Risk Management Practices and Performance: Evidence from Saudi Arabia Companies

Kais Ben-Ahmed[1,2]

[1]Department of Finance, College of Business, University of Jeddah, Jeddah, Saudi Arabia

[2]Department of Management, High Institute of Management, University of Sousse, Sousse, Tunisia; E-mail: benahmedkaies@gmail.com

Abstract: This paper scrutinizes the influence of risk management practices on Saudi financial companies' performance, as measured by accounting metrics, such as return on assets (ROA) and return on equity (ROE). The study focused on Saudi Arabia, an emerging nation, over twelve years (2010–2021). We collected financial and accounting variables data from the annual reports of ten financial companies listed on the Tadawul Stock Exchange in Saudi Arabia. We also obtained unavailable datasets from DataStream and Bloomberg. We followed the existing empirical literature, employed a panel-data approach, and formulated two equations using the Ordinary Least Square (OLS) estimator. The findings of this study revealed that bank size, total deposit, and credit-to-deposit ratio are vital for increasing the performance of Saudi banks. However, capital expenditure authorization negatively affects the performance of Saudi banks. Furthermore, loans have a negative impact on ROA but a positive effect on ROE. We also found that capital (CAP) has no significant association with the performance of Saudi banks in terms of ROE. This research is conducted in a less well-researched area, as limited studies have examined this question in Asian countries. However, like previous studies, it has limitations, such as a small sample size, limited variables, and study years. Future research should expand the sample size and extend the study to the Asian economic context. Better research and literature are much needed to understand the effects of other governance and control variables on financial companies' performance, particularly in emerging markets.

Keywords: Risk management practices, Performance, Panel model, Return on Assets, Return on Equity, Saudi Arabia.

1. INTRODUCTION

Existing literature focuses on studying risk management and financial performance relationships. This topic has raised the attention of many investigations where financial performance provides information about the economy's health and is a crucial determinant of growth and employment (Ongore & Kusa, (2013); Suzuki and Sastrosuwito, (2014); Saeed, (2016)). Using quantitative data analysis and a multiple regression model, Hallunovi and Berdo (2018) showed that risk management negatively impacts the profitability ROA and ROE of commercial banks in Albania. Similarly, Nwude and Okeke (2018) used an ordinary least square regression model to investigate the association between risk management and performing deposit money of banks in Nigeria from 2000 to 2014. The study demonstrated a positive and significant impact of risk management on the return on assets, loans of deposit money banks, and return on equity in Nigeria.

OFOSU-HENE and Amoh (2016) examined whether there is a significant association between risk management and banks in Ghana. To do this, the authors utilize a panel-data approach, and they found evidence that risk management enhances the financial performance of GSE-listed banks. Otieno and Onditi (2016) conducted a Panel data analysis to test whether a significant liaison exists between Risk management and bank performance in Kenya. Based on the system GMM techniques to estimate a multiple regression model, the authors came up with surprising results. In contrast to OFOSU-HENE and Amoh (2016), the authors stated that risk management had a strong negative relationship with returns on assets and equity performance measures.

Ahmadyan conducted a similar study in 2018 on bank performance in Iran. For this purpose, the author uses a panel data method and banks' financial reports for 2005–2017 to investigate risk management's impact on the performance of Iranian banks. As a result, the author showed a significant relationship between risk management and bank survivability. This result implies that liquidity risk decreases banks' capacity to fulfil their expected financial

obligations. At the end of this study, Ahmadyan (2018) concludes that inadequate liquidity risk management diminishes banks' profitability in Iran. In the same way, Saiful and Ayu (2019) studied the influence of risk management, liquidity, and credit on the performing Indonesian banks. Their study covers five years (2012-2016) and includes 26 conventional and 11 Sharia banks in Indonesia. By running multiple regressions, the authors demonstrate that liquidity risk and risk management positively and significantly affect ROA and ROE measures. Meanwhile, the authors also found that operational risk management has a positive and significant relationship with Indonesian banks' profitability.

