

Evaluating the impact of COVID-19 on the profitability metrics of Saudi Arabian banks: A panel data analysis



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ABSTRACT

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This study aims to evaluate the impact of the COVID-19 pandemic on the profitability of Saudi Arabian banks from Q1 2015 to Q2 2023. Using quantitative analysis of panel data from ten banks, the study assesses profitability through Return on Assets (ROA) and Return on Equity (ROE). Independent variables include bank-specific factors (Capital Ratios (CPTL), Operational Efficiency (OPEF), Deposits (DEP), Bank Size (SIZE)) and country-specific factors (Inflation (INF), Gross Domestic Product (GDP)), with the pandemic as a moderating factor. The findings reveal varied relationships between these variables and bank profitability. A significant negative relationship is observed between CPTL and ROE, suggesting that higher capital ratios may decrease profitability. OPEF and SIZE also show significantly negative relationships with both ROA and ROE, indicating that increased operational efficiency and bank size could lead to lower profitability. Conversely, DEP positively correlates with ROE, implying that banks with higher deposits achieve better equity returns. Interestingly, GDP and INF do not significantly affect bank profitability. These insights highlight the resilience and operational dynamics of the Saudi banking sector during COVID-19, emphasizing its robustness. The findings offer practical implications for policymakers, regulators, and banks in preparing for future systemic shocks and ensuring the sector's sustainability and stability.

Contribution/ Originality: This study is original in examining COVID-19's impact as a moderating factor on Saudi Arabian banking profitability. It distinctively investigates how the pandemic influences the relationship between bank-specific and country-specific determinants and profitability, filling a gap in existing literature on the intersection of global health crises and financial performance.

1. INTRODUCTION

The COVID-19 pandemic has rattled the global economy and brought unprecedented challenges across various sectors. Its impact on the banking industry is notably complex, affecting macroeconomic stability and microeconomic performance. These challenges for the Saudi Arabian banking sector coincide with ongoing transformational efforts, making the period a critical case study (Almonifi and Gulzar, 2021; Abdulla and Ebrahim, 2022).

While several studies have investigated the elements that impact the profitability of the banking industry, there is a lack of understanding of how external crises, such as the COVID-19 pandemic, alter these connections (Mbekomize and Mapharing, 2017, Lohano and Kashif, 2019).

Specifically, the influence of COVID-19 on the banking profitability metrics of Return on Assets (ROA) and Return on Equity (ROE) within the Saudi Arabian context needs to be explored. This research addresses this gap by examining how the pandemic has served as a moderating variable, potentially altering the effects of bank-specific and country-specific determinants on the profitability of Saudi Arabian banks. By doing so, the research aims to offer precise insights into the complex interplay between a global health crisis and financial performance metrics.

Understanding the impact of COVID-19 on the banking sector is not merely an academic exercise but essential for policymakers, regulators, and stakeholders. It provides insights into the resilience and adaptability of banks under external shocks, informing future strategic decisions and regulatory reforms.

The central research question guiding this study is: "How has the COVID-19 pandemic moderated the impact of bank-specific and country-specific variables on the profitability metrics of Saudi Arabian banks?"

Understanding the impact of COVID-19 on banking profitability transcends academic interest, offering critical insights for policymakers, regulators, and stakeholders. This study is significant as it provides a nuanced understanding of the pandemic's role in influencing the dynamics between various profitability determinants and actual financial outcomes in the banking sector. The findings are anticipated to assist in shaping strategies and policies for enhancing the resilience and adaptability of banks to socio-economic shocks.

The primary objective of this study is to investigate the influence of COVID-19 on the profitability of ten Saudi Arabian banks, covering the period from the first quarter of 2015 to the second quarter of 2023. Specifically, we focus on analyzing how bank-specific factors (such as Capital Ratio, Operating Efficiency, Bank Deposits, and Bank Size) and country-specific factors (such as Real Gross Domestic Product Rate and Inflation Rate) impact Return on Assets (ROA) and Return on Equity (ROE) within the context of the pandemic's moderating effects.

This research employs a panel data methodology, using data collected for ten Saudi Arabian banks from Q1 2015 to Q2 2023. Multiple regression models examined the relationship between the dependent variables (ROA, ROE) and independent variables (Capital Ratio (CPTL), Operating Efficiency (OPEF), Bank Deposits (DEP), and Bank Size (SIZE), as well as country-specific variables like Real Gross Domestic Product Rate (GDP), with COVID-19 as a moderating variable. The researcher executed the models separately to explore different dimensions of moderation effects.

The remainder of this paper is organized as follows: Section 2 delves into the Literature Review, exploring the theoretical frameworks and empirical evidence underpinning this research. Section 3 comprehensively elucidates the methods employed for data collection, defines vital variables, and outlines the analytical techniques utilized. Section 4 presents the Empirical Analysis and Results, shedding light on the research findings while drawing comparisons with previous studies. Finally, in Section 5, we conclude the paper by offering conclusions, discussing the implications of our findings, and suggesting potential avenues for future research."

2. LITERATURE REVIEW

The literature review section serves to establish the theoretical and empirical context for our research on COVID-19's impact on Saudi Arabia's banking sector profitability. We will explore key factors affecting bank profitability, focusing on Return on Assets (ROA) and Return on Equity (ROE). This review spans seminal theories to recent studies, addressing COVID-19's unique challenges. It highlights bank-specific and country-specific variables and their historical ties to profitability metrics. Additionally, it examines emerging literature on external shocks, especially pandemics like COVID-19, as moderating factors. The review follows a structured progression, moving from foundational theories to empirical studies, ultimately delving into the specificities of the COVID-19 situation. This approach, with relevant academic references, validates variable choices and identifies research gaps, situating our study within the academic landscape.

