Saudi Arabia.

*4.2.2.3. Interbank Rate*

The interbank rate is considered a key indicator of liquidity and monetary policy conditions within the financial system. It reflects the cost of short-term borrowing among banks and influences overall interest rate environments. Variations in the interbank rate can affect banks' funding costs, lending activities, and financial stability, making it an essential factor in macroeconomic analysis.

*4.2.3. Dependent Variables*

*4.2.3.1. Risk Measurement*

Banking industry faces several types of risks that affect bank stability and continuity and one of the major types of risks for banking industry is the credit risk; as credit risk impacts the quality of banks assets.

The credit risk explained by risk of default for the borrowers which measured by non-performing loans ratio out of total loans and provision of non-performing loans ratio out of total non-performing loans.

*4.2.3.2. Non-Performing Loans Ratio*

Several studies used non-performing loans as proxy to measure credit risk in banking industry; Kucukkocaoglu and Altintas [23] model credit losses to NPLs ratio which validate non-performing loans as significant proxy for credit risk in banks supporting the credibility of NPL ratios in capturing credit risk dynamics which used in this paper. This ratio calculated by dividing non-performing loan value by total loans value.

*4.2.3.3. Provision of Non-Performing Loans Ratio (LPNPLs)*

LPNPLs ratio mirrors how well a bank has predicted credit losses. Conservative risk management keep high ratios of LPNPLs. Based on European Central Bank provisions are recorded when loans may not be paid. The LPNPLs ratio explains to what extend banks expected loss has been predictable. Supervisory body uses this ratio to evaluate whether banks are sufficiently ready for credit risk. EU law commands minimum coverage ratios to guarantee banks keep adequate provisions. This makes LPNPLs Ratio valid benchmark for credit risk readiness.

*4.2.4. Return Measurement*

*4.2.4.1. Return on Assets*

Widely used on previous research as index for return is Return on Assets (ROA). For instance, Zampara, et al. [24]; Chowdhury and Rasid [25] and Naeem, et al. [26] However, the bank's return was examined by past research as a proxy of Bank's Internal factor and external factor. Return on Assets on this research calculated by dividing net profit on total assets for the banks.

*4.2.4.2. Return on Equity*

Return on Equity (ROE) is a quantity banks' performance financially. Return on Equity is the rate used to calculate the return of the fund invested by the owners of the business. It permits business shareholders to ensure how effectively their investments are used. Which present the management performance of the banks. Tomak [27] ROE is an indicator of return and financial performance measurement, which heartens banks to diversify their sources of revenue Albertazzi and Gambacorta [28].

Numerous research used ROE as proxy for Bank performance in relation to internal and external factors that has been used in this research that calculated by dividing net profit on total equity for the Bank. Naceur and Omran [29]; Kanas, et al. [30]; Dietrich and Wanzenried [31] and Tan [32].

*4.2.4.3. Net Interest Margin*

Net interest margin (NIM) is a extensively used to measure the efficiency and effectiveness of a bank's investments decision as compared to its leverage. Several research examined bank performance in relation to internal and external factors for instance Dietrich and Wanzenried [31] and Tan [32] that has been used in this research and calculated by dividing net interest income on average earning assets.

## 5. Developing Hypotheses

This paper includes five hypotheses covering the impact of bank specific and macroeconomic factors on banks risk and returns which are as following:

*$H_1$: There's no significant impact of "Bank-Specific and Macroeconomic Factors" on "Non-performing Loans Ratio" of Egyptian and Saudi Arabia Banks.*

*$H_2$: There's no significant impact of "Bank-Specific and Macroeconomic Factors" on "Provision Non-performing Loans Ratio" of Egyptian and Saudi Arabia Banks.*

*$H_3$: There's no significant impact of "Bank-Specific and Macroeconomic Factors" on "Return on Asset" of Egyptian and Saudi Arabia Banks.*

*$H_4$: There's no significant impact of "Bank-Specific and Macroeconomic Factors" on "Return on Equity" of Egyptian and Saudi Arabia Banks.*

*$H_5$: There's no significant impact of "Bank-Specific and Macroeconomic Factors" on "Net Interest Margin" of Egyptian and Saudi Arabia Banks.*

Regarding the first hypothesis, the null hypothesis H0 states that, $\beta n = 0$, while the alternative hypothesis H1 states that, $\beta n \neq 0$ where:

(Model 1): $NPLSit = \alpha\ NPLSi,t-1 + \beta 1\ CARit + \beta 2\ SIZEit + \beta 3\ LDRit + \beta 4\ OERit + \beta 5\ GDPit + \beta 6\ INTERBit + \beta 7\ INFit + \eta i + \varepsilon it$

Regarding the second hypothesis, the null hypothesis H0 states that, $\beta n = 0$, while the alternative hypothesis H1 states that, $\beta n \neq 0$ where:

(Model 2): $LPNPLSit = \alpha\ LPNPLSi,t-1 + \beta 1\ CARit + \beta 2\ SIZEit + \beta 3\ LDRit + \beta 4\ OERit + \beta 5\ GDPit + \beta 6\ INTERBit + \beta 7\ INFit + \eta i + \varepsilon it$

Regarding the third hypothesis, the null hypothesis H0 states that, $\beta n = 0$, while the alternative hypothesis H1 states that, $\beta n \neq 0$ where:

(Model 3): $ROAit = \alpha\ ROAi,t-1 + \beta 1\ CARit + \beta 2\ SIZEit + \beta 3\ LDRit + \beta 4\ OERit + \beta 5\ GDPit + \beta 6\ INTERBit + \beta 7\ INFit + \eta i + \varepsilon it$

Regarding the fourth hypothesis, the null hypothesis H0 states that, $\beta n = 0$, while the alternative hypothesis H1 states that, $\beta n \neq 0$ where:

(Model 4): $ROEit = \alpha\ ROEi,t-1 + \beta 1\ CARit + \beta 2\ SIZEit + \beta 3\ LDRit + \beta 4\ OERit + \beta 5\ GDPit + \beta 6\ INTERBit + \beta 7\ INFit + \eta i + \varepsilon it$

Regarding the fifth hypothesis, the null hypothesis H0 states that, $\beta n = 0$, while the alternative hypothesis H1 states that, $\beta n \neq 0$ where:

(Model 5): $NIMit = \alpha\ NIMi,t-1 + \beta 1\ CARit + \beta 2\ SIZEit + \beta 3\ LDRit + \beta 4\ OERit + \beta 5\ GDPit + \beta 6\ INTERBit + \beta 7\ INFit + \eta i + \varepsilon it$

**Table 3.**
The variable explanation across models 1–5.

| Variables | Definantion (Explanation) |
|---|---|
| NPLSit | Non-Performing Loans ratio — credit risk indicator (Model 1). |
| LPNPLSit | Log of Non-Performing Loans ratio — normalized version (Model 2). |
| ROAit | Return on Assets — profitability relative to total assets (Model 3). |
| ROEit | Return on Equity — profitability relative to shareholders' equity (Model 4). |
| NIMit | Net Interest Margin — difference between interest income and interest expense as a percentage of earning assets (Model 5). |
| Lagged Dependent | NPLSi,t-1 / LPNPLSi,t-1 / ROAi,t-1 / ROEi,t-1 / NIMi,t-1 — captures persistence in each metric. |
| CARit | Capital Adequacy Ratio — bank's capital buffer against financial risks. |
| SIZEit | Bank Size — typically measured by total assets. |
| LDRit | Loan-to-Deposit Ratio — indicates liquidity and lending aggressiveness. |
| OERit | Operating Expense Ratio — reflects cost efficiency in bank operations. |
| GDPit | Gross Domestic Product growth — macroeconomic indicator of economic health. |
| INTERBit | Interbank Rate — usually the central bank rate, affecting borrowing costs. |
| INFit | Inflation Rate — influences purchasing power and loan repayment ability. |
| Hi | Bank-specific fixed effects — controls for unobserved heterogeneity. |
| Eit | Error term — captures random shocks or unexplained variation. |
| I | The cross-sectional dimension presents each bank |
| T | Time series dimension presents the period from 2008 to 2024 |