More recently, Alim et al. (2021) used financial data of all commercial banks operating in Pakistan from 2006 to 2019 retrieved from the State Bank of Pakistan website. Based on the second model of Ibe (2013) and Mwangi (2012), the authors stated that higher liquidity increases financial performance in commercial banks of Pakistan. At the end of this study, the authors conclude that the banking sector's performance significantly affects the country's overall economy.

In 2020, Fadun and Oye conducted a study to explore the impact of risk management practices on the financial performance of commercial banks in Nigeria. Using the Linear Multiple Regression Model, they analyzed ten years (2008-2017) of secondary data extracted from audited financial reports of selected banks in Nigeria. According to their analysis, operational risk management practices significantly affect the financial performance of banks in Nigeria. The authors suggested that banks' management should allocate sufficient resources to apprehend operational risk to ensure proper operational risk management and improved financial performance.

In 2022, Mamari et al. investigated the relationship between risk management and bank financial performance in the Sultanate of Oman, using Structural Equation Modelling (SEM) with Partial Least Square PLS Software. Their study found that risk management significantly impacted the return on assets.

As our area was the context of Saudi Arabia, very few published works deal with the association between risk management and the performance of banks in the Kingdom of Saudi Arabia. Buallay et al. (2017) and Hacini et al. (2021) are the most notable studies. For example, Buallay et al. (2017) are interested in measuring Corporate Governance's (CG) impact on the firm profitability of 171 companies in Saudi Arabia over the 2012-2014 period. The authors used returns on assets and equity and Tobin's Q as measures of firm profitability. The authors also used five control variables to assess the association between CG and firm profitability. The authors conclude that there is no significant impact of CG adoption on the financial performance of firms in Saudi Arabia. Finally, the authors found a significant effect of the board of directors' ownership and size on the performance of firms. Sequel to this, Hacini et al. (2021) are interested in examining how liquidity risk management affects the profitability of banks in Saudi Arabia. As in previous studies, the authors used return on equity to indicate financial performance from 2002-2019. However, liquidity risks are measured with the loan-to-deposit ratio (LTD) and cash-to-deposit ratio (CTD). As the method of their study, the authors utilize the panel regression approach for testing the study hypothesis. As econometric results, the authors support that liquidity risk significantly negatively impacts the performance of banks in Saudi Arabia.

According to the significant role of risk management throughout the years in the loan process in the banking sector, this paper is interested in investigating the impact of risk management on the financial performance of banks. In particular, it examines factors and characteristics affecting bank performance in an emerging country, namely Saudi Arabia. To the best of our knowledge, this study is new to be applied in the Saudi Arabian context by examining the relationship between management practices and their impacts on banks' performance. Therefore, this study is the first to address financial risk management and Saudi banks' performance association using panel regression estimates. It is the first direct empirical study to examine the relationship between risk management and bank profitability in Saudi Arabia. It makes it a unique contribution outside the US and European markets.

Collectively, this study seeks to understand how governance variables moderate that relationship. It contributes to the corpus of information on the influence of risk management on Saudi banks' performance. The study's shortcomings include its small sample of Saudi banks and its concentration on the problem of risk management

practices in Saudi banks and their influence on bank performance.

The remainder of the paper is organized as follows—section 2 describes data sources and details the method used. Section 3 presents and discusses the main empirical results, while Section 4 draws the paper's main conclusions.

2. MATERIEL AND METHODS

2.1. Data Sources

According to the Saudi Arabian Monetary Agency, the study data set includes ten banks listed on the Tadawul Stock Exchange in Saudi Arabia. These include AlRiyadh Bank, Eldjazira Bank, Saudi Elfiransi Bank, Arabi Elwatani Bank, Elbiled Bank, Saudi Istithmar Bank, Saudi Britani Bank, AlRajhi Bank, Samba Bank, and Inmae Bank. It is noticeable that this study excluded all unlisted banks in Saudi Arabia. Therefore, annual reports of the selected banks were retrieved from annual reports and sourced from the official websites of each bank (Lipunga, 2014; Barakat & Hussainey, 2013). We collected unavailable datasets from DataStream and completed them from Bloomberg. This study comprises a period of twelve years, from 2010 to 2021. This investigation uses annual reports because of their comprehensive coverage and availability, and they are the primary source of information (Barakat & Hussainey, 2013; Elshandidy & Neri, 2015). The final study sampled the data of 120 listed banks in Saudi Arabia from 2010 to 2021, which Microsoft Excel manages and kindly provided for the present study.