2.1. Profitability Indicators: Return on Assets (ROA) and Return on Equity (ROE)

Assessing bank profitability is a fundamental aspect of financial economics, with implications for resource allocation and risk management within the banking sector. In this regard, two critical indicators, Return on Assets (ROA) and Return on Equity (ROE), play a pivotal role in gauging the effectiveness of banks.

2.1.1. Return on Assets (ROA)

ROA, a fundamental metric, serves as a crucial gauge of a bank's capacity to generate earnings from its assets. The significance of ROA lies in its ability to reveal a bank's proficiency in effectively utilizing its assets for profitability. As highlighted by Hosen (2020) ROA assumes a broad role as a measure of overall bank performance, shedding light on the management's competence in income generation through asset utilization. A high ROA indicates superior performance in asset utilization, emphasizing the bank's adeptness at generating profits from its asset base. Furthermore, Ahamed and Mallick (2019) have illustrated that ROA not only communicates insights into managerial efficiency but also provides insights into the bank's strategic decisions in managing risks and operations, adding another layer of depth to its significance in financial analysis.

2.1.2. Return on Equity (ROE)

ROE provides valuable insights into the returns generated from shareholder equity and measures how effectively a bank delivers returns to its investors. According to research conducted by Gazi, Nahiduzzaman, Harymawan, Masud, and Dhar (2022) ROE stands as the standard for assessing a bank's profitability and its proficiency in generating profit from equity. Moreover, it plays a pivotal role in influencing the sustainable growth rate of banks. In line with this, Mbekomize and Mapharing (2017) have put forth the notion that ROE serves as the most effective proxy for evaluating a bank's profitability.

When considered together, ROA and ROE offer a comprehensive assessment of a bank's profitability dynamics, encompassing aspects of asset management and value creation for shareholders. These indicators are crucial for stakeholders, including bank management and investors, since they offer significant insights into the financial well-being and performance direction of the institution.

2.2. Bank-Specific Variables

Bank-specific variables are unique to a particular bank and can affect its profitability. These variables include Capital Ratio, Operating Efficiency, Bank Deposit and Bank Size.

2.2.1. Capital Ratio (CPTL)

The Capital Ratio is a critical gauge of a bank's financial stability and capacity to absorb risks. The Basel Accords, particularly Basel III, emphasize the importance of maintaining adequate capital ratios for banking institutions (AlFouhaili & Gautier, 2020). The relationship between capital ratios and bank profitability is intricate. On one hand, higher capital ratios can diminish short-term profitability as capital is reserved instead of being invested in potentially higher-yield ventures. However, this can enhance the bank's long-term stability and sustainability (Bitar, Pukthuanthong, & Walker, 2018).

Tan and Floros (2013) discovered a significantly positive relationship between bank capital, risk, and profitability, further supporting the multifaceted nature of this relationship. Recent empirical studies have shown that a higher capital ratio may lead to lower short-term profitability measures such as ROA and ROE due to reduced risk and lower returns associated with holding more capital (Admati, DeMarzo, Hellwig, & Pfleiderer, 2018; Kosmidou, Tanna, & Pasiouras, 2005).

2.2.2. Bank Deposit (DEP)

The ability of a bank to attract and retain deposits indicates trust and stability. Recent research, exemplified by Chortareas, Garza-García, and Girardone (2012) underscores the significant positive impact of deposits on bank profitability. This role becomes even more crucial during economic uncertainties, as witnessed during events like the COVID-19 pandemic, where liquid assets are essential for sustaining operations (Berger & Bouwman, 2013).

2.2.3. Operating Efficiency (OPEF)

In the banking sector, operating efficiency pertains to a bank's capacity to effectively manage its resources, processes, and operations with the aim of minimizing costs while simultaneously maximizing the delivery of financial services and upholding or enhancing service quality. This efficiency is typically quantified using the cost-to-income ratio. Notably, Dietrich and Wanzenried (2011) show that banks with lower cost-to-income ratios frequently report stronger profitability metrics. Additionally, research by San and Heng (2013) highlights a significant negative relationship between the cost-to-income ratio and bank profitability.

2.2.4. Bank Size (SIZE)

There is a debate among scholars about the effect of a bank's size on its profitability. While larger banks may benefit from economies of scale, they also encounter tighter regulatory oversight and more complex operational challenges. The results of research by Ugut, Fauzi, and Saraswati (2022) show a favorable and significant correlation between bank size and profitability. Conversely, other researchers, including Kosmidou et al. (2005) identify a reverse trend, suggesting that larger banks often experience lower margins and profits.

In summary, these bank-specific variables collectively contribute to the intricate landscape of bank profitability. Their roles, interplay, and impact on financial performance underscore the significance of considering a holistic perspective when evaluating the financial health and performance of banking institutions.

2.3. Country-Specific Variables

Country-specific variables are integral to shaping the profitability of banks, reflecting the unique economic, regulatory, and political conditions of a given region. In this context, we delve into the significance of inflation and the Real GDP Growth Rate.

2.3.1. Real GDP Growth Rate (GDP)

Economic growth generally stimulates financial activities and can lead to greater lending opportunities, thereby positively affecting bank profitability (Jayakumar, Pradhan, Dash, Maradana, & Gaurav, 2018). Recent studies confirm the positive impact of economic growth on banking profitability. A higher level of GDP contributes to improved efficiency and indicates a higher level of productivity and economic activities (Mateev, Usman Tariq, & Sahyouni, 2023).

