



The Effects of Credit, Liquidity, and Operational Risks on GCC Bank Financial Stability: Moderating Role of Board Size

Fatima Alsulmi

Putra Business School,
University Putra of Malaysia, Selangor, Malaysia

Rosli Mahmood

Putra Business School,
University Putra of Malaysia, Selangor, Malaysia

Resul Sapar

Putra Business School,
University Putra of Malaysia, Selangor, Malaysia

ABSTRACT

This paper examined the impact of three types of bank risk: credit, liquidity, and operational risk on bank financial stability. It also examined the moderating role of board size and board frequency meetings. It also investigated the macroeconomic factors such as GDP growth and inflation and their influence on bank financial stability. A sample of listed banks in GCC stock exchanges from 2014 to 2022 using a panel data analysis. The findings highlighted that credit and operational risk significantly impact a bank's financial stability, but liquidity risk is unrelated to the bank's financial stability. In addition, GDP and the Covid-19 pandemic had a negative impact on bank financial stability. Board size significantly moderates relationships between credit risk, operation risk, and bank financial stability.

Keywords: Risk, Financial Stability, Governance, GCC.

INTRODUCTION

Over the past ten years, the term “financial stability” has come to represent a crucial role that central banks and other public bodies play. Although financial stability has only recently been used, central banks have long been concerned about banking stability. Over the past 30 years, several issues have arisen in commercial banking and other areas of the financial sector worldwide. These issues are primarily attributable to poor risk management by commercial banks and other players during financial market deregulation. This example demonstrates the need for strong regulation by strong regulators to maintain stability in the commercial banking sector [1]. The financial stability of a system is when lenders, such as banks and other financial markets, can offer households, societies, and businesses the funds required to contribute, invest, and grow in the economy, even in unfavourable events or shocks [2]. Although it is challenging to define and quantify bank stability, a banking system can be considered unstable when there is an excessive fluctuation in assets or during a crisis [3].

GCC refers to the Gulf Corporation Council, founded in 1981 in Abu Dhabi and consists of six countries: the Kingdom of Saudi Arabia, the Sultanate of Oman, the United Arab Emirates, the State of Bahrain, the State of Qatar, and the State of Kuwait. Furthermore, they agreed on a cooperative framework that would unite the six countries to achieve unity through coordination, integration, and interconnection among the Member States in all fields. They have unique relationships, shared characteristics, and comparable systems based on the Islamic religion, belief in a shared destiny, and shared objective [4-6].

In the Gulf Cooperation Council (GCC) countries, there are two primary types of banking systems: Islamic and conventional. Several countries, notably the GCC, use a dual banking system in which Islamic banks coexist with traditional banks. The division of banks into Islamic and conventional categories derives from how these institutions carry out their primary intermediation services, which include collecting deposits, making loans, and, on the other hand, paying (charging) interest or returns. Structure, regulators, international standards such as capital requirements, and corporate governance in GCC banks [7-9].

The banking sector has experienced instability at different times in the past. A bank's financial stability is commonly measured by the bank z-score ratio, which uses the sum of ROA and the equity-to-asset ratio (EAR) by the standard deviation of ROA. Over the past 15 years, the return on equity (ROA) has been dropping throughout the area, with the GCC region experiencing a worse decline than emerging market economies (EMs). Data indicates that ROAs decreased on average from 2006 to 2020 in all GCC countries. Leverage increased widely in all areas. Increased leverage resulted in increased debt expenses, as seen by the interest coverage ratio, which has decreased significantly since 2007. This can lead to a decline in banks' asset quality and the materialization of contingent liabilities [10].

Combining certain factors of the banking environment with crucial external variables has led to the stability of the banking sector in the GCC region [11]. A recent report by IMF (2022) highlighted how the banking sector in GCC countries is vulnerable even with the government. The double shock of COVID-19 and oil prices in 2020 exacerbated these vulnerabilities further, even though monetary and fiscal policy support helped cushion their impact. Although not critical, profitability, debt service, liquidity, and revenue have declined - translating into fewer buffers to cope with the subdued demand and low capital expenditure levels.