2.2. Variables Defined

We conducted this study on an unbalanced panel of 10 Saudi-listed banks covering 2010 to 2021. The dependent variable is firm performance. Following the existing empirical literature, we employ accounting and market data to gauge the firm's performance. Therefore, return on assets (ROA) and equity (ROE) were used to quantify financial and economic performance, respectively. The study applies a panel model approach to the data from 2010 to 2021, resulting in 120 observations. We formulate two equations using the ordinary least square regression to assess the connection between variables. As independent and control variables, we have retained the following variables. Bank size (Size), capital expenditure authorization (CEA), time deposit (TD), nonperforming loan (NPL), and credit-deposit ratio (CD), while for the control variables, we have considered Gross Domestic Product (GDP) and Inflation (Inf). For more details, see Table 1.

Table 1: Measurement of used variables in the analysis

Variable name	Abbreviation	Operationalization
Dependent variables		
ROA	Return on Assets	Return on Assets expresses the profitability of all a bank's assets (Net income / Total Assets).
ROE	Return on Equity	Return on Equity (Net income / Average shareholders' equity).
Independent variables		
BS	Bank size	Size of the bank (proxied by the bank's total assets)
CEA	Capital Expenditure Authorization	The weight of operating expenses compared to total assets (Operating expenses / total assets).
TD	Total Deposit	This includes demand deposits and term deposits (Total deposits / total assets)
NPL	A non-performing loan	Bank loans that are subject to late repayment or are unlikely to be repaid by the borrower (Credit nonperformance / Total loans)
CD	The credit-to-deposit ratio	Indicator of liquidity risk management (total credits / total deposits).
CAP	Capital of Bank.	A measure of the resource's banks has to absorb losses.
Control variables		
GDP	Gross Domestic Product	The monetary value of all finished goods and services made within a country during a specific period.
INF	Inflation	Captures the impact of price volatility on a bank's profitability.

Table 2 reports the data's main descriptive statistics and the variables' trends. As shown in Table 2, the dependent variable, net return, represents 4.62% of total assets (mean = 0.0462). The standard deviation is low, equal to 1.54%. One might support that there is no significant difference between Saudi banks in ROA. The ROE represents 13.11% of total assets (mean = 0.1311), while the standard deviation is high (6.96%). Regarding governance variables, our data shows that BS (mean = 14.8522, Std. Dev = 1.1345), CAP (mean = 0.3136, Std. Dev = 33.06%), CD (mean = 11.2519, Std. Dev = 1.4467), and TD (mean = 0.3664, Std. Dev = 12.53%) present a high standard deviation. Thus, there is a big difference between Saudi banks in size, between Saudi banks in capital, between Saudi banks in footings of CD, and between Saudi banks in terms of deposits. However, CEA and NPL present an average of 19.11% and 9.72%, respectively. Their standard deviations are low, about 1.11% and 7.32%, respectively. Therefore, there are no significant differences between Saudi banks regarding CEA and NPL. As for the control variables, the average economic growth was 2.91% in the study period 2010-2021. The standard deviation for economic growth in Saudi Arabia is low, at 2.17%. There is no significant difference in economic growth between years, excluding during 2020 after COVID-19, when there was a drop. The average inflation rate is 3.66%, with a minimum of 1.32% and a maximum of 8.15%. The standard deviation for inflation is also low, at 2.9%. There was no significant difference in inflation between years; Saudi Arabia's inflation rate remained unchanged during the study period 2010-2021 and even during COVID-19 (2020-2021).