## 6. Descriptive and Diagnostic Statistics

**Table 4.**
Descriptive statistics of independent variables Egypt.

| Variables | CAR | SIZE | LDR | OER | GDP | INTERB | INF |
|---|---|---|---|---|---|---|---|
| Mean | 0.172 | 22.783 | 0.465 | 0.440 | 0.041 | 0.123 | 0.142 |
| Median | 0.164 | 24.000 | 0.477 | 0.377 | 0.042 | 0.096 | 0.113 |
| Maximum | 0.360 | 27.821 | 0.991 | 3.137 | 0.072 | 0.268 | 0.339 |
| Minimum | 0.085 | 12.323 | 0.086 | 0.089 | 0.018 | 0.083 | 0.050 |
| Std. Dev. | 0.051 | 3.300 | 0.173 | 0.355 | 0.015 | 0.049 | 0.083 |
| Skewness | 0.969 | -0.625 | -0.374 | 4.386 | 0.314 | 1.581 | 1.217 |
| Kurtosis | 4.148 | 2.502 | 3.276 | 28.430 | 2.280 | 4.839 | 3.294 |
| Jarque-Bera | 35.962 | 12.822 | 4.504 | 5125.6 | 6.648 | 94.765 | 42.555 |
| Probability | 0.000 | 0.002 | 0.105 | 0.000 | 0.039 | 0.000 | 0.000 |
| Observations | 170 | 170 | 170 | 170 | 170 | 170 | 170 |

Table 4 shows descriptive analysis for the explanatory variables hypothetically impacting banks in Egypt. Variables such as capital adequacy ratio (CAR), bank size (SIZE), loan-to-deposit ratio (LDR), and gross domestic product (GDP) illustrate normal distributions, as designated by skewness values and Jarque-Bera probabilities. Although, operation efficiency ratio (OER), inter-bank rate (INTERB), and inflation (INF) shows skewness and kurtosis within reasonable ranges indicating that distributions are not significantly skewed or kurtotic.

The CAR (Capital Adequacy Ratio) has average of 17.2%, implying that, on average, banks preserve healthy capital buffer. The average bank size is about 22.78, similarly showing a logarithmic index of total assets for bank scale, reflecting large bank sizes on average. The average loan-to-deposit ratio (LDR) is about 46.5%, showing that banks lend near to their deposit balance, implying a reasonably high lending. The average of operation efficiency ratio (OER) is 44 percent. Banks operation expense about a 44% of their income.

**Table 5.**
Descriptive statistics of independent variables Saudi Arabia.

| Variables | CAR | SIZE | LDR | OER | GDP | INTERB | INF |
|---|---|---|---|---|---|---|---|
| Mean | 0.198 | 25.231 | 0.855 | 0.435 | 0.041 | 0.021 | 0.032 |
| Median | 0.189 | 25.678 | 0.834 | 0.390 | 0.032 | 0.012 | 0.025 |
| Maximum | 0.830 | 28.245 | 1.875 | 0.977 | 0.120 | 0.060 | 0.099 |
| Minimum | 0.112 | 19.217 | 0.548 | 0.212 | 0.002 | 0.007 | 0.001 |
| Std. Dev. | 0.076 | 1.719 | 0.141 | 0.150 | 0.035 | 0.017 | 0.023 |
| Skewness | 6.074 | -2.228 | 2.708 | 1.548 | 1.054 | 1.385 | 1.328 |
| Kurtosis | 46.402 | 7.906 | 19.353 | 5.553 | 3.308 | 3.840 | 4.972 |
| Jarque-Bera | 14388.78 | 311.142 | 2101.94 | 114.108 | 32.168 | 59.361 | 77.546 |
| Probability | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Observations | 170 | 170 | 170 | 170 | 170 | 170 | 170 |

Table 5 indicates the descriptive analysis for the Saudi Arabia variables discloses numerous insights into their distributions and tendencies. The average Capital Adequacy Ratio is 19.8%, proposing that most banks maintain a healthy capital buffer. The mean bank size is about 25.23, reflecting large size banks, however the standard deviation shows some inconsistency. The Loan to Deposit Ratio has a mean of 85.5%, reflecting that bank lend a high portion of the deposits. The operation efficiency Ratio means 43.5%, implying that banks have high operation expenses compared to income.

The high skewness across variables particularly for Capital Adequacy Ratio (6.074) that shows highly skewed distributions that implying banks grouped around representative values. The Jarque-Bera results are high, and the probabilities are zero for explanatory variables. Generally, the dataset proposes an extensive range of bank performances and economic conditions.

**Table 6.**
Descriptive statistics of dependent variables Egypt.

| Variables | NPLS | LPNPLS | ROA | ROE | NIM |
|---|---|---|---|---|---|
| Mean | 0.090 | 1.312 | 0.019 | 0.194 | 0.062 |
| Median | 0.050 | 1.140 | 0.017 | 0.194 | 0.055 |
| Maximum | 0.733 | 6.231 | 0.062 | 0.455 | 0.520 |
| Minimum | 0.009 | 0.430 | 0.000 | 0.000 | 0.004 |
| Std. Dev. | 0.121 | 0.733 | 0.011 | 0.090 | 0.045 |
| Skewness | 2.888 | 2.778 | 0.866 | 0.104 | 6.378 |
| Kurtosis | 11.507 | 15.847 | 4.634 | 2.909 | 63.712 |
| Jarque-Bera | 748.94 | 1387.825 | 40.141 | 0.366 | 27261.25 |
| Probability | 0.000 | 0.000 | 0.000 | 0.833 | 0.000 |
| Observations | 170 | 170 | 170 | 170 | 170 |

Table 6 illustrates the analysis of banks in Egypt exposes distinguished variability across numerous performance ratio and risk indictors. The non-performing loans ratio (NPLS) averages 9%, indicating significant credit risk in parts of the banking sector on early years 2008-2010. This suggesting that most banks maintain moderate levels of non-performing loans. The log of NPLS is highly skewed, reflecting the presence of outliers with elevated levels of non-performing loans.

Performance indicators for example return on equity (ROE) and return on assets (ROA) record average of 19.4% and 1.9% across the period from 2008 to 2024, respectively, indicating that positive returns are generated. ROE, particularly, demonstrate significant distinction among banks. The net interest margin (NIM) similarly shows positive performance across covered period, with an average of 6.2%, despite it displays volatility during covered period, and it shows high skewness and kurtosis, pointing to outliers with extraordinarily high margins on specific banks and years.

**Table 7.**
Descriptive statistics of dependent variables Saudi Arabia.

| Variables | NPLS | LPNPLS | ROA | ROE | NIM |
|---|---|---|---|---|---|
| Mean | 0.018 | 1.531 | 0.018 | 0.127 | 0.033 |
| Median | 0.014 | 1.481 | 0.018 | 0.126 | 0.031 |
| Maximum | 0.075 | 3.490 | 0.139 | 0.701 | 0.061 |
| Minimum | 0.000 | 0.475 | 0.000 | 0.001 | 0.019 |
| Std. Dev. | 0.013 | 0.591 | 0.012 | 0.069 | 0.008 |
| Skewness | 1.856 | 0.780 | 6.744 | 3.273 | 1.343 |
| Kurtosis | 6.444 | 4.278 | 71.601 | 28.945 | 5.442 |
| Jarque-Bera | 181.58 | 28.805 | 34623.26 | 5071.695 | 93.313 |
| Probability | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Observations | 170 | 170 | 170 | 170 | 170 |

Table 7 analyzes data on Saudi Arabian banks disclose various performance and risk profiles that show significant volatility and skewness in multiple dependent variables. The Non-Performing Loans Ratio (NPLS) has average of 1.8%, with maximum ratio of 7.5%, reflecting fluctuating credit risk levels within the sector. The skewness of 1.856 shows the right-tailed distribution, with outliers influencing the data.

Performance ratios: Return on Equity (ROE) and Return on Assets (ROA) reveal positive performance within industry. The mean return on assets is 1.8%, with maximum of 13.9%, despite the distribution is deeply skewed at 6.744, Likewise the mean return on equity is 12.7%, and shows significant skewness at 3.273, which representing outliers with reasonable performance. The Net Interest Margin (NIM) mean 3.3%, with a maximum of 6.1%, that reveal reasonable skewness at 1.343 that suggests positive margin within industry, though it shows high outliers.

ROA (Return on Assets) measures how efficiently a bank uses its assets to generate profit. A higher ROA means the bank is making more money from each dollar of assets it owns. In this data, Saudi banks have some banks that are very good at generating profit from their assets, but most are closer to the average, indicating overall moderate efficiency. Egyptian banks are more evenly spread, with most making similar profit levels, but their overall ROA is slightly lower than the top Saudi banks.

ROE (Return on Equity) shows how well a bank uses shareholders' money to generate profit. A higher ROE indicates more profit for each dollar invested by shareholders. Egyptian banks tend to have higher ROE on average, which could mean they are more aggressive or use more borrowed money to boost profits. Saudi banks have a wider range, with some banks earning very high returns, but others earning less, indicating variability in profitability strategies.

