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The Impact of Capital Adequacy and Operating Efficiency on Saudi Banks Performance

Khaled Subhi RAJHA¹

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Abstract

This study investigates the impact of capital adequacy and operating efficiency on the performance of Saudi banks. In the first part, the study includes a brief introduction focused on the impact of capital adequacy and operating efficiency on the performance of banks. In the second part, a literature review examined various studies on the impact of capital adequacy and operating efficiency on banks' performance. The study methodology was presented in the third part, based on a sample that included all local Saudi banks from 2010 to 2021, using a study model to answer the study hypotheses. The results of the panel data regression indicated that CAR had a negative and significant effect on ROA and ROE but a negative and non-significant effect on NIM. CIR has a negative and significant effect on ROA, ROE, and NIM, while SIZE, LTD, and MS have a positive and significant effect on ROA, ROE, and NIM. Elimination of defects has no significant effect on return on assets, return on equity, and the NIF. But CR has no significant effect on ROA and ROE but has a positive and significant effect on NIM.

Keywords: Capital Adequacy, Operating Efficiency, Performance, Saudi Banks

JEL Classification Code: G21, G24, G29

1. Introduction

The banking sector contributes to the development of economic growth. As an intermediary, banks mobilize savings from surplus units and direct them to the deficit units through credit facilities. Like any other type of firm, banks need a minimum level of capital. Capital is an essential component in the banking industry, and all banking regulators worldwide give special attention to bank capital. This is because banks are considered highly leveraged companies and rely heavily on deposits, constituting about 90% of the bank's sources of funds. Thus, banks need to maintain a minimum level of capital that enables them to absorb any unexpected loss and protect the depositors' funds. Antwi (2019) stated capital adequacy is essential in the banking industry. Banks should

have sufficient capital to face their daily needs, finance the bank's expansion, protect depositors' funds, and achieve the bank's sustainability.

The Saudi Central Bank (SAMA), the regulatory body of Saudi banks in Saudi, directed banks to comply with the Basel Committee on Banking Supervision standards to ensure stricter capital guidelines. The minimum capital adequacy ratio determined by SAMA for Saudi banks is 8%, lower than the minimum level stated by Basel III of 10.5%. On the other hand, bank efficiency is considered a crucial financial factor affecting performance. Bank efficiency is one of the main determinants of bank profitability because higher efficiency can generate more revenue by providing competitive products at reasonable prices (Rabbani et al., 2022; Nguyen & Nguyen, 2020).

Traditionally, operational efficiency for the banking sector is measured by the cost-to-income ratio (CIR), which is the bank's operating costs as a proportion of its total income. The lower the CIR, the more efficient the bank is. CIR represents an important indicator for investors because it reflects the efficiency of the bank's management in reducing bank operating cost and maintaining it within an acceptable level compared to bank income. Operational efficiency, measured by CIR, directly and significantly affects bank performance. To increase the performance, it is necessary to increase the

¹First Author and Correspondent Author. Assistant Professor, Department of Business Administration and Finance, Imam Mohammad Ibn Saud Islamic University, Saudi Arabia. [Postal Address: Al Thoumamah Road, Riyadh 11564, Saudi Arabia] Email: ksrajha@imamu.edu.sa; rajhakhale44@gmail.com

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efficiency of the bank's management, that is, the reduction of operating costs (e.g., administrative expenses, wages, and salaries, etc.) and increase gross income (revenues) (Neves et al., 2020). The relationship between capital adequacy, operating efficiency, and bank performance has attracted a great deal of research papers. However, the findings of the existing literature show different and inconsistent results concerning the relationship between capital adequacy, efficiency, and banks' performance.

Accordingly, this study has been conducted to investigate the effect of capital adequacy and operating efficiency on the performance of Saudi banks. More specifically, it examines the effect of capital adequacy ratio, cost-to-income ratio, bank size, credit growth, loan-to-deposit ratio, debt-to-equity ratio, and market share on the performance of Saudi banks. The remainder of this study is organized as follows: Section two presents the related literature, and Section three describes the research methodology, including sample, estimation method, hypothesis, and measurement of variables. Section four presents Data Analysis and Interpretation; the final section contains the conclusion.

2. Literature Review

Many previous studies investigated the effect of capital adequacy and efficiency on bank performance. Several studies have found a positive effect of capital adequacy on bank performance (Goddard et al., 2004; Pasiouras & Kosmidou, 2007). While other studies have found a negative effect of capital adequacy on bank performance. On the other hand, Căpraru and Ilnatov (2015) found that the cost negatively influences banks' profitability to income ratio. While Ikpefan (2013) reported that the capital adequacy ratio and the efficiency of the management have a negative impact on profitability.