Table 2: Summary Descriptive Statistics (2010 —2021)

Variables	Obs.	Min.	Max.	Mean	Std. Dev.	Prob.	Skewness	Kurtosis
ROA	120	0.0000	0.0852	0.0462	0.0154	0.0211	1.5153	5.0921
ROE	120	0.0000	0.2871	0.1311	0.0696	0.0515	2.2177	7.8371
BS	120	10.3341	19.4493	14.8522	1.1345	0.0031	2.1398	7.1013
CEA	120	0.0000	0.6633	0.1911	0.0111	0.0417	0.6121	3.2924
TD	120	0.0511	0.7270	0.3664	0.1253	0.3182	1.7594	5.3376
NPL	120	0.0377	0.1955	0.0972	0.0732	0.0611	0.9902	2.1543
CD	120	0.1446	31.5541	11.2519	1.4467	0.0055	3.5638	8.3915
CAP	120	0.0000	0.7879	0.3136	0.3306	0.0000	1.8671	6.2124
GDP	120	0.0000	0.0931	0.0291	0.0217	0.0822	2.6635	8.0113
INF	120	0.0132	0.0815	0.0366	0.0290	0.0711	0.8113	1.9905

The preliminary tests are conducted to avoid multicollinearity, which means a robust correlation between the various independent variables. Table 3 reports Pearson's rank correlation matrix and the variance inflation factor (VIF) to determine the strength and association among variables. According to Bryman and Cramer (2001), multicollinearity occurs when the correlation between two independent variables is high and exceeds 80%. As shown in Table 3, the highest correlation values with the variable's TD and CAP (62.3% and 71.8%, respectively) indicate no multicollinearity problem between the study variables. Also, Table 3 shows that the variance of information factor (VIF) values ranges between 1.01 and 2.63, much lower than the 10-cutoff point of Greene (2000). Consequently, there is no multicollinearity concern in our study's model.

Table 3: Pearson's Rank Correlation Matrix and Variance Information Factor (2010 —2021)

Variables	ROA	ROE	Size	CEA	TD	NPL	CD	CAP	GDP	INF
ROA	1.000									
ROE	0.223	1.000								
BS	0.041	0.332	1.000							
CEA	0.066	−0.021	0.157	1.000						
TD	−0.011	0.147	0.623	−0.067	1.000					
NPL	−0.032	−0.176	−0.051	−0.046	−0.087	1.000				
CD	0.245	−0.198	−0.297	0.113	−0.441	−0.079	1.000			
CAP	0.131	−0.215	−0.396	−0.097	0.718	−0.056	0.473	1.000		
GDP	0.097	−1.194	−0.261	−0.038	−0.113	0.115	0.072	0.049	1.000	
INF	0.073	0.037	0.102	0.079	0.058	−0.054	−0.029	−0.037	−0.266	1.000
VIF	1.45	1.13	1.73	2.63	1.55	2.12	1.01	1.24	1.44	2.31

2.3. Models' specification

We employ two-panel regression models to determine the influence of financial risk management on Saudi Banks' profitability.

$$ROA_{it} = \alpha_0 + \alpha_1 BS_{it} + \alpha_2 CEA_{it} + \alpha_3 TD_{it} + \alpha_4 NPL_{it} + \alpha_5 CD_{it} + \alpha_6 CAP_{it} + \alpha_7 GDP_{it} + \alpha_8 INF_{it} \\ + \varepsilon_{it} \tag{1}$$

$$ROE_{it} = \beta_0 + \beta_1 BS_{it} + \beta_2 CEA_{it} + \beta_3 TD_{it} + \beta_4 NPL_{it} + \beta_5 CD_{it} + \beta_6 CAP_{it} + \beta_7 GDP_{it} + \beta_8 INF_{it} + \varepsilon_{it} \tag{2}$$

Where $\alpha_0 \ and \ \beta_0$ represent intercepts, i = 1, …, 10, and $t = 2010,…,2021$ count bank i and time t. $\alpha_k \ (k = 1, …, 8)$ and $\beta_k \ (k = 1, …, 8)$ covariate effects parameters to be estimated, assessing the effect of ROA and ROE, respectively. We test the following hypothesis:

H_1: Bank size (BS) significantly affects Saudi bank profitability.
H_2: Capital Expenditure Authorization (CEA) significantly affects Saudi bank profitability.
H_3: Deposits (TD) significantly affect Saudi bank profitability.
H_4: Loans (NPL) significantly affect Saudi bank profitability.
H_5: The credit-to-deposit ratio (CD) significantly affects Saudi bank profitability.
H_6: Capital (CAP) significantly affects Saudi bank profitability.
H_7: Economic growth (GDP) significantly affects Saudi bank profitability.
H_8: Inflation (INF) significantly affects Saudi b²ank profitability.