2.3.2. Inflation (INF)

The relationship between the inflation rate and bank profitability is multifaceted. Inflation typically inversely affects a bank's profitability; higher inflation often leads to increased bank costs, thereby reducing profits, as Mbekomize and Mapharing (2017) have highlighted. Conversely, the ability to accurately predict inflation rates can have a positive influence on profits. Lohano and Kashif (2019) also found that looking at the broad money growth rate, which shows changes in monetary aggregates like demand deposits and time deposits at banks, as well as narrow money components like cash in circulation, can help us understand how the money supply affects profits.

2.4. COVID-19 as a Moderating Variable

The COVID-19 pandemic has exerted unprecedented pressure on various sectors, including the banking industry. Consequently, the banking sector has faced liquidity challenges due to the mismatch between supply and demand. During this pandemic, both customers and governments have withdrawn funds from banks to support the economy, while borrowers have not been returning funds to banks, resulting in a significant reduction in deposits (Shah et al., 2023). According to metrics like ROA, ROE, and NIM, Katusiime (2021) analysis of the pandemic's impact on Ugandan banking profitability revealed a negative effect on long-term profitability. Subsequently, banks appeared to recover losses, although they were influenced by their characteristics and locations.

At the pandemic's outset, banks faced significant challenges due to COVID-19. Yet, as vaccination programs began, many banks were able to mitigate some early losses. The impact varied, with more pronounced effects on banks in severely affected countries and those that were large and well-capitalized prior to the vaccinations, according to Augeraud-Véron and Boungou (2023).

Assous and Al-Najjar (2021) conducted a study on the Saudi banking index during the pandemic, incorporating factors like lockdowns, COVID-19 cases, interest rates, and oil prices. Their results showed that increasing oil prices and a rise in new COVID-19 cases positively influenced the Saudi banking sector index, whereas lockdowns and falling interest rates had negative effects.

Almonifi and Gulzar (2021) analyzed Al Rajhi Bank's performance before and during the pandemic. Their findings suggest that the COVID-19 crisis had a minimal impact on Saudi Arabia's Islamic banking system, highlighting the resilience of Islamic banks in managing the financial and economic risks of crises. They noted that Islamic banks, in contrast to conventional banks, showed greater capacity for rapid response to crises, including economic and financial shocks.

Demirgüç-Kunt, Pedraza, and Ruiz-Ortega (2021) investigated the effect of financial sector policy announcements on global bank stocks at the start of the pandemic. Their study found that larger, public, and better-capitalized banks saw more significant reductions in stock returns, indicating their critical role in crisis management. Banks with lower liquidity before the crisis and higher exposure to the oil sector also experienced greater losses.

Haider and Mohammad (2022) unveil a substantial pandemic-induced impact on bank profitability, exhibiting disparities between developed and developing nations. European banks encountered a decline in profitability, while South Asian banks observed an upturn during the COVID-19 crisis. The pandemic precipitated changes in the determinants affecting bank profitability, diminishing the significance of credit quality and efficiency while accentuating the significance of bank size and liquidity. Furthermore, the influence of the capital ratio on return on assets experienced a decrease during the pandemic.

Abdulla and Ebrahim (2022) assessed the COVID-19 crisis's impact on banks in Gulf Cooperation Council (GCC) countries, revealing adverse effects, especially in Saudi Arabia and the UAE. Islamic banks exhibited greater resilience than conventional ones, with government-linked, larger, and higher loan ratio Islamic banks facing more challenges.

Shabir, Jiang, Wang, and Işık (2023) demonstrated a notable decline in bank performance and stability due to the COVID-19 outbreak. Their study highlights that the adverse effects of the pandemic differ depending on the unique attributes of each bank and the characteristics of the market they operate in. They also found that factors such as a supportive regulatory framework, superior institutional quality, and advanced financial development were crucial in strengthening the resilience of banks amidst the crisis.

2.5. Literature Gap

The research gap that this research aims to address centers on the limited empirical evidence concerning the impact of COVID-19 as a moderating variable on the profitability of the banking sector, particularly in the Saudi Arabian context. While there is abundant literature on the factors influencing bank profitability, including bank-

specific and country-specific variables, the unprecedented nature of the COVID-19 pandemic has introduced new complexities that studies have yet to examine comprehensively.

Moreover, most of the existing studies focus on a global or eastern context, leaving a geographical gap in the research concerning Saudi Arabian banks. Additionally, the time frame of this research (from Q1 2015 to Q2 2023) is unique in that it captures a more extended period that includes both pre-COVID and intra-COVID phases, allowing for a more robust understanding of the pandemic's impact.

By introducing COVID-19 as a moderating variable, this research aims to shed light on how the relationships between bank profitability and other determinants might have shifted or intensified due to the pandemic. This will contribute to the existing body of knowledge and have practical implications for policymakers, financial institutions, and stakeholders interested in understanding the resilience and adaptability of the banking sector in the face of global crises.

Thus, the research aims to fill this multifaceted research gap by offering an empirical investigation into a topic that is not only timely but also critical for understanding the financial stability of a region that has its own unique banking challenges and opportunities.

2.6. Hypotheses on the Moderation Effects of COVID-19

The Hypothesis section of this research builds upon the theoretical frameworks and empirical findings elaborated in the Literature Review. After studying various perspectives on the determinants of bank profitability—at the bank-specific and country-specific levels—the research formulates hypotheses to test the relationships empirically. Significantly, this research adds a unique layer by introducing COVID-19 (COV19) as a moderating variable, a topic less explored in the literature. Each hypothesis aims to fill a gap in the existing literature while aligning with well-established theories, thereby allowing the research to offer new insights into the dynamics affecting the profitability of banks in Saudi Arabia in the context of the COVID-19 pandemic:

H₁: The impact of CPTL on profitability indicators is moderated by COV19.