Alamri and Almazari (2021) investigated the effect of efficiency and liquidity on the profitability of Saudi commercial banks. They used five dependent variables to measure profitability: return on assets, return on equity, operating profit, net interest margin, and net interest income ratio. While they used four independent variables that represent bank efficiency and liquidity, including the cost to income, loans to total assets, total customer deposits to total assets, and loans to deposits. Based on a sample of 12 Saudi banks during the period 2014–2020, they found that the cost-to-income ratio and loans to total assets ratio significantly affect the profitability of the Saudi commercial banks.

Dao and Nguyen (2020) examined the determinants of capital adequacy ratio and banks' performance using a sample of 16 Vietnamese commercial banks from 2010 to 2017. They used two dependent variables, CAR and ROE. The independent variables included ROA, Tobin Q, Credit

growth, GDP growth, equity to deposits, loans to deposits, bank size, the cost to income, liquidity risk, loan loss provision, nonperforming loans, and inflation. The results indicated that the capital adequacy ratio and banks' performance have statistically significant relationships. While credit growth, GDP growth, equity-to-deposit ratio, and cost-to-income ratio significantly affect the two dependent variables. The findings suggested that commercial banks should control the respective elements to maintain adequate capital and create an effective performance.

Abdelqader et al. (2020) examined the effect of the capital adequacy ratio and the cost-to-income ratio on the financial performance of local Kuwaiti banks measured by return on assets and return on equity. They used a sample of Kuwaiti banks listed on the Kuwaiti stock market from 2009 to 2018. The results indicated that the capital adequacy ratio has a positive impact on each return on assets and return on equity. While the cost-to-income ratio has a negative impact on both return on assets and returns on equity of local Kuwaiti banks.

Antwi (2019) examined the relationship between capital adequacy, cost-income ratio, and the performance of banks in Ghana. He used a sample of banks listed on the Ghana Stock Exchange from 2013 to 2018. The study found that capital adequacy is negatively related to performance, as measured by return on assets (ROA) and equity (ROE). However, it was insignificant against return on assets but significant in the case of return on equity. The study also revealed that the cost-income ratio negatively correlates with ROA and ROE. The study indicated that total equity debt is negatively related to ROA and ROE, bank size has a negative relationship with performance, and asset growth has a positive relationship with both ROA and ROE.

Chalise (2019) examined the impact of capital adequacy and cost-income ratio on the performance of Nepalese commercial banks. The study used a sample of 10 commercial banks operating in Nepal from 2007/8 to 2016/17. The dependent variable was return on assets which measures bank performance, while the independent variables were bank size, Debt-equity ratio, cost-income ratio, equity ratio, and capital adequacy. The results revealed that capital adequacy and cost-income ratio have negative and significant effects on banks' performance, whereas equity ratio has a positive and significant effect on bank performance. Debt-equity ratio and bank size haven't any significant impact on bank performance.

Reviewing the available literature on the effect of capital adequacy and cost-income ratio on bank performance reveals that the relationship has not been conclusive, and some researchers have reported positive, while others found a negative relationship. This study adds to the existing literature in several ways. First, the current study is conducted to assess this relationship in the context of the Saudi banking

sector with special attention on the last ten years, which has gained monumental attention among regulators and policymakers, especially after introducing and implementing the regulatory reform of Basel III.

Second, this study used capital adequacy, cost-income ratio, other explanatory variables, and new variables that haven't been used by previous studies, such as market share, to examine their effect on the widest measures of banks' performance through a quantitative approach.

Finally, the study's findings are expected to help academicians, practitioners, industry experts, and regulators better understand the performance of Saudi banks.

3. Research Methodology

3.1. Research Design

This study adopted descriptive research because it is purely quantitative research and deals with the impact of capital adequacy and operating efficiency on the performance of Saudi banks. Moreover, descriptive research aligns with the deductive approach and positivist paradigm.

3.2. Sampling

To investigate the effect of capital adequacy and cost-to-income ratio on the performance of Saudi banks, we have used the annual reports of the Saudi banks to get bank-level information on all the variables used in the study.

As of June 2022, the number of Saudi local banks listed on the Saudi Exchange stood at 10 banks, namely; Saudi National Bank, Al Rajhi Bank, Riyadh Bank, The Saudi British Bank, Arab National Bank, Alinma bank, Banque Saudi Fransi, Saudi Investment Bank, Bank AlJazira and Bank AlBilad.

This study used a sample comprising all Saudi local banks from 2010 to 2021. Accordingly, we obtained balanced cross-sectional data (panel data) comprising 120 bank-year observations for the sample banks. The total number of observations used in this study reached 120 balanced observations. The secondary data was obtained from the annual reports of respective sample banks.

3.3. Estimation Equation

This study used a similar estimation equation to that used in previous studies, which aimed to examine the impact of capital adequacy and cost-to-income ratio on banks' performance. These studies include Dao and Nguyen (2020), Antwi (2019), Chalise (2019), and Rahman et al. (2021).