To this end, this study utilizes the panel data technique to assess the connection between variables in Saudi Arabia.

3. RESULTS AND DISCUSSIONS

This study scrutinizes the impact of financial risk management on Saudi Banks' profitability, usually measured by accounting measures, namely return on assets (ROA) and return on equity (ROE). Using Stata statistical software (version 16), the estimates obtained from the panel regression models (1) and (2) are displayed in Table 4. The findings of this study indicate several causes affecting Saudi banks' performance. These outcomes suggest a positive association between Saudi Bank's performance for ROA and ROE and governance variables, except for NPL, which negatively affects ROA. This result proves that as BS, CEA, TD, CD, and CAP increase, ROA increases, too.

In more detail, Table 4 shows a significant positive association between BS ($\alpha_1 = 2.62\%, p = 0.0263$) at the 5% level. This study suggests that banks with large sizes may experience cost savings and benefits by diversifying their operations (Menicucci & Paoulucci, 2016). This result is in line with the result found by Serwadda (2018) but controversial to the result found by Athanasoglou et al. (2008). We found a similar result with ROE ($\beta_1 = 2.33\%, p = 0.0021$) at the 5% level. This result was supported by Topak and Talu (2017), Abobakr and Elgiziry (2017), and Bogale (2019). We support our first hypothesis (H_1), indicating that a strengthening in BS leads to a higher ROA and ROE.

Concerning the governance variables, consistent with previous findings in the literature (Athansoglou et al. (2008) and Kosmidou et al. (2012)), our results show a negative association between CEA and ROA ($\alpha_2 = -5.13\%, p = 0.0000$) at the 1% level. Therefore, if CEA increases by 1%, ROA will reduce by 5.13%. In addition, the increase in operating expenses hurts the ROE ($\beta_2 = -8.41\%, p = 0.0105$) at the 5% level. Thus, an increase in CEA by 1% leads to a decrease in ROE by 8.41%. As a result, the increase in operating costs harms bank return on equity, supporting the prediction of our second hypothesis (H_2) that CEA decreases Saudi banks' performance.

The findings also indicate that TD influences ROA levels ($\alpha_3 = 3.24\%, p = 0.0008$) at the 1% level. In addition, our study found that CEA significantly impacts ROE levels, with positive and significant TD values (at the 5% level). In this regard, an increase in CEA by 1% results in a 3.24% increase in ROA and a 9.73% increase in ROE levels. Therefore, our third hypothesis (H_3) was supported.

We find a significant negative coefficient of α_4, ($\alpha_4 = -11.19\%, p = 0.0144$) at the 1% level, suggesting a significant negative impact of NPL on ROA. As NPL increases by 5%, ROA decreases by 11.19%. This result implies that an increase in nonperforming credits negatively impacts the Saudi banks' return on assets. This result aligns so found by Konde et al. (2018). If the NPL grows higher, this leads to a lower Saudi banks' performance. Similarly, a significant negative association at the 5% level was found between NPL and ROE ($\beta_4 = -3.49\%, p = 0.0123$). One might, therefore, support that if NPL increases by 5%, ROE will decrease by 3.49%). Overall, H_4 states that nonperforming credits significantly negatively impact ROE in Saudi banks. This result was supported by (Besmir and Aliu, 2021).