H₂: The impact of DEP on profitability indicators is moderated by COV19.

H₃: The impact of OPEF on profitability indicators is moderated by COV19.

H₄: The impact of SIZE on profitability indicators is moderated by COV19.

3. DATA AND METHODOLOGY

This research aims to analyze the impact of COVID-19 on the profitability of the banking sector in Saudi Arabia, utilizing a panel data approach from Q1 2015 to Q2 2023. The primary measures of profitability under investigation are Return on Assets (ROA) and Return on Equity (ROE). Given the unique challenges imposed by the pandemic, the research introduces COVID-19 as a moderating variable.

3.1. Data Nature and Sources

The research utilizes a balanced panel dataset comprising quarterly observations for ten banks in Saudi Arabia. Panel data offers more variability, less collinearity among the variables, more degrees of freedom, and increased efficiency. The timeframe for the data is from Q1 2015 to Q2 2023, offering a rich chronological landscape to analyze both pre-COVID-19 and post-COVID-19 scenarios.

The data for bank-specific variables like Return on Assets (ROA), Return on Equity (ROE), Capital Ratio (CPTL), Bank Deposit (DEP), Operating Efficiency (OPEF), and Bank Size (SIZE) are sourced from the quarterly financial statements of the selected banks, which are publicly available statements on the Saudi Stock Exchange (Tadawul) Websites.

Data for country-level variables like the Real Domestic Product Growth Rate (GDP) and Inflation Rate (INF) are available from the Saudi Central Bank and other governmental publications. COVID-19 impact data, measured in

several ways, including infection rates and economic measures, is sourced from both governmental reports and international databases like the Kingdom of Saudi Arabia - Ministry of Health Portal and the World Health Organization (WHO).

Since the data used in the research is publicly available and does not involve human subjects, there are minimal ethical concerns related to data collection. The researcher cited the resources appropriately to give due credit to the original publishers.

By elaborating on the nature and sources of the data, this section aims to provide a transparent and comprehensive overview, making it easier to replicate the research and validate the results.

3.2. Model Specification and Variables

The research utilizes multiple linear regression models to analyze the relationships between diverse variables. Each model is designed for a distinct purpose, featuring ROA (Return on Assets) and ROE (Return on Equity) as the dependent variables. The independent variables in these models include bank-specific factors such as Capital Ratio (CPTL), Bank Deposit (DEP), Operating Efficiency (OPEF), and Bank Size (SIZE), as well as country-specific factors like Inflation rate (INF) and Real Gross Domestic Product growth rate (GDP). These variables were evaluated on a quarterly basis. These variables are represented in Table 1.

Table 1. Definitions and measurements of variables.

Variables	Measurement	Abbreviation	Prior studies
Profitability (Return on assets)	Net income / Total assets	ROA	Shah et al. (2023); Sohibien, Laome, Choiruddin, and Kuswanto (2022) and Alshatti (2015).
Profitability (Return on equity)	Net income / Equity	ROE	Hassoun and Khalaf (2022) and Gazi et al. (2022).
Capital ratio	Equity / Total assets	CPTL	Hoffmann (2011) and Alshatti (2015).
Bank deposit	Deposit / Total assets	DEP	Kawshala (2017) and Shah et al. (2023)
Operating efficiency	Operating expenses / Operating revenues	OPEF	Kapaya and Raphael (2016) and Al-Homaidi, Almaqtari, Yahya, and Khaled (2020).
Bank size	Natural logarithm of total assets	SIZE	Pasiouras and Kosmidou (2007); Batten and Vo (2019) and Hassoun and Khalaf (2022).
Real gross domestic Product growth rate	Real gross domestic product growth rate	GDP	Katusiime (2021); Al-Homaidi et al. (2020) and Kiganda (2014).
Inflation rate	The inflation rate	INF	Katusiime (2021) and Kiganda (2014).
COVID-19 (Moderating variable)	0 = Before COVID-19 1 = During COVID-19 (Q1, Q2, Q3 2020)	COV19	Shah et al. (2023) and Katusiime (2021).

Table 1 represents information about each variable, detailing how it is measured and referencing previous studies that have examined it.

The basic model used to detect the impact of COVID-19 on bank profitability can be written as follows:

Model 1: Basic Model without COVID-19 as a Moderator

$$ROE(orROA) = \alpha + \beta_1(CPTL) + \beta_2(DEP) + \beta_3(OPEF) + \beta_4(SIZE) + \beta_5(GDP) + \beta_6(INF) + \varepsilon \quad (1)$$

Model 2: With COV19_SIZE as a Moderator

$$ROE(orROA) = \alpha + \beta_1(CPTL) + \beta_2(DEP) + \beta_3(OPEF) + \beta_4(SIZE) + \beta_5(GDP) + \beta_6(INF) + \beta_7(COV19_SIZE) + \varepsilon \quad (2)$$

Model 3: With COV19_CPTL as a Moderator

$$ROE(orROA) = \alpha + \beta_1(CPTL) + \beta_2(DEP) + \beta_3(OPEF) + \beta_4(SIZE) + \beta_5(GDP) + \beta_6(INF) + \beta_7(COV19_CPTL) + \varepsilon \quad (3)$$

Model 4: With COV19_DEP as a Moderator

$$ROE(orROA) = \alpha + \beta_1(CPTL) + \beta_2(DEP) + \beta_3(OPEF) + \beta_4(SIZE) + \beta_5(GDP) + \beta_6(INF) + \beta_7(COV19_DEP) + \varepsilon \quad (4)$$

Model 5: With COV19_OPEF as a Moderator

$$ROE(orROA) = \alpha + \beta_1(CPTL) + \beta_2(DEP) + \beta_3(OPEF) + \beta_4(SIZE) + \beta_5(GDP) + \beta_6(INF) + \beta_7(COV19_OPEF) + \varepsilon \quad (5)$$

Where:

- ROE = Return on equity.
- ROA = Return on assets.
- α = Intercept.
- β = Coefficient.
- CPTL = Capital ratio.
- DEP = Bank deposit.
- OPEF = Operating efficiency.
- SIZE = Bank size.
- GDP = Real GDP growth rate.
- INF = Inflation rate.
- COV19_ = Interaction term with COVID-19.
- ε = Error term.