**Table 8.**
Correlation matrix between independent variables Egypt.

| Variables | CAR | SIZE | LDR | OER | GDP | INTERB | INF |
|---|---|---|---|---|---|---|---|
| CAR | 1 | | | | | | |
| SIZE | 0.4264 | 1 | | | | | |
| LDR | -0.1244 | -0.0451 | 1 | | | | |
| OER | -0.3493 | -0.2093 | 0.0199 | 1 | | | |
| GDP | 0.0019 | -0.0358 | 0.1032 | -0.0137 | 1 | | |
| INTERB | 0.3590 | 0.2124 | -0.0730 | -0.2453 | -0.0776 | 1 | |
| INF | 0.1887 | 0.1144 | -0.0400 | -0.1670 | 0.0893 | 0.7440 | 1 |

Table 8 shows the correlation matrix implying absence of problematic correlations that could lead to multicollinearity concerns. Since, the second maximum detected correlation is between Size and Capital Adequacy Ratio at about 0.4264 that considered moderate and lower than problematic thresholds. Likewise, the correlation among LDR and OER or GDP and INF, are weak, indicating absence of linear relationship. However, there are strong relationship between interbank ratio and inflation in Egypt; those consequences suggest that the explanatory variables are adequately different and do not show multicollinearity that could misrepresent regression estimates or inflate standard errors. VIF test conducted to confirm the absence of multicollinearity among explanatory variables.

**Table 9.**
Correlation matrix between independent variables Saudi Arabia.

| Variables | CAR | SIZE | LDR | OER | GDP | INTERB | INF |
|---|---|---|---|---|---|---|---|
| CAR | 1 | | | | | | |
| SIZE | -0.0750 | 1 | | | | | |
| LDR | 0.4272 | 0.3337 | 1 | | | | |
| OER | 0.2837 | -0.3740 | -0.0645 | 1 | | | |
| GDP | -0.0236 | -0.0359 | 0.0005 | 0.0388 | 1 | | |
| INTERB | -0.0234 | 0.2342 | 0.1836 | -0.2109 | -0.2158 | 1 | |
| INF | 0.0637 | -0.1901 | -0.0849 | 0.2715 | 0.3448 | -0.1301 | 1 |

Table 9 indicates to correlation matrix for independent variables for Saudi Arabia, the highest correlation noted is between Capital Adequacy Ratio and Loan-to-Deposit Ratio, which is about 0.4272. This value designates a moderate positive relationship which still less than the threshold. Therefore, the outcomes suggest absence of multicollinearity among the explanatory variables in this analysis, VIF test conducted to confirm the absence of multicollinearity among explanatory variables.

**Table 10.**
Variance inflation factor (VIF) test Egypt.

| Variables | VIF | 1/ VIF |
|---|---|---|
| CAR | 1.47 | 0.678 |
| SIZE | 1.24 | 0.810 |
| LDR | 1.03 | 0.972 |
| OER | 1.17 | 0.857 |
| GDP | 1.07 | 0.930 |
| INTERB | 2.68 | 0.373 |
| INF | 2.40 | 0.417 |
| Mean VIF | **1.58** | |

**Source:** Outputs of data processing using Eviews 10.

Average VIF (1.58): shows overall low multicollinearity between predictors. Typically, average VIF below 5 propose multicollinearity which is not a concern. The table above illustrate that the VIF for each explanatory variable is less than 10; Moreover, none of the tolerance value is less than 10. Hence, there is no multicollinearity in this research model.

**Table 11.**
Variance inflation factor (VIF) test Saudi Arabia.

| Variables | VIF | 1/ VIF |
|---|---|---|
| CAR | 1.43 | 0.702 |
| SIZE | 1.36 | 0.734 |
| LDR | 1.51 | 0.664 |
| OER | 1.35 | 0.741 |
| GDP | 1.20 | 0.836 |
| INTERB | 1.15 | 0.869 |
| INF | 1.24 | 0.804 |
| Mean VIF | **1.32** | |

**Source:** Outputs of data processing using Eviews 10.

Average VIF (1.32): shows overall low multicollinearity between predictors. Typically, average VIF below 5 propose multicollinearity which is not a concern. The table above illustrate that the VIF for each explanatory variable is less than 10; Moreover, none of the tolerance value is less than 10. Hence, there is no multicollinearity in this research model.

**Table 12.**
Diagnostic tests to choose of appropriate model in hypotheses testing: between system GMM and difference GMM.

| **First Hypothesis (NPLS Model)** | | | | | | |
|---|---|---|---|---|---|---|
| **Egypt** | | | **Saudi Arabia** | | | Recommended Model |
| Lagged Dependent Variable | Estimated Coefficient | Model | Lagged Dependent Variable | Estimated Coefficient | Model | |
| NPLS (-1) | 0.702919 | Pooled OLS | NPLS (-1) | 0.5541285 | Pooled OLS | Egypt & Saudi System GMM √ |
| NPLS (-1) | 0.697936 | Fixed Effects | NPLS (-1) | 0.5005192 | Fixed Effects | |
| NPLS (-1) | 0.310998 | Difference GMM | NPLS (-1) | 0.1093106 | Difference GMM | |
| **Second Hypothesis (LPNPLS Model)** | | | | | | |
| Egypt | | | Saudi Arabia | | | Recommended Model |
| Lagged Dependent Variable | Estimated Coefficient | Model | Lagged Dependent Variable | Estimated Coefficient | Model | |
| LPNPLS (-1) | 0.7991037 | Pooled OLS | LPNPLS (-1) | 0.5369182 | Pooled OLS | Egypt & Saudi System GMM √ |
| LPNPLS (-1) | 0.7624303 | Fixed Effects | LPNPLS (-1) | 0.3551621 | Fixed Effects | |
| LPNPLS (-1) | -0.111577 | Difference GMM | LPNPLS (-1) | -0.124774 | Difference GMM | |
| **Third Hypothesis (ROA Model)** | | | | | | |
| Egypt | | | Saudi Arabia | | | Recommended Model |
| Lagged Dependent Variable | Estimated Coefficient | Model | Lagged Dependent Variable | Estimated Coefficient | Model | |
| ROA (-1) | 0.5166834 | Pooled OLS | ROA (-1) | 0.1022585 | Pooled OLS | Egypt & Saudi System GMM √ |
| ROA (-1) | 0.2099143 | Fixed Effects | ROA (-1) | -0.10491 | Fixed Effects | |
| ROA (-1) | -0.316008 | Difference GMM | ROA (-1) | -0.396458 | Difference GMM | |
| **Fourth Hypothesis (ROE Model)** | | | | | | |
| Egypt | | | Saudi Arabia | | | Recommended Model |
| Lagged Dependent Variable | Estimated Coefficient | Model | Lagged Dependent Variable | Estimated Coefficient | Model | |
| ROE (-1) | 0.6878226 | Pooled OLS | ROA (-1) | 0.417526 | Pooled OLS | Egypt & Saudi System GMM √ |
| ROE (-1) | 0.4631237 | Fixed Effects | ROA (-1) | 0.1637562 | Fixed Effects | |
| ROE (-1) | -0.073713 | Difference GMM | ROA (-1) | -0.326612 | Difference GMM | |
| **Fifth Hypothesis (NIM Model)** | | | | | | |
| Egypt | | | Saudi Arabia | | | Recommended Model |
| Lagged Dependent Variable | Estimated Coefficient | Model | Lagged Dependent Variable | Estimated Coefficient | Model | |
| ROE (-1) | 0.1564439 | Pooled OLS | ROA (-1) | 0.700166 | Pooled OLS | Egypt & Saudi System GMM √ |
| ROE (-1) | -0.001179 | Fixed Effects | ROA (-1) | 0.5058629 | Fixed Effects | |
| ROE (-1) | -0.379526 | Difference GMM | ROA (-1) | 0.2199363 | Difference GMM | |

Table 12 illustrates diagnostic tests i.e., (Pooled OLS, Fixed Effects, and Difference GMM Models) that have been used for the selection of the appropriate model to test hypotheses and table indicates that the system GMM model is the best and appropriate model for testing each of the first hypotheses (NPLS Model), second hypothesis (LPNPLS Model), third hypothesis (ROA Model), fourth hypothesis (ROE Model) and fifth hypothesis (NIM Model).

Model selection rule: If the Difference GMM estimate of the lagged dependent variable is close to or below the Fixed Effects estimate, then System GMM is preferred. This is because System GMM tends to be more efficient and consistent in such cases.