Moreover, the CD significantly positively affects ROA ($\alpha_5 = 6.28\%, p = 0.0441$) at the 5% level. An increase in CD by 1% leads to a corresponding 6.28% increase in ROA. This finding is in line with the results of Hadian et al. (2021). Similarly, we have observed a significant positive correlation between CD and ROE ($\beta_5 = 2.47\%, p = 0.0177$) at the 5% level. It means that an increase in credits by deposits results in a higher return on equity for Saudi banks. According to H5, CD has a positive effect on ROA. This is evidenced by the count of 6.28% with a significant value of 0.0441, which is well less than 0.05; therefore, H5 is accepted.

Based on the study, this study assumes a significant positive correlation exists between ROA and CAP ($\alpha_6 = 4.21\%, p = 0.0115$). However, CAP seems to have an insignificant relation to ROE ($\beta_6 = 3.82\%, p = 0.4411$). Therefore, an increase of 1% in CAP will lead to an increase of 4.21% in ROA. These findings are consistent with the previous study conducted by Dhouibi (2013), which also found that CAP was significantly related to banks' performance. To summarize, the hypothesis (H5) was accepted for ROA but rejected for ROE.

Table 4: The Impact of financial risk management on Saudi Banks' performance (2010 —2021)

Variable	Model — ROA			Model — ROE		
	Coefficient	Pr. > t	Information	Coefficient	Pr. > t	Information
$C(\alpha_0, \beta_0)$	−0.0531	0.0440**	Significant effect (Negative direction)	−0.0773	0.0050***	Significant effect (Negative direction)
BS	0.0262	0.0263**	Significant effect (Positive direction)	0.0233	0.0021***	Significant effect (Positive direction)
CEA	−0.0513	0.0000***	Significant effect (Negative direction)	−0.0841	0.0105**	Significant effect (Negative direction)
TD	0.0324	0.0008***	Significant effect (Positive direction)	0.0973	0.0148**	Significant effect (Positive direction)
NPL	−0.1119	0.0144**	Significant effect (Negative direction)	−0.0349	0.0123**	Significant effect (Negative direction)
CD	0.0628	0.0001***	Significant effect (Positive direction)	0.0247	0.0177**	Significant effect (Positive direction)
CAP	0.0421	0.0115**	Significant effect (Positive direction)	0.0382	0.4411	No effect
GDP	0.0061	0.0006***	Significant effect (Positive direction)	−0.1039	0.0941*	Significant effect (Negative direction)
INF	0.1281	0.0175**	Significant effect (Positive direction)	−0.0217	0.0706*	Significant effect (Negative direction)

Note: The codes in the p values' columns ***, **, and * mean the coefficients are significant respectively at 1%, 5%, and 10%.

In our study of Saudi banks, we discovered a significant finding regarding the impact of control variables on Saudi Banks' performance, which differs depending on the measured variable (ROA and ROE). Our analysis showed that while GDP and INF have a positive and significant association with ROA, they have a negative and statistically significant association with ROE. This finding supports the arguments put forth by earlier studies. (See, for example, Almansour et al. (2021); Ebrahimi et al. (2021)).

Of note, neither the CAP nor INF variables significantly influence firm performance when measured from an ROE perspective. These results support our hypotheses (H7) and (H8), which show that GDP and INF significantly and positively influence ROA at a 5% significance level. However, the control variables (GDP and INF) significantly and negatively influence ROE at 10%.

4. CONCLUSIONS

At the end of these analyses, the results of this study show that several factors affect the performance of Saudi banks. Panel regression models (1) and (2) indicate that bank size, total deposit, and credit-to-deposit ratio are essential for improving Saudi banks' performance. However, capital expenditure authorization has a negative impact on performance. Moreover, loans negatively affect the return on assets (ROA) but positively influence the return on equity (ROE). The study also reveals an insignificant relationship between capita (CAP) and Saudi banks' performance in the case of ROE.

This research fills a gap in the literature, as few studies have explored this issue in emerging countries. However, like previous research, this study has limitations such as a small sample size, limited variables, and

years. Therefore, future studies should expand the sample size and extend the research to the Asian economic context. There is a need for more research to better understand the impact of various metrics, including governance and control variables, on banks' performance, particularly in emerging markets.

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