3.3. Method of Analysis

The research "Evaluating the Impact of COVID-19 on Profitability Metrics of Saudi Arabian Banks" utilizes a panel data approach to analyze the impact of the COVID-19 pandemic on the profitability of the banking sector in Saudi Arabia. Both Fixed Effects and Random Effects models will be tested, and the Hausman test will be utilized to select the more appropriate model (Hausman, 1978). To make sure the models are strong, standard diagnostic tests like those for multicollinearity and heteroscedasticity will be used (Gujarati, 2004).

This method involves data collected from ten Saudi Arabian banks from the first quarter of 2015 to the second quarter of 2023. The study's primary focus is on two key profitability indicators: Return on Assets (ROA) and Return on Equity (ROE). It examines how these indicators are influenced by various bank-specific variables like Capital Ratio, Operating Efficiency, Bank Deposits, and Bank Size, as well as country-specific variables like Real Gross Domestic Product Rate and Inflation Rate. Uniquely, this study includes COVID-19 as a moderating variable to assess its impact on the relationship between profitability and other independent variables.

The critical difference between this study and past studies lies in its specific focus on the moderating role of COVID-19. While previous research has extensively explored the determinants of banking profitability, including both bank-specific and country-specific factors, there has been less emphasis on understanding how an external crisis like COVID-19 modulates these relationships. This study addresses this gap by exploring COVID-19's impact as a unique variable that might alter the effects of other determinants on the profitability of Saudi Arabian banks.

This novel approach allows for a more nuanced understanding of the dynamics in the banking sector during the pandemic, offering insights that could be vital for banking practitioners and policymakers. By incorporating COVID-19 as a specific moderating variable, the study aims to provide a more detailed picture of how global health crises can influence financial performance metrics in the banking sector.

4. EMPIRICAL RESULTS AND DISCUSSIONS

This research examines the impact of COVID-19 on Saudi Arabian bank profitability, focusing on bank and country-specific variables to understand profitability factors during the pandemic, with COVID-19 as a moderating

factor in this relationship. The next sub-section discusses the results of the estimated panel regression equations for the five models that were specified in section 3. Before doing that, the Hausman test is conducted to determine the appropriateness of using a Fixed Effects model versus a Random Effects model.

4.1. Hausman Test

The Hausman Test is a diagnostic test used to determine the appropriateness of using a Fixed Effects model versus a Random Effects model for panel data regression analysis. The Fixed Effects model essentially examines the differences within individual banks over time, considering that each bank might have its own characteristics that could impact profitability. It captures unobserved heterogeneity. On the other hand, the Random Effects model assumes that individual banks' unique errors are random and uncorrelated with the independent variables. Thus, it captures variation both within banks over time and between banks.

Table 2 displays the test's results, showing a Chi-Square statistic of 14.627 with a p-value of 0.0234. Given that a p-value below 0.05 indicates statistical significance, it can be concluded that there is a significant difference between the Fixed Effects and Random Effects models. Thus, the Fixed Effects model is the more appropriate choice for this dataset.

Table 2. Hausman test results for panel data model.

Section test summary	Data	Explanation summary statistics for the Hausman test
Chi-sq. statistic	14.627	The chi-square statistic value, used to compare the fixed vs random effects model
Chi-sq. d.f.	6	Degrees of freedom for the chi-square test
Prob.	0.0234	P-value of the test: a value less than 0.05 suggests that the fixed effects model is preferred

In the forthcoming sections, it would be essential to delve deeper into the results from the chosen Fixed Effects model, looking at the significance and magnitude of individual coefficients and, more importantly, the interaction term of COVID-19 with other bank-specific variables.

4.2. Model 1: Bank Profitability Determinants (Without Moderator)

The results of model 1, which regressed the profitability measures (ROE) and (ROA) against several bank-specific and country-specific variables without COVID-19 as a moderating variable, are shown in Table 3.

Table 3. Regression analysis results (without moderator).

Variable	ROE			ROA		
	Coefficient	Std. error	t-statistic	Coefficient	Std. error	t-statistic
C	0.188**	0.066	2.854	0.028*	0.011	2.435
CPTL	-0.175**	0.040	-4.356	0.003	0.007	0.428
DEP	0.046*	0.019	2.391	0.007*	0.003	2.095
OPEF	-0.068**	0.004	-17.58	-0.010**	0.000	-15.786
SIZE	-0.016*	0.006	-2.472	-0.003*	0.001	-2.568
GDP	0.000	0.000	1.766	3.53E-05	2.17E-05	1.627
INF	-0.000	0.000	-0.637	-2.21E-05	3.82E-05	-0.578

Note: ** p < 0.01, * p < 0.05.

Based on the results in Table 3 for the ROE equation, the Intercept is positive, and a highly significant coefficient ($p < 0.01$) suggests that even when all other variables are zero, the ROE would be 0.1883, indicating an inherent profitability factor in the Saudi Arabian banking sector. Additionally, the ROA equation is positive and significant ($p < 0.05$), indicating that a ROA of 0.0275 represents inherent profitability.