THEORETICAL BACKGROUND

The theory of financial intermediation was adopted by Diamond and Dybvig [12]. This theory serves two essential functions: facilitating risk transfer and managing the intricate web of financial instruments and markets. Additionally, this theory can explain banks' inherent risks and their role as a source of returns [13]. According to Diamond and Dybvig [12], banks can only achieve stability if there is a match between their liquidity and assets. According to Kashyap, Rajan [14], banks function as financial intermediaries, acquiring assets using funds obtained through deposits, equity issuance, or bonds. This banking model suggests that banks facilitate financial transactions and drive economic growth. A particular focus of the theory of financial intermediation is the role banks play in vetting and supervising borrowers during the loan process [15]. factors that affect bank financial stability examined factors such as credit risk, liquidity risk, and Operational risk [16, 17]. These risk factors are linked to FIT because the central concept of FIT, which pictures banks as intermediates, can disrupt the

intermediation process by limiting banks' capacity to extend credit or fulfil their duties to creditors and depositors.

Based on the agency theory assumptions, it can be inferred that larger boards may negatively affect board dynamics, leading to decreased efficiency and effectiveness. Poor communication, coordination problems, and limited flexibility in the decision-making process are potential challenges that larger boards may face [18]. The agency theory is one of the main theories in the governance framework [17]. The theory addresses agency problems arising from the conflict of interest between the firm's management, board, shareholders, and any party interested in the firm. The agency problem is heightened by the failure of shareholders to monitor senior managers successfully. Within the banking sector, senior managers' present and future wage opportunities may be influenced by the banks' future successes or long-term sustainability [19]. It also demands the formation of board sub-committees, risk management, and internal control systems to observe managerial attitude [17, 20].

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Financial Stability

The term financial stability of the financial system can be used when extreme volatility, stress, or crises are absent. Narrowly, it can be defined if the financial system can function well compared to the overall economy; it involves how smoothly the complex relationship between financial markets, infrastructures, and institutions [21-23]. Banking industry stability is highlighted by the strong profitability of their operations and enough liquidity, showing that banks have a balanced structure of assets and liabilities [24]. Nevertheless, due to the poor quality of their capital, assets, and liabilities and the aggressiveness of their loan strategy, raising credit risk and, consequently, the likelihood of losses, banks' financial stability may be compromised in the medium future. The financial stability of developed and emerging nations, however, differs significantly. For instance, economic progress, regulatory frameworks, and institutional quality can all affect how well private credit can increase financial stability. Additionally, depending on the economic environment, currency price variations can affect financial stability [25-27]. Specifically, emerging economies may have weak early warning signs than advanced economies, reflecting the unique challenges and risks faced by these economies. Gulaliyev, Ashurbayli-Huseynova [28] highlighted that identifying the factors depends on various factors, such as the nature of the research questions, the types of data available, and the specific characteristics of the variables being used or location.

Credit Risk

Credit risk is described by Supervision and Settlements [29] as "the potential that a bank borrower or counterparty will fail to meet its obligations following with agreed term credit risk management aims to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters." Financial institutions typically face credit risk on the asset side of the balance sheet. Haron and Hock [30] claimed that there may be credit risk when the bank buys the goods and then sells them to the client for a profit. Credit risk arises, nevertheless, if a customer breaches their delivery-related commitments. A bank must accept credit risk since it exists to receive deposits and extend credit [1, 31, 32]. By far, the most significant risk that banks confront is credit risk, and more than any other risk, the success of their operations depends on precise measurement and effective management of this risk [33]. Scholars found that credit risk harms and reduces a bank's stability and affects bank survival

[3, 34, 35]. Additionally, work by Rajhi and Hassairi [36] in the MENA region confirmed the same finding: credit risk reduces banks' stability. Thus, the following hypothesis is formulated:

- **H1:** Credit risk significantly impacts the financial stability of banks.