Based on the above, and to examine the effect of capital adequacy and operating efficiency on the performance of Saudi banks, we developed the following general regression model:

$$\text{PERF}_{i,t} = f(\text{CAR}_{i,t}, \text{CIR}_{i,t}, X_{i,t}, \varepsilon_t)$$

Where;

$\text{PERF}_{i,t}$ = a measure of performance for bank i at time t . the study will use three measures of banks' performance, namely, return on assets (ROA), return on equity (ROE), and net interest margin (NIM).

$\text{CAR}_{i,t}$ = capital adequacy ratio of bank i at time t .

$\text{CIR}_{i,t}$ = cost to income ratio for bank i at time t .

$X_{i,t}$ = a vector of control independent variables that may affect bank performance.

ε_t = error term.

Based on the above equation, we can rewrite the study model as follows:

$$\begin{aligned} \text{PERF}_{i,t} = & \beta_0 + \beta_1 \text{CAR}_{i,t} + \beta_2 \text{CIR}_{i,t} + \beta_3 \text{SIZE}_{i,t} \\ & + \beta_4 \text{CR}_{i,t} + \beta_5 \text{LTD}_{i,t} + \beta_6 \text{DE}_{i,t} \\ & + \beta_7 \text{MS}_{i,t} + \varepsilon_t \end{aligned}$$

Where;

$\text{SIZE}_{i,t}$ = bank size, measured by the natural logarithm of total assets of bank i at time t .

$\text{CR}_{i,t}$ = credit growth, measured by the annual change in credit facilities of bank i at time t .

$\text{LTD}_{i,t}$ = loan to deposit ratio, measured as the ratio of credit facilities to total deposits of bank i at time t .

$\text{DE}_{i,t}$ = debt to equity ratio, measured as the ratio of total liabilities to total equity of bank i at time t .

$\text{MS}_{i,t}$ = market share, used as a measure of competition, will be measured by the share of bank i at time t from total credit facilities.

3.4. Hypothesis

In this study, the following null hypothesis will be tested:

H01: Capital adequacy ratio (CAR) has no effect on bank performance.

H02: Cost-to-income ratio (CIR) has no effect on bank performance.

H03: Bank size (SIZE) has no effect on bank performance.

H04: Credit growth (CR) has no effect on bank performance.

H05: Loan to deposit ratio (LTD) has no effect on bank performance.

H06: Debt to equity ratio (DE) has no effect on bank performance.

H07: Market share (MS) has no effect on bank performance.

3.5. Measurement of Variables

The study used ROA, ROE, and NIM as measures of bank performance, representing the dependent variables, while it used eight independent variables to examine their effect on bank performance measures. The following section describes the definition of the study variables:

3.5.1. The Dependent Variable: Bank Performance

1. **Return on Assets (ROA):** This rate is the yield or returns on total assets invested in the bank. Alamri and Almazari (2021) stated that ROA portrays the efficiency of management because they obtain results through the assets that banks hold. ROA is calculated by dividing net income by total assets and measures the bank's overall effectiveness in creating profits on the invested funds (Chalise, 2019). Higher ROA indicated higher profitability and better performance.
2. **Return on Equity (ROE):** Return on Equity (ROE) is another measure of bank performance, and it is estimated by dividing net income by total equity. ROE measures the return achieved by the bank's shareholders. Higher ROE means the bank has favorable growth and effectively creates shareholder value (Dao & Nguyen, 2020). nevertheless, high ROE value may indicate low equity and hog level of debt, and thus greater financial leverage.
3. **Net Interest Margin (NIM):** This variable is computed as the difference between interest income and interest expense divided by total assets. This ratio provides relevant information about the operational efficiency of banks. Bahiru (2014) used net interest margin to measure banks' performance evaluation.