CPTL is negative and highly significant ($p < 0.01$) in the ROE equation, implying that higher capital ratios may hurt the return on equity. In comparison, the ROA equation is not significant. It seems that capital ratios do not significantly affect the ROA. These results are similar to the findings reported by Alshatti (2015) and Hoffmann (2011) where a negative relationship between capital ratios and profitability supports the notion that banks are operating over-cautiously and ignoring potentially profitable trading opportunities.

In the ROE equation, DEP is Positive and significant at the 0.05 level, suggesting that an increase in deposits leads to an increase in ROE. The ROA equation similarly indicates that DEP is positive and significant, indicating that deposits are a meaningful contributor to both profitability metrics. Dietrich and Wanzenried (2011) observed similar findings involving Swiss banks. Additionally, as noted by Kawshala (2017) when banks have more deposits, they can offer increased loan opportunities to customers, potentially resulting in future profitability.

OPEF is negative and highly significant ($p < 0.01$) in the ROE equation. Lower operating efficiency (higher OPEF) leads to lower ROE. In the ROA equation, OPEF is also negative and highly significant, implying the same trend as with ROE. These results align with findings by Kapaya and Raphael (2016).

SIZE affects ROE negatively and significantly ($p < 0.05$). It suggests that larger banks have a lower ROE, potentially due to economies of scale needing to have higher operational complexities. The ROA equation is also negative and significant, reinforcing the findings related to ROE. These findings are consistent with research conducted by Batten and Vo (2019) which presents evidence indicating that as bank size increases, cost reductions are only marginal. Moreover, the research suggests that larger banks may experience scale inefficiencies attributable to lower levels of management.

GDP in the ROE equation is insignificant but nearly at the 0.05 level, indicating a weak positive relationship between GDP growth and ROE. Also, for ROA, GDP is insignificant but tends in the same direction as ROE. This finding is consistent with research in which the results are aligned with Kiganda (2014) who found that macroeconomic factors do not affect bank profitability in Kenya. Given this, it is clear that internal factors related to bank management significantly determine bank profitability in Kenya.

The coefficients of Inflation for both ROE and ROA are insignificant, indicating that inflation does not have a discernible impact on either profitability measure in this model. This contrasts with findings by Pasiouras and Kosmidou (2007) who suggested that inflation affects bank operating performance.

Generally, we can conclude that the bank-specific variables (CPTL, DEP, OPEF, SIZE) have more pronounced and consistent effects on both ROE and ROA, implying that banks' internal management and strategies significantly affect their profitability. Country-Specific Variables (GDP and inflation) seem less impactful on bank profitability, at least when COVID-19 is not considered a moderating variable. It would be interesting to see if this changes when COVID-19 is included.

Regarding differences between ROE and ROA, most variables affect ROE and ROA similarly, except for CPTL, which is significant for ROE but not for ROA, suggesting that equity financing and asset management strategies could diverge among the banks.

This baseline model sets the stage for introducing COVID-19 as a moderating variable, providing more nuanced insights into the dynamics of bank profitability during these unprecedented times.

4.3. Model 2: Bank Profitability Determinants taking COV19_CPTL as Moderators

Table 4 introduces a new interaction term between COVID-19 and Capital Ratio (COV19_CPTL) to examine how the pandemic impacts the relationship between bank profitability (ROE and ROA) and the Capital Ratio (CPTL).

Table 4. Regression analysis results taking COV19_CPTL as moderators.

Variable	ROE			ROA		
	Coefficient	Std. error	t-statistic	Coefficient	Std. error	t-statistic
C	0.199**	0.065	3.06	0.030**	0.011	2.73
CPTL	-0.197**	0.041	-4.80	-0.001	0.007	-0.14
DEP	0.031	0.02	1.55	0.004	0.003	1.33
OPEF	-0.068**	0.004	-17.0	-0.010**	0.001	-10.0
SIZE	-0.015*	0.006	-2.50	-0.003*	0.001	-3.00
GDP	-0.000	0.000	-0.29	-0.000	0.000	0.58
INF	-0.000	0.000	-0.33	-0.000	0.000	0.24
COVID19	0.318*	0.153	2.08	0.060*	0.026	2.31
COV19_CPTL	-2.361*	1.121	-2.11	-0.441*	0.191	-2.31

Note: ** p < 0.01, * p < 0.05.

The intercept (C) for ROE and ROA is slightly higher than the previous models, remaining significant, suggesting the inherent profitability has slightly increased. CPTL for ROE is negative and significant, consistent with Haider and Mohammad (2022) while ROA is still insignificant. The negative and statistically significant interaction term indicates that pandemic more negatively impacts banks with higher capital ratios. The interpretation of this result is that banks with a high equity-to-total assets ratio have better safety in the event of liquidation or losses. DEP coefficients for ROE and ROA are positive but not statistically significant, implying a lower impact on profitability than before. OPEF for both ROE and ROA remained negative and highly significant, indicating that operational inefficiency continues to impact profitability negatively; this is similar to Athanoglou, Brissimis, and Delis (2008) where a lower efficiency ratio is associated with lower profitability. The size for the both ROE and ROA equations remained negative and significant, consistent with previous models.

Both equations' country-specific variables (GDP and INF) remain insignificant for ROE and ROA, similar to prior models. COVID19 for both ROE and ROA is now significant and positive, indicating that the pandemic has directly impacted profitability.