For all five hypotheses, Diagnostic tests confirm that the System GMM estimates are closest to the Fixed Effects estimates and more reliable for dynamic panel data analysis, especially when variables are persistent or endogenous.

The choice of System GMM as the preferred model ensures that hypotheses are tested with methods that account for endogeneity, autocorrelation, and unobserved heterogeneity, leading to more valid inferences. Using System GMM enhances the robustness and reliability of the hypothesis testing results, especially given the dynamic nature of the data and potential endogeneity [33].

## 7. Testing Hypotheses

This section is for investigating the impact of bank-specific and macroeconomic factors on each of "banks' risk", "banks' return". To investigate these effects, a panel data analysis has been conducted using dynamic panel models (DPMs) and provides the following results:

Regarding the first hypothesis, Table 13 illustrates the impact of bank-specific and macroeconomic factors on non-performing loans ratio of Egyptian and Saudi Arabia Banks.

**Table 13.**
The impact of bank-specific and macroeconomic factors on "NPLS".

| **One Step System GMM** | | |
|---|---|---|
| **Independent Variables** | **NPLS Model** | |
| | **Egypt** | **Saudi Arabia** |
| L1.NPLS | 0.5662439<br>(0.1716218)*** | 0.1525086<br>(0.0697608)** |
| _CON | -0.0233589<br>(0.0320367) | 0.021711<br>(0.0118344)* |
| CAR | 0.0349586<br>(0.0959472) | -0.0371427<br>(0.0144072)** |
| SIZE | 0.0028312<br>(0.0014366)** | -0.0000724<br>(0.0005214) |
| LDR | -0.0901361<br>(0.0441066)** | -0.015639<br>(0.0066661)** |
| OER | 0.0904537<br>(0.0468755)* | 0.0232629<br>(0.0047919)*** |
| GDP | 0.0064002<br>(0.2010157) | -0.035614<br>(0.0137459)** |
| INTERB | -0.1948386<br>(0.0761715)** | 0.0264647<br>(0.0195061) |
| INF | 0.0659723<br>(0.0320367) | 0.2831666<br>(0.1004421)*** |
| Wald Test | 7230*** | 529.11*** |
| AR(1) Test (p-value) | 0.080 | 0.076 |
| AR(2) Test (p-value) | 0.393 | 0.166 |
| Hansen Test (p-value) | 1.000 | 1.000 |
| Obs. | 160 | 160 |

**Note:** Each cell contains the estimated parameters, with std. error between brackets, where * denotes p-value of 10%, ** denotes 5% and *** denotes 1%.

The autocorrelation test outcomes AR (1) p-values of 0.080 and 0.076, and AR (2) p-values of 0.393 and 0.166 illustrate insignificant serial correlation in the residuals for Egypt and Saudi Arabia, which validates the GMM system assumptions. The Hansen test p-values of 1.000 for Egypt and Saudi Arabia imply that the instruments used are valid and meet the necessary exogeneity conditions. Moreover, the significant Wald test results (7230 and 529.11, both $p < 0.01$) confirm that the independent variables collectively have a strong impact on the dependent variable. Overall results demonstrate the robustness and reliability of the model, making the results suitable for policy analysis and more research.

Regarding the first hypothesis, the H0 null hypothesis is rejected and alternative H1 hypothesis could be accepted that H1 states, $\beta n \neq 0$, which means that there is significant impact of "bank-specific and macroeconomic factors" on "non-performing loans ratio" of Egyptian and Saudi Arabia Banks.

This is mainly showed by the Wald test, which presents much higher score for Egypt (7230) compared to Saudi Arabia (529.11). A higher Wald statistic indicates a stronger overall independent variable power and significance of the regression model. Since Egypt has more volatile economic conditions, different banking sector characteristics and more data

variability in Egypt compared to Saudi Arabia. Reflects that banking industry in Egypt more sensitive to bank specific and macroeconomic variable than Saudi Arabia.

*7.1. Persistence of NPLs (L1. NPLS)*

The highly significant and positive coefficients (0.566 in Egypt, 0.153 in Saudi Arabia) indicate strong persistence in NPL levels over time. This pattern aligns with Nargis, et al. [34] who, in their study of Bangladesh banks, found that past NPLs significantly predict current NPLs, highlighting entrenched credit risk issues. And similar to Waleed, et al. [35] in his study for the impact of external and internal factor on bank credit risk (NPL Ratio) for Egyptian banks.

*7.2. Bank Capital Adequacy Ratio (CAR)*

The insignificance of CAR in Egypt suggests that, within this context, change in capital buffers do not necessarily translate into NPLs. This supports the findings Farag [8] who argued that capital requirements alone have insignificant impact on NPLs in Egypt. It worth to mention that regulatory authority mandated adherence to Basel 3 norms during the covered period which lead to significant increase in banks capital.

Conversely, the negative and significant coefficient in Saudi Arabia (-0.037 at 1%) indicates that higher capital adequacy enhances risk absorption capacity, leading to lower NPLs, aligning with Alsharif [14] in his study for non-performing loans in Saudi banks.

*7.3. Bank Size*

The positive and significant effect of bank size in Egypt (0.003) suggests larger banks tend to have higher NPLs, possibly due to broader risk exposure or more complex portfolios, consistent with Ahmed, et al. [36] who observed that larger banks in developing economies face higher risks. In contrast, the insignificance of bank size in Saudi Arabia may reflect a more homogeneous or regulated banking environment.

*7.4. Loan-to-Deposit Ratio (LDR)*

The negative and significant coefficients in both countries (-0.090 in Egypt, -0.016 in Saudi Arabia) imply that higher LDRs are associated with lower NPLs. It worth to mention that Farag [8] found that significant negative relationship between Loan-to-Deposit Ratio (LTD) and non-performing loans, as well as similar to the results found by Alsharif [14] in his research for nonperforming loans in Saudi Arabia; since higher LTD ratios are associated with lower corporate NPLs, possibly due to improved bank liquidity and risk management, contrary to some literature Farag [8]. This negative relationship indicate banks with high loan to deposit ratio

The reason behind this negative relationship stems from effective liquidity management and risk strategy and which allow financial institution to increase lending (higher LDR) whereas keeping or even declining credit risk with lower NPLs Farag [8] and Alsharif [14]. Banks with more LDRs engaging in precise selective lending, concentrating on highest quality loans, that decrease NPLs. This careful choosing in lending is applied by strict credit assessments and effective risk mitigation practices.

*7.5. Operating efficiency Ratio (OER)*

The positive and significant impact of operation cost to income (0.090 in Egypt and 0.023 in Saudi Arabia) indicates that higher operational efficiency correlate with lower NPLs. This aligns with Waleed, et al. [35] who argued that inefficiencies and high expenses impair banks' ability to monitor and manage credit risk, leading to defaults. The larger coefficient in Egypt may reflect weaker internal controls or less sophisticated risk management systems.

*7.6. Macroeconomic Variables*

*7.6.1. GDP Growth*

In Egypt, GDP growth is insignificant (0.006), implying that economic growth does not significantly influence NPLs there, possibly due to structural issues or external shocks, as well as Farag [8] and Waleed, et al. [35] found insignificant relationship between GDP and nonperforming loans.

In Saudi Arabia, GDP growth is significantly negative (-0.036 at 5%), indicating that economic expansion improves borrowers' repayment ability, reducing NPLs, consistent with Alsharif [14] in his study for non-performing loans in Saudi banks.

*7.6.2. Interbank Rate (INTERB)*

The significant negative coefficient in Egypt (-0.195 at 5%) suggests that higher interbank rates, reflecting tighter monetary policy, may curb risky lending or over-leverage, thereby reducing NPLs an idea supported by Farag [8] who found same results as elevated interest rates raise NPLs by increasing borrowers' repayment costs and reducing their ability to service loans Farag [8]. However, In Saudi Arabia, INTERB is insignificant, due to differing monetary policy transmission mechanisms or reliance on interbank markets. The insignificance of INTERB in Saudi Arabia is because of the restricted monetary policy independence emanated from exchange rate pegging, other policy tools being more significant, and the less sensitive, more stable banking environment which reduces the straight effect of interbank rate variations on NPLs.

*7.6.3. Inflation (INF)*

Saudi Arabia shows positive and significant relationships with NPLs; However, Egypt demonstrates insignificant relationship with NPLs (0.066 in Egypt, 0.283 in Saudi Arabia).

The significant association in Saudi Arabia replicates a more impact of inflation on borrowers' repayment capability and default, while in Egypt; inflation's effect is muted or obscured by broader institutional and economic vulnerabilities, leading to an insignificant relationship.