3.5.2. The Independent Variables

1. **Capital Adequacy Ratio:** Central banks require banks to hold a minimum level of capital because they are exposed to considerable risks. Banks must have enough capital to cover unexpected losses to keep themselves well-balanced and proactively managed. Thus, they can protect their depositors from unforeseen likelihood and encourage the stability and competence of the financial systems (Saba et al., 2018). The capital adequacy ratio reflects the bank's internal strength, and thus resilience, to face any unexpected losses during a crisis. CAR is calculated by the banks' tier 1 and tier 2 capital ratio to their risk-weighted assets. The ratio determines the banks' ability to meet their liabilities and all kinds of risks such as credit, market, operational, etc. CAR directly affects banks' profitability by determining their expansion (Sangmi & Tabassum, 2010).
2. Nevertheless, the direction of the relationship between the capital adequacy ratio and bank performance cannot be unanimously predicted in advance. For example, Dao and Nguyen (2020) found that CAR had a positive relationship with ROA and a negative one with ROE but had no relation with net interest margin. Many studies by Irawati et al. (2019) reported a positive relationship between the capital adequacy ratio and bank performance. Irawati et al. (2019) suggested that banks with higher capital adequacy will have lower external funding needs and, therefore, higher profitability. Olarewaju and Akande (2016) found a positive relationship between ROA and capital adequacy.
3. On the contrary, other studies argued that a high capital adequacy ratio reflects that the bank follows conservative policies and may ignore some profitable opportunities, negatively affecting bank performance (Goddard et al., 2004). they indicated a negative relationship between capital adequacy ratio and ROA and ROE. We expect a positive impact of CAR on bank performance.
4. **The Cost-to-Income Ratio:** The cost-to-income ratio measures a bank's efficiency and is a benchmarking metric. The ratio is calculated by dividing the operating expenses by the operating income (Mathuva, 2009). The cost-to-income ratio increase reflects the increase in operating costs (e.g., staff cost, rents, and other operating expenses) or the decrease in gross income. The lower the ratio, the more profitable the bank will be. Most previous studies reported that cost to income ratio negatively correlates with bank performance. For example, Dao and Nguyen (2020) found that the cost-to-income ratio significantly affects profitability. Many other researchers, including Antwi (2019) and Chalise (2019), confirmed this relationship. Accordingly, we expect a negative impact of CIR on bank performance.
5. **Bank size (SIZE):** Bank size, measured by the natural logarithm of total assets, is one of the control variables used in analyzing bank performance (Chalise, 2019). Many academic works concluded a positive relationship between bank size and bank performance, such as Halkos and Salamouris (2004), who found that asset volume positively correlated with bank efficiency. Nevertheless, some researchers, such as Brahmaiah (2018), revealed that bank size has no impact on profitability. We expect a positive impact of bank size on bank performance.
6. **Credit growth (CR):** credit growth can be calculated by changing outstanding loans over ending outstanding loans (Dao & Nguyen, 2020). Dang (2019) found that credit growth is an essential driver

of bank performance, indicating that high loan growth caused more significant risks for banks in subsequent years, implying that implementing rapid loan growth strategies makes banks face poor performance. Dang (2019) pointed out that the expansion of the bank's loan portfolio had an insignificant impact on the current performance of banks but had a significant negative impact on subsequent years. Dao and Nguyen (2020) found that credit growth positively affects ROE. While some researchers indicated that credit growth positively influenced the CAR ratio). Based on the above argument, we expect a positive impact of credit growth on bank performance.

7. **The loan deposit ratio (LTD)** is calculated as outstanding loans over outstanding deposits. This ratio indicates the ability of banks to channel third-party funds. It also shows the ability of banks to generate interest from allocating their funds to extend credit and increase bank profitability. The LTD can be used to measure liquidity in the banking industry. Liquidity is the ability of a bank to meet the cash demand with a minimum or no loss. Literature reveals the importance of liquidity in determining a bank's profitability (Edison, 2019). Banks with high LTD are presumed to be riskier.
8. In contrast, low LTD indicates that banks are not maximizing the spread between their costs of funds and interest income, resulting in lower profitability. Sari et al. (2022) found that the loan-to-deposit ratio has a significant and negative effect on the efficiency of commercial banks. Tan et al. (2017) confirmed that liquidity risk has a positive influence on ROA and a negative effect on ROE. Accordingly, we expect a positive impact of LTD on bank performance.
9. **Debt to equity ratio (DE):** DE ratio can be calculated by dividing the total debt by the total equity of a bank. DE ratio measures the extent to which the bank relies on debt to finance its assets. Thus, it reflects the degree of financial leverage (Alamri & Almazari, 2021). Various studies indicated divergent views on the effect of debt to equity ratio on financial performance (Mugun et al., 2019). Alamri and Almazari (2021) found a positive correlation between the debt-to-equity ratio and ROA. We expect that the DE ratio has a positive effect on bank performance.
10. **Market share (MS):** market share is computed by dividing the bank's credit facilities by the total credit facilities granted by all banks in the market. According to Structure-Conduct-Performance (SCP) hypothesis, a bank's performance depends on the market's structure, as fewer banks in the market (thus highly concentrated) lead to less competitive

behavior and higher profits. While the efficient structure (ES) hypothesis argues that the performance of banks increases with their size. This means that an increasing market share of banks and a growing ability to achieve higher profits are linked to market concentration growth (Kočiřov, 2016). The relationship between market share and profitability is probably management research's most widely studied phenomenon. Buzzell (2004) pointed out that most studies found a positive relationship between market share and financial performance. Kočiřová (2016) found a positive relationship between performance indicators and absolute concentration and between efficiency and market share of the banking sector. Accordingly, we expect MS to have a positive effect on bank performance.