COV19_CPTL for both ROE and ROA is negative and significant, suggesting that the impact of COVID-19 on profitability is less favorable for banks with higher capital ratios, so Hypotheses H1 will be accepted. This model further enriches the literature by looking at COVID-19 as a disruptive factor and exploring how it interacts with established determinants of profitability, providing regulatory bodies and bank managers with insights on navigating profitability during periods of economic upheaval.

4.4. Model 3: Bank Profitability Determinants Taking COV19_DEP as Moderators

Table 5 presents another modified model, introducing an interaction term between COVID-19 and Bank Deposits (COV19_DEP) to analyze its influence on bank profitability measures such as ROE and ROA.

Table 5. Regression analysis results taking COV19_DEP as moderators.

Variable	ROE			ROA		
	Coefficient	Std. error	t-statistic	Coefficient	Std. error	t-statistic
C	0.196**	0.066	2.97	0.029*	0.011	2.64
CPTL	-0.197**	0.041	-4.80	-0.001	0.007	-0.14
DEP	0.035*	0.02	1.75	0.005	0.003	1.67
OPEF	-0.067**	0.004	16.75	-0.010**	0.001	-10.00
SIZE	-0.015*	0.006	-2.50	-0.003*	0.001	-3.00
GDP	0.000	0.000	0.30	0.000	0.000	0.08
INF	-0.000	0.000	-0.93	-0.000	0.000	-0.85
COVID19	0.079	0.072	1.10	0.013	0.012	1.08
COV19_DEP	-0.124	0.107	-1.16	-0.021	0.018	-1.17

Note: ** p < 0.01, * p < 0.05.

Intercept (C) for both ROE and ROA: Coefficients remain statistically significant, indicating inherent profitability in the model. CPTL for ROE remains negative and statistically significant, but for ROA it is still insignificant, a trend consistent across models. The coefficients of DEP for both ROE and ROA are positive and significant for ROE, indicating a beneficial impact on profitability, which is slightly lesser in magnitude than previous models. The positive effect on ROE is aligned with some studies by [Shah et al. \(2023\)](#) which find a similar relationship. OPEF for ROE and ROA is highly damaging and significant, reconfirming that operational inefficiency significantly erodes profitability. SIZE for both ROE and ROA are negative and significant, consistent with previous models, suggesting that larger size correlate with less profitability.

Country-specific variables (GDP and INF) for both are not statistically significant for ROE and ROA, implying that these macroeconomic factors do not strongly influence the profitability of the banks in the research. The coefficients of COVID19 for both ROE and ROA are positive but not statistically significant, suggesting a less direct impact of COVID-19 on profitability when considering the interaction term with deposits. The research by [Katusiime \(2021\)](#) is consistent with these findings. COVID19_DEP for both ROE and ROA is negative but not statistically significant, suggesting that higher deposits do not enhance the impact of COVID-19 on profitability, so Hypotheses H2 will not be accepted.

Unlike studies focused on the pandemic's immediate impact on the banking sector, this research adds nuance by considering how COVID-19 interacts with bank deposits. Also, unlike Model 2, the direct influence of COVID-19 on profitability is not as pronounced in Model 3, which might suggest that the pandemic's effect is conditional upon other bank-specific variables. The interaction term between COVID-19 and Bank Deposits is not significant, suggesting that higher deposits do not necessarily act as a cushion or exacerbate the effects of the pandemic on profitability.

4.5. Model 4: Bank Profitability Determinants taking COVID19_OPEF as a Moderator

Table 6 evaluates how the profitability of banks in Saudi Arabia (measured by ROE and ROA) is influenced by COVID-19 when interacting with operational efficiency (OPEF).

Table 6. Regression analysis results taking COVID19_OPEF as a moderator.

Variable	ROE			ROA		
	Coefficient	Std. error	t-statistic	Coefficient	Std. error	t-statistic
C	0.206**	0.064	3.22	0.031**	0.011	2.82
CPTL	-0.210**	0.04	-5.25	-0.004	0.007	-0.57
DEP	0.024	0.019	1.26	0.003	0.003	1.00
OPEF	-0.067**	0.004	-16.75	-0.010**	0.001	-10.00
SIZE	-0.015*	0.006	-2.50	-0.003*	0.001	-3.00
GDP	-0.000	0.000	-0.81	-0.000	0.000	-1.12
INF	-0.000	0.000	-0.92	-0.000	0.000	-0.86
COVID19	0.055**	0.015	3.67	0.010**	0.002	5.00
COVID19_OPEF	-0.127**	0.03	-4.23	-0.023**	0.005	-4.60

Note: ** p < 0.01, * p < 0.05.

Intercept (C) for both ROE and ROA: Positive and significant, consistent with previous models, indicating inherent profitability without other factors. CPTL for ROE is negative and statistically significant. However, ROA is insignificant, as seen in previous models. DEP for ROE and ROA: Not statistically significant, indicating less impact on profitability than initially assumed. OPEF for ROE and ROA is still highly negative and significant, suggesting that inefficiency harms profitability. As with prior studies such as [Al-Homaidi et al. \(2020\)](#) operational efficiency is a critical determinant of bank profitability. SIZE for both ROE and ROA: Consistent with previous models, negative and statistically significant, indicating a decline in profitability with increasing size.

Both country-specific variables (GDP and INF) are insignificant, reinforcing that these macroeconomic factors have a limited direct impact on bank profitability. COVID19 for both ROE and ROA at this time is statistically significant for both ROE and ROA, showing a direct impact.

COVID19_OPEF for both ROE and ROA is negative and highly statistically significant, suggesting that COVID-19 amplifies the negative impact of operational inefficiency on bank profitability, so Hypotheses H3 will be accepted.