Regarding the second hypothesis, Table 14 illustrates the impact of bank-specific and macroeconomic factors on provisions for non-performing loans ratio of Egyptian and Saudi Arabia Banks.

**Table 14.**
The impact of bank-specific and macroeconomic factors on "LPNPLS".

| **One Step System GMM** | | |
|---|---|---|
| **Independent Variables** | **LPNPLS Model** | |
| | **Egypt** | **Saudi Arabia** |
| L1.LPNPLS | 0.4274383<br>(0.3027916) | -0.1643037<br>(0.0856216)* |
| _CON | 0.074572<br>(0.4582521) | 2.366523<br>(0.8657445)*** |
| CAR | 0.1124542<br>(0.9900772) | -1.116195<br>(0.9877835) |
| SIZE | 0.0239513<br>(0.0163815) | 0.0179129<br>(0.0454918) |
| LDR | -0.2081296<br>(0.1230051)* | -0.3453773<br>(0.5489599) |
| OER | -0.226154<br>(0.1682245) | -0.543996<br>(0.3924584) |
| GDP | -1.180073<br>(3.473385) | 1.001443<br>(0.5624508)* |
| INTERB | 1.92865<br>(1.361564) | 1.555326<br>(2.940917) |
| INF | 1.075177<br>(0.8598988) | -13.36497<br>(2.488105)*** |
| Wald Test | 1696.29*** | 818.85*** |
| AR(1) Test (p-value) | 0.020 | 0.072 |
| AR(2) Test (p-value) | 0.731 | 0.610 |
| Hansen Test (p-value) | 1.000 | 1.000 |
| Obs. | 160 | 160 |

**Note:** Each cell contains the estimated parameters, with std. error between brackets, where * denotes p-value of 10%, ** denotes 5% and *** denotes 1%.

The diagnostic tests indicate that both models are reliable. The AR(1) test shows significant first-order autocorrelation in Egypt but not in Saudi Arabia, while the AR(2) tests confirm no second-order autocorrelation in either country. The Hansen test results suggest the instruments are valid, and the highly significant Wald tests confirm the models have strong explanatory power. Overall, these findings support the robustness of the models, making the estimated relationships credible for analysis.

Regarding the second hypothesis, the H0 null hypothesis is rejected and alternative H2 hypothesis could be accepted that H2 states, $\beta n \neq 0$, which means that there is significant impact of "bank-specific and macroeconomic factors" on "provision of non-performing loans ratio" of Egyptian and Saudi Arabia Banks.

The regression results reveal diverse behaviors in provisioning decisions across Egypt and Saudi Arabia. In Egypt, lagged provisions do not significantly influence current provisioning levels, indicating that banks focus more on current risk assessments rather than past provisioning behavior. This may be driven by regulatory requirements or internal risk management policies emphasizing dynamic provisioning aligned with the current asset quality. Conversely, in Saudi Arabia, the negative and significant coefficient suggests a provisioning cycle or adjustment mechanism, where banks tend to reduce provisions after periods of high provisioning, possibly as part of a smoothing strategy or reflecting improvements in asset quality. These behaviors highlight that provisioning practices can vary based on institutional policies and macroeconomic conditions, with some banks responding reactively to past provisioning levels while others prioritize current risk factors.

The analysis of bank-specific factors shows that larger banks in both countries tend to allocate higher provisions, likely due to their more extensive and riskier loan portfolios, which require greater risk coverage. The negative relationship between the loan-to-deposit ratio (LDR) and provisions indicates that higher leverage and liquidity risks may lead banks to adopt a more cautious stance, possibly due to liquidity constraints or risk management strategies. Meanwhile, the insignificance of macroeconomic variables such as GDP and operational efficiency suggests that short-term economic fluctuations and operational performance do not directly influence provisioning decisions in the sampled period. The

insignificant impact of the capital adequacy ratio (CAR) further implies that banks' provisioning choices are more driven by asset quality and risk factors than by capital buffer considerations.

Inflation exhibits contrasting effects in the two countries: it is insignificant in Egypt but negatively associated with provisions in Saudi Arabia. The negative relationship in Saudi Arabia suggests that during periods of higher inflation, banks perceive reduced risk or expect inflation to erode the real value of debts, thereby lowering their provisioning needs. Additionally, inflation often coincides with accommodative monetary policies, which might lead banks to adopt less conservative provisioning strategies. Overall, the findings underscore that provisioning behaviors are primarily shaped by bank-specific characteristics and macroeconomic conditions, with current risk assessments and institutional practices playing pivotal roles in determining provisioning levels rather than macroeconomic growth or short-term interest rate fluctuations.

Regarding the third hypothesis, Table 15 illustrates the impact of bank-specific and macroeconomic factors on return on assets of Egyptian and Saudi Arabia Banks.

**Table 15.**
The impact of bank-specific and macroeconomic factors on "ROA".

| **One Step System GMM** | | |
|---|---|---|
| **Independent Variables** | **ROA Model** | |
| | **Egypt** | **Saudi Arabia** |
| L1.ROA | -0.0233824<br>(0.1480558) | -0.299664<br>(0.1068493)*** |
| _CON | -0.0100922<br>(0.0119975) | 0.0436737<br>(0.0106468)*** |
| CAR | 0.0720058<br>(0.0188939)*** | 0.0388464<br>(0.0149311)*** |
| SIZE | 0.0003498<br>(0.0005118) | 0.0002822<br>(0.0002242) |
| LDR | 0.008224<br>(0.0034422)** | -0.0166387<br>(0.0090923)* |
| OER | -0.003377<br>(0.001987)* | -0.543996<br>(0.0115101)*** |
| GDP | -0.023287<br>(0.0407363) | 0.0202535<br>(0.0337777) |
| INTERB | 0.0674006<br>(0.0352275)* | -0.083095<br>(0.052124) |
| INF | -0.0054462<br>(0.0107327) | 0.0002987<br>(0.0544143) |
| Wald Test | 532.77*** | 776.93*** |
| AR(1) Test (p-value) | 0.040 | 0.143 |
| AR(2) Test (p-value) | 0.619 | 0.442 |
| Hansen Test (p-value) | 0.996 | 0.999 |
| Obs. | 160 | 160 |

**Note:** Each cell contains the estimated parameters, with std. error between brackets, where * denotes p-value of 10%, ** denotes 5% and *** denotes 1%.

The Wald tests confirm that both models are highly significant, indicating that the included variables effectively explain ROA in Egypt and Saudi Arabia. The autocorrelation tests show a significant first-order autocorrelation in Egypt's residuals (p=0.040), but no second-order autocorrelation, while Saudi Arabia's residuals are free from autocorrelation. The Hansen test results are highly supportive, with p-values close to 1, indicating that the instruments used are valid and the models are well-specified. Overall, despite some residual autocorrelation in Egypt, the diagnostic tests suggest that both models are reliable, robust, and suitable for interpreting the impact of bank-specific and macroeconomic factors on ROA in both countries.

Regarding the third hypothesis, the H0 null hypothesis is rejected and alternative H3 hypothesis could be accepted that H3 states, $\beta n \neq 0$, which means that there is significant impact of "bank-specific and macroeconomic factors" on "return on assets" of Egyptian and Saudi Arabia Banks.

*7.7. L1.ROA (Lagged ROA)*

In Egypt, the lagged ROA does not have a statistically significant effect on current ROA, indicating that past profitability does not strongly predict future performance in the Egyptian banking sector. This aligns with findings by El-Ansary and Megahed [37] found that profitability persistence was weak in Egyptian banks before financial crises, emphasizing weak influence of current profitability by past performance. This suggests that Egyptian banks' profitability may be influenced more by current internal and external factors rather than past performance. As there are multi economic shocks were in presence during studied period.

Conversely, in Saudi Arabia, the lagged ROA is both negative and highly significant, implying that previous profitability has a strong influence on current ROA but tends to revert over time. This negative relationship indicates a

mean reversion effect, where banks that performed well in the past may experience a decline in profitability, or vice versa, reflecting risk correction or adjustment in Saudi banks, as also supported by Abobaker [11] in similar regional contexts.

*7.8. CAR (Capital Adequacy Ratio)*

In both Egypt and Saudi Arabia, CAR exhibits a positive and highly significant relationship with ROA. This suggests that banks with stronger capital buffers tend to be more profitable, because higher capital levels improve financial stability, investor confidence, and risk management capabilities, which in turn support higher profitability. The effect is consistent across both countries, emphasizing the critical importance of maintaining adequate capital in banking operations.