4. Data Analysis and Results

This section presents the results of data analysis to examine the effect of capital adequacy, the cost-to-income ratio, and other explanatory variables on the performance of Saudi banks. It includes descriptive statistics for study variables, correlation matrix, and regression analysis. Data analysis was done by using E-views software.

4.1. Descriptive Statistics

The data set comprises three dependent variables and seven independent variables for 10 Saudi banks over 12 years (2010–2021), which produced 120 balanced observations.

Table 1 shows a summary of the descriptive statistics of the study variables. Based on the results of the dependent variables shown in table 1, all Saudi banks in the sample have maintained satisfactory performance during the study period. The sample banks' average return on assets (ROA) from 2010 to 2021 stood at 1.8%, indicating good profitability for the Saudi banks. ROA ranged from 0.78% to 2.26%, with a standard deviation of 0.38%, indicating the differences in bank profitability from year to year and from one bank to another. The average return on equity (ROE) reached 12.6%, confirming the Saudi banks' profitability. ROE ranged from 3.97% to 17.52%, with a standard deviation of 3.67%, indicating the high variances among Saudi banks' profitability. The net interest margin (NIM) for Saudi banks reached 2.92% on average, ranging from 1.63% to 4.90%, with a standard deviation of 0.422%, reflecting the relatively stable NIM during the study period. These results indicate that the overall performance of the Saudi banking sector has remained good during the study period, and interest-based activities have also enabled the banks to earn satisfactory profits. In addition, these results particularly signify the

Table 1: Descriptive Statistics of the Study Variables

	ROA	ROE	NIM	CAR	CIR	SIZE	CR	LTD	DE	MS
Mean	1.834	12.577	2.921	18.486	39.210	10.564	8.962	82.432	7.043	10.000
Median	1.919	13.158	2.896	18.750	38.162	10.692	10.124	83.854	6.927	9.352
Maximum	2.263	17.518	4.896	24.320	56.830	11.850	16.758	98.921	8.233	35.821
Minimum	0.785	3.974	1.631	14.550	30.269	10.293	-0.941	67.171	6.414	2.458
Std. Dev.	0.384	3.672	0.422	3.538	4.218	0.438	5.628	8.749	0.394	4.562
Observations	120	120	120	120	120	120	120	120	120	120
Cross sections	10	10	10	10	10	10	10	10	10	10

efficiency of Saudi banks in managing and utilizing their assets.

The average capital adequacy ratio (CAR) of the sample banks during the period 2010 to 2021 stood at 18.49%, which is more than double the minimum level of (8%) required by the Saudi Central Bank and much higher than the minimum level of (10.5%) required by Basel III Committee. CAR for Saudi banks ranged from 14.55% to 24.32%, with a standard deviation of 3.54%, which implies that Saudi banks are adequately capitalized throughout the study, and all banks are functioning with more capital-to-risk-weighted asset ratio than what is recommended by the regulatory authorities.

The cost-to-income ratio (CIR) for Saudi banks reached 39.21% on average from 2010 to 2021, a sign of good operating efficiency for Saudi banks regarding the cost incurred to earn the income. CIR ranged from 30.27% to 56.83%, with a standard deviation of 4.22%, indicating variances in the operating efficiency of Saudi banks.

Bank size (SIZE) stood at 10.564 logarithms on average and ranged from 10.293 to 11.850, with a standard deviation of 0.438, indicating the considerable differences in the size of Saudi banks. The mean of credit growth (CR) was 8.96% and ranged from -0.94% to 16.76% with a standard deviation of 5.63%, indicating good growth in credit facilities extended by Saudi banks, which may increase banks' income and profitability. The loan deposit ratio (LTD) for Saudi banks was 82.4% on average and ranged from 67.2% to 98.9%, with a standard deviation of 8.75%, which reflects the liquidity risk of Saudi banks. Turning to debt-to-equity ratio (DE), it stood at 7 times on average, indicating that Saudi banks have acceptable leverage. DE ranged from 6.4 to 8.2 times, confirming the acceptable leverage ratio for all banks. Finally, the average market share (MS) stood at 10%, which reflects the normal share for each bank in the sample. However, the maximum share reached 35.8% while the minimum share stood at 2.5%, which may indicate the high concentration and, thus, low competition in the Saudi market.

4.2. Correlation Matrix

Table 2 reveals the Pearson correlation matrix among study variables. The table indicates a positive correlation between the dependent variables, ROA, ROE, and NIM.

On the other hand, we can observe that ROA has a positive relationship with CAR, SIZE, CR, LTD, and DE, while it has a negative relationship with CIR and MS. In addition, ROE has a positive relationship with CAR, SIZE, CR, and DE, while it has a negative relationship with CIR, LTD, and MS. However, NIM has a positive relationship with all independent variables.

The correlations among independent variables are relatively low, thus indicating the absence of multicollinearity among independent variables.