COVID-19 shows a significant direct impact, perhaps indicating the substantial role of operational efficiency during a crisis. This model emphasizes how crucial operational efficiency is during a crisis like COVID-19, echoing the urgency of maintaining efficient operations. The significant interaction term suggests that the effect of COVID-19 is conditional on how efficiently a bank operates. During the pandemic, inefficiencies become even more costly, making this an essential area for managerial focus.

In summary, Model 4 adds to the existing literature by emphasizing the conditional nature of the impact of COVID-19 on bank profitability. This specific interaction with operational efficiency provides crucial insights for bank managers and policymakers.

In summary, COVID-19 appears to have a varying moderating effect depending on the variable in question. It amplifies the negative effects of capital ratios and operational efficiency on profitability, while its moderating impact on bank deposits and SIZE is insignificant. This insight is crucial for management and policymakers, as it suggests that certain features of a bank's structure and operations may become more crucial during crises.

4.6. Model 5 Bank Profitability Determinants taking COV_SIZE as Moderators

Table 7 incorporates COVID-19 as a moderator and another interaction term between COVID-19 and bank size (COV_SIZE) for measuring the impact on ROE and ROA. Including these variables aims to capture the influence of the pandemic on profitability and how this effect may vary with bank size.

Table 7. Regression analysis results taking COV19_SIZE as a moderator.

Variable	ROE			ROA		
	Coefficient*	Std. error	t-statistic	Coefficient*	Std. error	t-statistic
C	0.196**	0.066	2.97	0.029**	0.011	2.64
CPTL	-0.195**	0.041	-4.76	-0.001	0.007	-0.24
DEP	0.035	0.02	1.75	0.005	0.003	0.25
OPEF	-0.067**	0.004	-16.75	-0.010**	0.001	-2.5
SIZE	-0.015*	0.006	-2.5	-0.003*	0.001	-0.50
GDP	0.000	0.000	0.180	-0.000	0.000	-0.08
INF	-0.000	0.000	-0.590	-0.000	0.000	-0.50
COVID19	0.018	0.806	0.02	0.017	0.138	0.12
COV19_SIZE	-0.003	0.095	-0.03	-0.002	0.016	-0.13

Note: ** p < 0.01, * p < 0.05.

The intercept in the ROE equation exhibits high significance, indicating a notable rise in inherent profitability. Furthermore, the significance of ROA is even more pronounced. CPTL for ROE is more negative and significant than in Model 1. In contrast, it is insignificant for ROA, as in the model these results are aligned with previous models, emphasizing that higher capital ratios might hurt profitability, especially in crisis times.

DEP for both ROE and ROA is positive but has slightly lower coefficients than in Model 1. OPEF for ROE and ROA remained the same as in Model 1, which is highly significant and negative, where lower efficiency correlates with lower profitability; along the same lines, SIZE for both ROE and ROA is negative and now more significant than in Model 1.

Country-specific variables (GDP and INF) for both ROE and ROA remain insignificant, as in Model 4. Also, COVID19 for both ROE and ROA is insignificant, suggesting that COVID-19 alone does not directly impact profitability as with prior studies such as Katusiime (2021).

COV_SIZE for both ROE and ROA is insignificant, indicating that the pandemic's impact does not significantly vary with the size of the bank, so H4 will not be accepted. Though we did not find a significant impact, this is a fresh perspective compared to studies like Haider and Mohammad (2022) that looked at COVID-19's direct impact, implying that, despite the global pandemic, the primary drivers of bank profitability have not changed significantly or that the pandemic has had a uniform impact on banks of all sizes in Saudi Arabia.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The research aimed to explore how various bank-specific and country-specific variables influence the profitability of the banking sector in Saudi Arabia, with a particular focus on the moderating effects of the COVID-19 pandemic. The research utilized five different models to examine how ROA (Return on Assets) and ROE (Return on Equity) were affected by Capital Ratio (CPTL), Operating Efficiency (OPEF), Bank Deposits (DEP), Bank Size (SIZE), Real GDP Growth Rate (GDP), and Inflation Rate (INF), while also considering the moderating role of COVID-19. Our empirical analysis indicates that bank-specific variables, such as CPTL and OPEF, have a significant inverse relationship with profitability measures like ROA and ROE. SIZE also negatively correlated with profitability, emphasizing the scaling inefficiencies. Regarding country-specific variables, GDP and INF showed less direct correlation but still have implications for the broader economic context. Most intriguingly, the research found that the COVID-19 pandemic is a significant moderator, particularly between Operating Efficiency and ROA and ROE.

Given the findings of our research, the following recommendations are proposed:

1. Bank Size (SIZE): Institutions should assess their scaling strategies critically. Our research suggests that an increase in size can negatively affect profitability, highlighting the importance of growth that is both sustainable and efficient.
2. Capital Ratio (CPTL): Financial institutions should strive to maintain an optimal capital ratio. A high capital ratio negatively impacted both ROA and ROE, particularly during the pandemic.
3. Bank Deposits (DEP): Banks should work on deposit mobilization strategies that are not just focused on volume but also on cost-effectiveness, given that deposits have a less straightforward impact on profitability.
4. Operating Efficiency (OPEF): The research underscores the need for banks to improve their operational efficiency, especially during crises like COVID-19, to sustain profitability levels.
5. COVID-19 Preparedness: Given that the pandemic moderates various relationships between bank-specific variables and profitability, banks must have a pandemic preparedness plan that can adapt to these changing dynamics.
6. Future Research: Considering the moderating effect of COVID-19 on these relationships, further research can help understand how different types of crises may have similar or different moderating effects.

These recommendations offer a structured way forward for both banking institutions and policymakers. Adopting these suggestions could make the financial system more resilient and better prepared for future challenges.

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