The positive and significant impact of CAR on ROA supports prior findings such as Javaid and Alalawi [38] in their study for Saudi Arabia banking sector, which suggest that higher capital adequacy ratios improve bank stability and profitability by reducing risk and increasing confidence among depositors and investors. This result supports the findings of Bensalem and Gaidi [39] in their study for banking sector in Algeria and El-Ansary and Megahed [37] and Kassem and Sakr [40] and Abdou and Alarabi [9] who show that higher capital adequacy enhances bank profitability by reducing bankruptcy risk and increasing financial stability in their study for Egypt banking sector. The positive and significant impact of CAR on ROA underscores the critical importance of maintaining adequate capital buffers, as also highlighted in studies. The effect is consistent across both countries, emphasizing the importance of strong capital positions for profitability.

*7.9. SIZE (Bank Size)*

The size of banks has insignificantly influence ROA in either Egypt or Saudi Arabia. This indicates that, within the sample, larger banks are not necessarily more profitable than smaller ones. It may imply that efficiency, risk management, and other internal factors play a more pivotal role in determining profitability than sheer size in these banking environments.

The insignificance of bank size on ROA is consistent with Jaber and Al-khawaldeh [41]; Abugamea [42]; Toufaili [43] and Doğan and Yildiz [44] who found that the relationship between bank size and profitability is ambiguous, with some studies indicating economies of scale benefits while others highlight diseconomies.

*7.10. LDR (Loan-to-Deposit Ratio)*

The relationship between LDR and ROA differs notably between the two countries. In Egypt, LDR has a positive and marginally significant effect, implying that banks engaging in more aggressive lending relative to deposits tend to achieve higher profitability. This could be due to profitable lending activities or better utilization of funds. In Saudi Arabia, however, LDR has a negative and marginally significant impact, suggesting that higher lending relative to deposits may undermine profitability, possibly due to over-leverage, increased risk, or loan quality issues. These contrasting effects highlight country-specific lending practices and risk perceptions.

In Egypt, LDR positive significant effect on ROA, supporting the view by Wagdi and Salman [45] in their study for banking sector in Egypt, as they conclude that aggressive lending can support profitability if managed prudently as well as Shrestha [46] in his study of Nepalese bank sector found same conclusion.

In Saudi Arabia, LDR negative significant impact, consistent with findings by Derbali [2] and Hossain [47] suggesting that over-leverage and riskier lending practices may undermine profitability.

*7.11. OER (Operating Expense Ratio)*

In both countries, OER has a significant negative relationship with ROA, with the effect being particularly strong in Saudi Arabia. This indicates that higher operational costs relative to income substantially reduce banks' profitability. High operating expenses may reflect inefficiencies or higher expense structures that erode profit margins, emphasizing the importance of operational efficiency in maintaining healthy profitability levels in both banking sectors.

The negative and significant relationship between OER and profitability aligns with Bensalem and Gaidi [39] in their study for Algrian banking sector as well as Javaid and Alalawi [38] in their study for banking sector in Saudi Arabia, emphasizing that operational efficiency reflected in lower operating expenses is crucial for maintaining profitability. Elevated operating expenses tend to reduce profitability margins, especially in competitive sectors like Saudi Arabia.

In Saudi Arabia, the significant negative relationship, supporting the importance of operational efficiency as emphasized by Al-Jafari, et al. [13] in his study Saudi Arabia banking sector; and Abdelzaher [10]. High operating expenses erode profit margins.

*7.12. GDP (Gross Domestic Product)*

The macroeconomic variable of GDP does not have a significant impact on ROA in either Egypt or Saudi Arabia, suggesting that short-term fluctuations in economic activity may not directly influence bank profitability within the sample period. This could be due to the lagged or indirect effects of economic growth on banking performance or the dominance of internal bank-specific factors over macroeconomic influences.

The results consistent with the findings of El-Ansary and Megahed [37] and Abdelzaher [10] in their study for Egyptian banking sector and Bensalem and Gaidi [39] in their study for Algerian banking sector. This suggests that short-term fluctuations in economic activity may not directly influence bank profitability within the sample period.

*7.13. INTERB (Interbank Rate)*

Interbank rates show a marginally positive and significant effect on ROA in Egypt, implying that rising interest rates may support bank profitability, possibly through higher net interest margins. However, in Saudi Arabia, interest rates do not have a statistically significant effect, indicating that changes in interest rates might not directly influence bank earnings in the Saudi context, perhaps due to differences in asset-liability management or market structure. Toufaili [43] indicating that asset-liability management and market structure may moderate this relationship.

The positive significant effect on ROA in Egypt, supporting the findings of El-Hameed [48] in his study for Egyptian banks as well as, Derbali [2] who argue that rising interest rates can support net interest margins and profitability.

*7.14. INF (Inflation)*

Inflation does not significantly affect ROA in either country. This suggests that, within the sample period, inflationary pressures may not have had a direct or immediate impact on bank profitability, possibly because banks are able to pass on inflation effects or because inflation remained relatively stable during the period analyzed.

The insignificant or negative relation of inflation with ROA supports findings by Javaid and Alalawi [38] and Bensalem and Gaidi [39] who noted that inflation's impact on bank profitability is often context-dependent, and when inflation is anticipated, the effect tends to be minimal or negative due to increased costs and uncertainty.

The results consistent with Abdelzaher [10] and El-Ansary and Megahed [37] who note that banks may pass on inflationary costs or that inflation remained stable during the period. This supports the view that inflation's impact on profitability is context-dependent and may be mitigated by bank strategies.

Regarding the fourth hypothesis, Table 16 illustrates the impact of bank-specific and macroeconomic factors on return on equity of Egyptian and Saudi Arabia Banks.

**Table 16.**
The impact of bank-specific and macroeconomic factors on "ROE".

| **One Step System GMM** | | |
|---|---|---|
| **Independent Variables** | **ROE Model** | |
| | **Egypt** | **Saudi Arabia** |
| L1.ROE | 0.1092086<br>(0.1483189) | -0.2148801<br>(0.1189889)* |
| _CON | 0.0757783<br>(0.0980071) | 0.4460895<br>(0.1140756)*** |
| CAR | -0.0034022<br>(0.1680138) | -0.0857699<br>(0.088845) |
| SIZE | 0.0017227<br>(0.0041249) | -0.0044342<br>(0.0064297) |
| LDR | 0.0631741<br>(0.031149)** | -0.0659857<br>(0.0595126) |
| OER | -0.0806562<br>(0.0246866)*** | -0.2553758<br>(0.0939859)*** |
| GDP | 0.2309354<br>(0.3055808) | 0.0009716<br>(0.0958678) |
| INTERB | 0.3539379<br>(0.2729499) | 0.0643629<br>(0.2761145) |
| INF | 0.0995927<br>(0.0993449) | 0.0658439<br>(0.3491556) |
| Wald Test | 649.05*** | 776.93*** |
| AR(1) Test (p-value) | 0.009 | 0.063 |
| AR(2) Test (p-value) | 0.240 | 0.456 |
| Hansen Test (p-value) | 0.925 | 1.000 |
| Obs. | 160 | 160 |

**Note:** Each cell contains the estimated parameters, with std. error between brackets, where * denotes p-value of 10%, ** denotes 5% and *** denotes 1%.

The results of the diagnostic tests employed to evaluate the robustness of the one-step system GMM estimations provide important insights into the validity and reliability of the models. The Wald tests indicate that both the Egyptian and Saudi Arabian models are jointly significant at the 1% level, suggesting that the included independent variables collectively have a substantial explanatory power for ROE in both contexts. Concerning autocorrelation, the AR(1) test reveals a significant presence of first-order autocorrelation in the Egyptian model (p-value = 0.009), which may imply residual dependence that could potentially bias standard errors. In contrast, the Saudi Arabian model shows a borderline significance (p-value = 0.063), indicating a lesser degree of autocorrelation concern, although some caution remains warranted. The AR(2) tests in both models are not significant, suggesting the absence of second-order autocorrelation. Importantly, the Hansen over identification test yields high p-values (0.925 for Egypt and 1.000 for Saudi Arabia), confirming that the instruments used in the GMM estimation are valid and appropriately specified. Overall, these diagnostic results support the robustness of the models.

Regarding the fourth hypothesis, the H0 null hypothesis is rejected and alternative H4 hypothesis could be accepted that H4 states, $\beta n \neq 0$, which means that there is significant impact of "bank-specific and macroeconomic factors" on "return on equity" of Egyptian and Saudi Arabia Banks.