4.3. Regression Analysis

Table 3 reveals the results of panel data regression for the study models that examine the effect of capital adequacy and operating efficiency on the performance of Saudi banks. Panel data was used because the dataset comprises both cross-sectional and time series, including 10 Saudi banks over 12 years (2010–2021).

According to Table 3, the capital adequacy ratio (CAR) negatively and significantly affects ROA and ROE, indicating that the increase in CAR reduces bank profitability. This negative effect may be because the high capital adequacy ratio indicates the bank's conservative policies, thus ignoring some profitable opportunities, negatively affecting bank performance. This finding is similar to the findings of many previous studies, such as Goddard et al. (2004), Antwi (2019), and Chalise (2019). However, the effect of (CAR) on NIM is negative but insignificant, consistent with the findings of (Dao & Nguyen, 2016).

As a measure of a bank's operating efficiency, the cost-to-income ratio (CIR) has a negative and significant effect on ROA, ROE, and NIM, indicating that the increase in the CIR

Table 2: Pearson Correlations Matrix

	ROA	ROE	NIM	CAR	CIR	SIZE	CR	LTD	DE	MS
ROA	1.000									
ROE	0.796	1.000								
NIM	0.491	0.337	1.000							
CAR	0.267	0.243	0.181	1.000						
CIR	-0.282	-0.251	0.032	0.034	1.000					
SIZE	0.249	0.199	0.051	-0.027	0.187	1.000				
CR	0.089	0.064	0.046	0.195	-0.121	0.134	1.000			
LTD	0.126	-0.066	0.192	0.082	0.062	-0.092	-0.176	1.000		
DE	0.273	0.185	0.168	0.126	0.051	0.131	0.184	0.177	1.000	
MS	-0.224	-0.224	0.189	0.046	0.033	0.193	0.205	0.169	0.071	1.000

Table 3: The Results of Regression Analysis

$$PERF_{i,t} = \beta_0 + \beta_1 CAR_{i,t} + \beta_2 CIR_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 CR_{i,t} + \beta_5 LTD_{i,t} + \beta_6 DE_{i,t} + \beta_7 MS_{i,t} + \varepsilon_t$$

Coefficients	Dependent Variables		
	ROA	ROE	NIM
β_0	0.076 (1.112)	0.054 (1.143)	-0.198 (-2.1282)**
CAR	-0.252 (-3.016)***	-0.221 (-2.971)***	-0.043 (-1.3784)
CIR	-0.284 (-3.772)***	-0.236 (-3.318)***	-0.177 (-2.265)**
SIZE	0.304 (3.512)***	0.273 (3.282)***	0.189 (2.271)**
CR	0.098 (1.189)	0.064 (1.171)	0.173 (2.107)**
LTD	0.167 (2.133)**	0.258 (2.235)**	0.241 (2.7165)***
DE	-0.0582 (-1.236)	-0.0371 (-1.119)	-0.014 (-0.1108)
MS	0.238 (2.296)**	0.213 (2.219)**	0.185 (2.118)**
Regression Statistics			
Observations	12	12	12
Cross-Sections Included	10	10	10
Total Pool (Balanced) Observations	120	120	120
R-Squared	0.4942	0.4668	0.4165
Adjusted R-squared	0.4792	0.4447	0.3957
S.E. of Regression	0.0387	0.0416	0.0523
Durbin-Watson Stat	1.9692	1.8825	1.9251
F-statistic	15.4842	11.7585	10.4113
Prob (F-statistic)	0.0000	0.0000	0.0000

White standard errors & covariance (d.f. corrected); Values in parenthesis represent t-statistic; *, ** and *** denotes that the coefficient is significant at 10%, 5% and 1% respectively.

ratio decreases bank profitability. This result is consistent with the findings of many previous studies, such as Antwi (2019), Abdelqader et al. (2020), and Chalise (2019).

The bank size (SIZE) positively and significantly affects ROA, ROE, and NIM. This finding may be explained by the fact that larger banks could capture the potential economies of scale, which is also consistent with the findings of (Chalise, 2019).

Credit growth (CR) has no significant effect on ROA and ROE. This may reflect that the expansion in credit will not affect the current performance of banks but will affect the subsequent years, which is consistent with the findings of Pradhan et al. (2017). However, CR has a positive and significant effect on NIM because extending more loans will increase the interest income and thus increase NIM.

Loan to deposit ratio (LTD) positively and significantly affects ROA, ROE, and NIM, indicating banks' ability to generate interest by allocating their funds to extend credit and increase bank profitability. This result is similar to the findings of Edison (2019).

Debt to equity ratio (DE) has no significant effect on ROA, ROE, and NIM, which confirms the findings of many other studies that indicated divergent views on the effect of debt-to-equity ratio on financial performance (Mugun et al., 2019).

Finally, market share (MS) has a positive and significant effect on all bank performance measures, which means that an increasing market share of banks leads to higher profitability, which is consistent with the findings of many researchers such as Kočišová (2016) and Genchev (2012).

5. Conclusion

The available literature on the effect of capital adequacy and cost-income ratio on bank performance reveals that the relationship has not been conclusive. Some researchers have reported positive, while others found a negative relationship. Accordingly, this study aimed to investigate the effect of capital adequacy and operating efficiency on the performance of Saudi banks. More specifically, it examines the effects of the capital adequacy ratio, the cost-to-income ratio, bank size, credit growth, loan-to-deposit ratio, debt-to-equity ratio, and market share on the performance of Saudi banks.

Based on a sample comprising all Saudi local banks from 2010 to 2021, the results indicated that all Saudi banks had maintained satisfactory performance during the study period, with an average ROA of 1.8%, ROE of 12.6%, and NIM of 2.92%. On the other hand, results indicated that Saudi banks are characterized by a high capital adequacy ratio (18.49%) and good operating efficiency (as the cost-to-income ratio stood at 39.2%). In addition to the large size of the banking sector, good growth in the credit facilities (8.96%), good liquidity (measured by loan to deposit ratio), acceptable leverage (measured by debt to equity ratio), but

high concentration and relatively low level of competition in the Saudi market.

The results of panel data regression indicate that the capital adequacy ratio has a negative and significant effect on ROA and ROE but a negative and insignificant effect on NIM. The cost-to-income ratio (CIR) has a negative and significant effect on ROA, ROE, and NIM, while bank size (SIZE), loan-to-deposit ratio (LTD), and market share (MS) have a positive and significant effect on ROA, ROE, and NIM. The debt-to-equity ratio (DE) does not significantly affect ROA, ROE, and NIM. Credit growth (CR) has no significant effect on ROA and ROE but has a positive and significant effect on NIM.

Therefore, the study recommends banks reduce the excess capital adequacy ratio and the cost of operation to enhance the performance of the Saudi banking sector. Moreover, small banks should extend more credit and become more competitive to increase their market share and profitability.

References

- Abdelqader, M., Almansour, A., & Almansour, B. (2020). The impact of the capital adequacy and cost-to-income ratio on the financial performance of Kuwaiti local banks. *Journal of Xi'an University of Architecture and Technology*, 12(10), 45–64.
- Alamri, A., & Almazari, A. (2021). The effect of efficiency and liquidity on the profitability of the Saudi commercial banks. *European Journal of Accounting, Auditing and Finance Research*, 9(8), 1–13.
- Antwi, F. (2019). Capital adequacy, cost-income ratio and performance of banks in Ghana. *International Journal of Academic Research in Business and Social Sciences*, 9(10), 168–184. <https://doi.org/10.6007/IJARBS/v9-i10/6471>
- Bahiru, W. (2014). *Determinants of capital adequacy ratio of commercial banks in Ethiopia* [Doctoral Thesis, Addis Ababa University]. AAU Institutional Repository. <http://etd.aau.edu.et/handle/123456789/2679>
- Brahmaiah, B. (2018). Factors influencing the profitability of banks in India. *Theoretical Economics Letters*, 8, 3046–3061.
- Buzzell, R. D. (2004). The PIMS program of strategy research. *Journal of Business Research*, 57(5), 478–483. [https://doi.org/10.1016/S0148-2963\(02\)00314-4](https://doi.org/10.1016/S0148-2963(02)00314-4)
- Căpraru, B., & Ilnatov, I. (2015). Determinants of bank's profitability in EU15. *Annals of the Alexandru Ioan Cuza University–Economics*, 62(1), 93–101. <https://doi.org/10.1515/aicue-2015-0007>
- Chalise, S. (2019). The impact of capital adequacy and cost-income ratio on performance of Nepalese commercial banks. *International Journal of Economics and Management Studies*, 6(7), 78–83. <https://doi.org/10.14445/23939125/IJEMS-V6I7P112>
- Dang, V. D. (2019). The effects of loan growth on bank performance: Evidence from Vietnam. *Management Science Letters*, 9(6), 899–910. <https://doi.org/10.5267/j.ms.l.2019.2.012>