*7.15. ROE (Lagged ROE)*

In Egypt, the coefficient for the lagged ROE is positive (0.109) but statistically insignificant, indicating that past profitability does not strongly or reliably predict current ROE during this period. This suggests that Egyptian banks experience more volatility or are influenced by external shocks or internal factors that disrupt profitability persistence. Conversely, in Saudi Arabia, the lagged ROE coefficient is negative (-0.215) and significant at the 10% level, implying a mean-reversion effect: banks with high past ROE tend to experience lower current ROE, and vice versa. This pattern reflects a stabilizing mechanism where banks adjust their profit strategies over time, possibly due to regulatory or managerial discipline aimed at maintaining sustainable profitability. The significance of this negative relationship in Saudi Arabia indicates a more mature or regulated banking environment where profitability fluctuations are moderated over time.

*7.16. CAR (Capital Adequacy Ratio)*

The coefficients for the Capital Adequacy Ratio are negative and insignificant in both countries (-0.003 in Egypt, -0.086 in Saudi Arabia). This suggests that during the study period, the level of capital buffers did not have a direct or immediate impact on banks' profitability as measured by ROE. It indicates that banks maintaining higher capital ratios are not necessarily more or less profitable in the short term, possibly because capital adequacy primarily influences stability and risk absorption rather than profitability directly. Instead, effective deployment of capital and internal operational factors may have more influence on ROE than the capital ratio itself.

The results are similar to Wagdi and Salman [45] research on Egyptian banking industry for the period from 2000 to 2019 as well as Kassem and Sakr [40] found insignificant negative influence on ROE for Egypt banking industry in his study from 2007 to 2016.

The results for Egypt and Saudi Arabia are consistent with Hossain [47] results in his study 10 banks in Bangladesh from 2017 to 2023; moreover, Chintha [15] found similar results in their study for Omani Banking industry.

*7.17. SIZE (Bank Size)*

The analysis shows that bank size has no significant effect on ROE in either country (coefficients of 0.002 in Egypt or -0.004 in Saudi Arabia). This indicates that, within the sample, the scale of a bank neither significantly enhances nor diminishes profitability. Larger banks may benefit from economies of scale, but they could also face complexities or inefficiencies that offset these advantages. The neutrality of size effects suggests that other internal management practices or strategic choices are more critical determinants of profitability than sheer size in these markets.

The result is similar to Wagdi and Salman [45] and Abobaker [11] research on Egyptian banking industry; moreover, Kassem and Sakr [40] pointed out insignificant positive relationship with size in Egypt banking industry.

Hossain [47] found negative insignificant relationship between size and ROE which is similar to Saudi Arabia results.

*7.18. LDR (Loan-to-Deposit Ratio)*

In Egypt, the Loan-to-Deposit Ratio exhibits a positive and statistically significant coefficient (0.063), implying that higher lending activity relative to deposits boosts ROE. This reflects that in Egypt, banks may effectively leverage their deposit base to generate interest income, and higher LDRs could be associated with increased profitability, assuming credit risk remains manageable. Conversely, in Saudi Arabia, the LDR coefficient is negative (-0.066) but statistically insignificant, indicating that aggressive lending does not have a clear impact on profitability in the Saudi context. This difference likely stems from more conservative lending practices and macroeconomic stability in Saudi Arabia, where banks may prioritize risk mitigation over maximizing lending.

*7.19. OER (Operating Expense Ratio)*

The results reveal a strong negative and highly significant relationship between operating expenses and ROE in both countries (-0.081 in Egypt and -0.255 in Saudi Arabia, both $p<0.01$). This indicates that higher operating costs directly erode profitability, emphasizing the importance of cost efficiency in banking operations. Banks that manage their operating expenses effectively can sustain higher ROE, highlighting operational efficiency as a key driver of profitability. The more pronounced effect in Saudi Arabia could reflect stricter cost management or a more competitive environment where expenses more directly influence margins.

It worth to mention that El-Hameed [48] found negative significant influence for operation efficiency on ROE in his study for Egyptian banking industry for the period from 2015 to 2022.

Moreover, this research results consistent with Hossain [47] finding in his study for Bangladesh banking industry from 2017 to 2023 as well as Bensalem and Gaidi [39] in his study for Algerian banking industry.

Javaid and Alalawi [38] found that negative significant influence of Operation efficiency ratio on ROE in their study for Saudi Arabia banking industry.

*7.20. GDP Growth*

The coefficients for GDP growth are positive but statistically insignificant in both countries (0.231 in Egypt, 0.001 in Saudi Arabia). This suggests that macroeconomic growth during this period did not have a direct, measurable impact on

banks' profitability as captured by ROE. The insignificance could be due to lagged effects, or because internal factors like operational efficiency and risk management overshadow macroeconomic influences in determining profitability over the short term.

The results are similar to Wagdi and Salman [45] research on Egyptian banking industry for the period from 2000 to 2019 as well as Chintha [15] found similar results in their study for Omani Banking industry from 2007 to 2016.

*7.21. INTERB (Interbank Rate)*

The impact of interbank rates on ROE is positive but not statistically significant in either country (0.354 in Egypt, 0.064 in Saudi Arabia). This indicates that fluctuations in short-term interest rates do not have a direct or immediate effect on banks' profitability in this sample. It could be that banks' lending and funding strategies are more influenced by long-term rates or macroeconomic stability rather than short-term interbank rates, or that their profit margins are resilient to interest rate changes within this period.

Toufaili [43] found that interest rate has insignificant influence on ROE in his study for 15 commercial banks in Lebanon for the period from 2005 to 2017.

*7.22. INF (Inflation)*

Inflation rates show positive but insignificant coefficients (0.100 in Egypt, 0.066 in Saudi Arabia), implying that inflation does not have a statistically significant direct effect on ROE during this period. This may be because inflation's impact on profitability is complex; potentially offsetting effects such as increased nominal interest income against rising operating costs or credit risk.

This research results similar to Abdelzaher [10] finding in his study for banking industry in Egypt for the period from 2003 to 2019.

Regarding the fifth hypothesis, Table 17 illustrates the impact of bank-specific and macroeconomic factors on net interest margin of Egyptian and Saudi Arabia Banks.

**Table 17.**
The impact of bank-specific and macroeconomic factors on "NIM".

| **One Step System GMM** | | |
|---|---|---|
| **Independent Variables** | **NIM Model** | |
| | **Egypt** | **Saudi Arabia** |
| L1.NIM | -0.154047<br>(0.0978477) | 0.217658<br>(0.2307133) |
| _CON | 0.0761368<br>(0.0420734)* | 0.0350659<br>(0.0142961)** |
| CAR | 0.1811448<br>(0.0888276)** | 0.0319008<br>(0.00827)*** |
| SIZE | -0.0028364<br>(0.0021427) | -0.0000503<br>(0.0004078) |
| LDR | 0.0124769<br>(0.0211512) | -0.0125056<br>(0.005947)** |
| OER | -0.0138464<br>(0.0072981)* | -0.0109661<br>(0.0085728) |
| GDP | -0.022523<br>(0.2572938) | -0.0188151<br>(0.0126517) |
| INTERB | 0.3834433<br>(0.1892193)** | 0.0042483<br>(0.0577458) |
| INF | -0.1183718<br>(0.1106311) | 0.047816<br>(0.0165233)*** |
| Wald Test | 250.29*** | 28213.52*** |
| AR(1) Test (p-value) | 0.179 | 0.149 |
| AR(2) Test (p-value) | 0.486 | 0.984 |
| Hansen Test (p-value) | 0.999 | 0.990 |
| Obs. | 160 | 160 |

**Note:** Each cell contains the estimated parameters, with std. error between brackets, where * denotes p-value of 10%, ** denotes 5% and *** denotes 1%.

This model reliability is supported by the results of the Wald and Hansen tests. The highly significant Wald test statistics (p-values at the 1% level) indicate that the models are statistically significant and effectively explain variations in Net Interest Margin (NIM) for both Egypt and Saudi Arabia. Additionally, the Hansen test p-values are very close to 1, suggesting that the instruments used in the Generalized Method of Moments (GMM) estimation are valid and that the models are properly specified without over fitting.

Furthermore, the autocorrelation tests (AR(1) and AR(2)) show no evidence of serial correlation in the residuals, with p-values well above conventional significance levels. This absence of autocorrelation confirms that the models' residuals are well-behaved, ensuring the validity of the GMM estimates. Overall, the combination of significant Wald and Hansen

tests along with non-significant autocorrelation results indicates that the models are robust, reliable, and suitable for interpreting the effects of bank-specific and macroeconomic factors on NIM in both countries.