- Dao, B. T. T., & Nguyen, K. A. (2020). Bank Capital adequacy ratio and bank performance in Vietnam: A Simultaneous equations Framework. *Journal of Asian Finance, Economics, and Business*, 7(6), 39–46. <https://doi.org/10.13106/jafeb.2020.vol7.no6.039>
- Edison, A. (2019). Capital adequacy ratio, loan to deposit ratio, operational costs on operational income: The influence on return on equity (survey of foreign exchange national private banks listed on the Indonesia stock exchange for 2014-2016). *Journal of Advanced Research in Dynamical and Control Systems*, 11(3), 154–160.
- Genchev, E. (2012). Effects of market share on the bank's profitability. *Review of Applied Socio-Economic Research*, 3(1), 87–94.
- Goddard, J. A., Molyneux, P., & Wilson, J. O. S. (2004). Dynamics of growth and profitability in banking. *Journal of Money, Credit, and Banking*, 36(6), 1069–1090. <https://doi.org/10.1353/mcb.2005.0015>
- Halkos, G. E., & Salamouris, D. S. (2004). Efficiency measurement of the Greek Commercial banks using financial ratios: A data envelopment analysis approach. *Management Accounting Research*, 15(2), 201–224. <http://doi.org/10.1016/j.mar.2004.02.001>
- Ikpefan, O. A. (2013). Capital adequacy, management and performance in the Nigerian commercial bank (1986–2006). *African Journal of Business Management*, 7(30), 2938–2950. <https://doi.org/10.5897/AJBM09.258>
- Irawati, N., Maksum, A., Sadalia, I., & Muda, I. (2019). Financial performance of Indonesian's banking industry: The role of good corporate governance, capital adequacy ratio, nonperforming loan, and size. *International Journal of Scientific and Technology Research*, 8(4), 22–26.
- Kočišová, K. (2016). Market structure and banking sector performance. *Journal of Applied Economic Sciences*, 11(4), 709–719.
- Mathuva, D. M. (2009). Capital adequacy, cost-income ratio and the performance of commercial banks: The Kenyan scenario. *International Journal of Applied Economics and Finance*, 3(2), 35–47. <https://doi.org/10.3923/ijaef.2009.35.47>
- Mugun, W., Odhiambo, S., & Momanyi, G. (2019). Effect of debt-to-equity ratio on the financial performance of microfinance institutions in Kenya. *International Journal of Research and Scientific Innovation*, 6(7), 412–426.
- Neves, M. E. D., Gouveia, M. D. C., & Proença, C. A. N. (2020). European bank's performance and efficiency. *Journal of Risk and Financial Management*, 13(4), 67–79. <https://doi.org/10.3390/jrfm13040067>
- Nguyen, D. D., & Nguyen, A. H. (2020). The impact of cash flow statement on the lending decision of commercial banks: Evidence from Vietnam. *Journal of Asian Finance, Economics and Business*, 7(6), 85–93. <https://doi.org/10.13106/jafeb.2020.vol7.no6.085>
- Olarewaju, O. M., & Akande, J. O. (2016). An empirical analysis of capital adequacy determinants in the Nigerian banking sector. *International Journal of Economics and Finance*, 8(12), 132–142. <https://doi.org/10.5539/ijef.v8n12p132>
- Pasiouras, F., & Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, 21(2), 222–237. <https://doi.org/10.1016/j.ribaf.2006.03.007>
- Pradhan, Radhe and Parajuli, Pratikshya, (2017). Impact of Capital Adequacy and Cost Income Ratio on Performance of Nepalese Commercial Banks. *International Journal of Management Research*, 8(1), 6–18.
- Rabbani, M. R., Kayani, U., Bawazir, H. S., & Hawaldar, I. T. (2022). A commentary on emerging markets banking sector spillovers: COVID-19 vs. GFC pattern analysis. *Heliyon*, 8(3), e09074. <https://doi.org/10.1016/j.heliyon.2022.e09074>
- Rahman, S., Chowdhury, M., & Tania, T. (2021). Nexus among bank competition, efficiency, and financial stability: A comprehensive study in Bangladesh. *Journal of Asian Finance, Economics, and Business*, 8(2), 317–328. <https://doi.org/10.13106/jafeb.2021.vol8.no2.0317>
- Saba, I., Narmeen, S., Kouser, R., & Khurram, H. (2018). Why do banks need an adequate capital adequacy ratio? A study of lending and deposit behaviors of the banking sector of Pakistan. *Journal of Accounting and Finance in Emerging Economies*, 4(1), 1–16. <https://doi.org/10.26710/jafee.v4i1.343>
- Sangmi, M., & Tabassum, N. (2010). Analyzing financial performance of commercial banks in India: Application of CAMEL model. *Pakistan Journal of Commercial Social Sciences*, 4(1), 40–55.
- Sari, S., Ajija, S. R., Wasiaturrahma, W., & Ahmad, R. A. R. (2022). The efficiency of Indonesian commercial banks: Does the banking industry competition matter? *Sustainability*, 14(17), 10995. <https://doi.org/10.3390/su141710995>
- Tan, Y., Floros, C., & Anchor, J. (2017). The profitability of Chinese banks: Impacts of risk, competition, and efficiency. *Review of Accounting and Finance*, 16(1), 86–105. <https://doi.org/10.1108/RAF-05-2015-0072>