Regarding the fifth hypothesis, the H0 null hypothesis is rejected and alternative H5 hypothesis could be accepted that H5 states, $\beta n \neq 0$, which means that there is significant impact of "bank-specific and macroeconomic factors" on "net interest margin" of Egyptian and Saudi Arabia Banks.

*7.23. L1.NIM (Lagged NIM)*

The coefficient for the lagged NIM is negative (-0.154 for Egypt; 0.217 for Saudi Arabia) but not statistically significant in either country, indicating limited evidence that past NIM strongly influences current NIM. This suggests that NIM does not exhibit consistent persistence over time across both banking sectors within this period.

*7.24. CAR (Capital Adequacy Ratio)*

The positive and significant coefficients (Egypt: 0.076, *p<0.10*; Saudi: 0.035, **p<0.01**), similar to El-Hameed [48] in his study for Egypt naming industry; indicate that banks with higher capital buffers tend to earn higher NIMs. Strong capital positions may allow banks to undertake more profitable lending activities while maintaining resilience, aligning with Basel Committee on Banking Supervision [16]. This suggests that capital adequacy not only ensures safety but also enhances profitability margins.

Similar to this research results, Kassem and Sakr [40] pointed out significant positive relationship between Capital adequacy ratio and Net interest margin in their study for Egyptian banking industry.

Kunwar and Jnawali [49] found positive significant influence for CAR on NIM in their study for Commercial Banks in Nepal which is similar to Rani and Zergaw [50] on their study for Ethiopian banking industry.

*7.25. Size (Bank Size)*

The coefficient is negative and insignificant in both countries, indicating no strong evidence that larger banks automatically achieve higher NIMs. This may reflect that the benefits of size plateau or that operational complexity offset scale advantages.

Edi [51] found insignificant negative relationship between ban size and NIM in their study for banking industry in Indonesia. Derbali [2] found that the size of the bank maintains a negative and significant correlation at the 1% threshold (for models 2 and 3), with the interest margin, this result is confirmed by the fact that the authors argue that size can result from aggressive growth strategy, released at the expense of margins and profitability.

*7.26. LDR (Loan to Deposit Ratio)*

The coefficients are positive and insignificant for Egypt; despite it is negative significant for Saudi Arabia, the results for Saudi Arbia consistent with Azar and Kouyoumjian [52] in their study for commercial banks in Lebanon; showing that higher utilization of deposits in lending activities is associated with increased interest income, thereby improving NIM. This supports the view that efficient deployment of funds enhances bank profitability.

*7.27. OER (Operating Expense Ratio)*

Higher operating expenses ratio negatively affect NIM in Egypt, with significant impacts at the 1% level which is similar to Azar and Kouyoumjian [52] in his study for Lebanon banking industry, this aligns with the expectation that increased operational costs diminish bank profitability, emphasizing the importance of operational efficiency for maintaining healthy margins. The results for Saudi Arabia were insignificant but showing negative relationship as well.

The study by Derbali [2] for Moroccan banking industry supports this, indicating that operational efficiency and cost management are central to maintaining bank profitability, especially during economic instability.

*7.28. GDP (Gross Domestic Product Growth)*

In Saudi Arabia, higher GDP growth is with lower NIM which is insignificant, possibly indicating increased competition or saturated markets during periods of economic expansion. In Egypt, the relationship is negative but statistically insignificant, suggesting no clear macroeconomic influence on bank margins within the studied period which consistent with Derbali [2] results that found insignificant relationship between NIM and GDP for Moroccan banking industry. Rani and Zergaw [50] found negative insignificant influence of GDP on NIM for banks in Ethiopia.

*7.29. INTB (Interbank Rate):*

The positive and highly significant coefficients in Egypt: 0.383 suggest that higher interbank interest rates are associated with increased NIMs. Rising benchmark rates can widen the spread banks earn on loans relative to deposits, emphasizing the sensitivity of bank margins to interest rate movements.

In Saudi Arabia the relationship between Interbank rate and Net Interest Margin were insignificant, however the relationship was positive.

*7.30. INF (Inflation Rate)*

In Egypt, the coefficient is negative (-0.118) and marginally insignificant (p<0.10), implying that rising inflation might put downward pressure on NIM, possibly due to monetary tightening or compressed real interest margins. Conversely, in Saudi Arabia, the coefficient is positive and significant (0.048, p<0.01) similar to Kunwar and Jnawali [49] results in their study for commercial banks in Nepal and Toufaili [43] in his study for Lebanon banking industry, which could indicate that

moderate inflation helps expand nominal interest rates, thereby positively influencing NIM; the result similar to Kapaya and Raphael [53] finding on their study for macroeconomic determinants of Banks Profitability in Tanzania.

## 8. Summary and Concluded Remarks

The analysis confirms that both bank-specific characteristics and macroeconomic conditions significantly influence the risk and profitability of banks in Egypt and Saudi Arabia. Factors such as higher capital adequacy ratios and operational efficiency generally support financial stability and enhance performance, although their effects vary by country. Conversely, the loan-to-deposit ratio demonstrates contrasting impacts, highlighting the importance of prudent lending and liquidity management. Macroeconomic variables such as GDP growth, inflation, and interbank rates also play a crucial role, affecting bank risk and returns in country-specific ways due to differing economic structures and regulatory environments. Empirical evidence from panel data analysis using dynamic panel models (DPMs) with system GMM underscores the significance of these factors on both risks measured by non-performing loans to gross loans and loan provisions to non-performing loans and return measured by return on assets, return on equity, and net interest margin. These findings provide valuable insights for regulators, policymakers, and banking managers aiming to strengthen financial resilience and foster sustainable growth. Enhancing macroeconomic stability, internal risk controls, and adopting tailored policies are essential for maintaining financial stability and promoting long-term profitability in both nations.

The empirical analysis underscores that both bank-specific characteristics and macroeconomic conditions markedly influence the risk profiles and return of banks in Egypt and Saudi Arabia. Internal factors such as capital adequacy, operational efficiency, and lending practices play vital roles in shaping financial stability and profitability, although their effects differ across the two countries.

### *8.1. Bank Risk Variables (NPLs and LPNPLs):*

The results reveal notable country-specific differences in risky behavior. In Egypt, the high and significant persistence of non-performing loans (L1.NPLS) suggests entrenched credit risk issues, potentially driven by economic volatility, weaker credit risk management, or regulatory challenges. The insignificance of the capital adequacy ratio (CAR) indicates that increases in capital buffers do not effectively reduce NPL levels, as other factors have more influence on NPL compared to CAR in Egyptian banks. Conversely, in Saudi Arabia, a significant negative relationship between CAR and NPLs demonstrates that higher capital adequacy strengthens banks' capacity to absorb credit risks, resulting in lower NPL ratios.

The loan-to-deposit ratio (LDR) exhibits a negative impact on NPLs in Egypt and Saudi Arabia, highlighting effective liquidity management and prudent lending practices higher LDRs are associated with lower NPLs, possibly due to careful credit assessment and risk controls. The positive and significant effect of operating efficiency (OER) on NPLs in both contexts suggests that operational weaknesses impair banks' ability to monitor and control credit risk effectively.

Macroeconomic factors also influence risk differently. In Saudi Arabia, higher GDP growth significantly reduces NPLs, indicating that economic stability supports better credit quality. In Egypt, macroeconomic variables are less impactful, possibly due to structural vulnerabilities or external shocks, which diminish their influence on credit risk levels.

### *8.2. Bank Return Variables (ROA, ROE, and NIM)*

Return ratios ROA and ROE are positively affected by capital adequacy in Egypt and Saudi Arabia, emphasizing the importance of a strong capital base for sustainable profitability. However, bank size does not show a significant effect on performance in either country, suggesting internal management practices and risk controls are more critical determinants than scale.

The loan-to-deposit ratio (LDR) displays contrasting effects in Egypt, a higher LDR positively influences ROA, indicating that banks effectively leverage their deposits to generate profits. Conversely, in Saudi Arabia, higher LDRs are associated with lower ROE and NIM, reflecting more conservative lending strategies aimed at risk mitigation.

Operational efficiency consistently enhances bank performance across both nations; higher operating expenses (OER) negatively impact profitability measures, underscoring the importance of cost management. The influence of macroeconomic variables varies while GDP growth remains insignificant for profitability ratios, interbank rates and inflation affect net interest margin (NIM) differently. In Egypt, rising interbank rates positively influence NIM, whereas inflation has a negative effect. In Saudi Arabia, the effects are either insignificant or show opposite directions, shaped by differing market structures, regulatory environments, and economic stability.

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