Liquidity Risk

Liquidity risk arises when a borrower cannot repay the loan; as a result, if the economy falters, the bank may experience a lack of deposits or even "bankruptcy" [13]. liquidity risk is the ability to pay debt commitments due within the next 12 months with cash or assets that can be converted into cash. Commercial banks with less liquid assets fare better than those with more liquid assets. However, if the proper steps are taken, agency costs and reinvestment risk can be substantially reduced [37-39]. According to Nesvetailova and Palan [40], liquidity risk is the possibility of a financial crisis. In contrast to CBs, where the liquidity instrument is based on equity, IBs' liquidity instrument is based on debt [41-43]. In 2007, Wagner determined that liquidity risk negatively influences bank stability. Similarly, after using data from 52 IBs and CBs from 2007-2015, it was found that liquidity risk and financial stability in IBs are negatively related. However, there was a positive relationship in the case of CBs [16]. Therefore, the following hypothesis is formulated.

- **H2:** Liquidity risk significantly impacts the financial stability of banks.

Operational Risk

Operational risk can be defined as "the risks of losses from internal processes inadequate or faulty, people and systems or external events" [29]. The Islamic Financial Services Board (2005) has a similar definition of operational risk; "loss resulting from the inadequacy or failure of internal processes, persons, internal systems or external events and also the loss resulting from non-compliance with the 'Shariah' and the failure of the fiduciary responsibilities". Karim and Archer [44] operational risk is considered the second and most critical risk that managers of IFIs face. Unlike liquidity and credit risks, operational risk is mainly internal to banks, is hard to evaluate, and can affect the organization's existence [45]. Hosseininassab, Yavari [46] found that operational risk significantly affects financial performance and stability. In addition, Cheng, Nsiah [47] reported that operational risk significantly influences banks financially. Meanwhile, Ko, Lee [48], Hunjra, Mehmood [49] highlighted that higher operational risk increases bank default and leads to poor performance and instability. it was reported that there is a significant relationship between operational risk and the financial stability of banks [50, 51]. Supporting the previous view, Mazankova and Nemec [52] studied the impact of operational risk on financial stability. They found that operational risk influences the stability of financial institutions. Thus, the following hypothesis is formulated:

- **H3:** Operational risk significantly impacts the financial stability of banks

GDP

The impact of GDP on the financial stability of banks has been examined in past research. A growing GDP signifies a strong economy, indicating a robust financial system. This positive economic outlook is reflected in financial institutions, such as banks, playing a pivotal role in any thriving economy. Several studies have reported that GDP positively impacts bank stability; as GDP increases, bank stability is also likely to increase [53, 54]. Similarly, Rahim and Zakaria [55] found that a rise in GDP leads to a higher Z-score and greater bank stability; this observation aligns with the findings of [34].

However, some scholars have found no relationship between GDP and financial stability [56], and Ali and Puah [57] discovered a negative impact of GDP on bank stability. Thus, the following hypothesis is formulated:

- **H4:** GDP significantly impacts the financial stability of banks.

Inflation

Inflation is commonly referred to as the consumer price index (CPI), and it is expected to impact bank stability [7], while Mokhova and Zinecker [58] referred to inflation as the overall cost of living index. Inflation is an influential macroeconomic variable providing information about CPI and the GDP deflator. Therefore, rising inflation in a country drives the banking system to be more exposed to risk, which is expected to influence the financial stability of banks. As a result, most research on financial stability has found a strong, negative relationship between inflation and bank financial stability. Al-Shboul, Maghyreh [59] revealed contrasting results. On the other hand, Ali and Puah [57], in their study of bank stability in Pakistan, found a negative influence of inflation on bank stability. Jokipii and Monnin [53] found no apparent connection between inflation and the financial stability of banks. In comparison, it is positive and significant for the stability of smaller banks and the performance of CBs [59-61]. Thus, the following hypothesis is formulated:

- **H5:** Inflation significantly impacts the financial stability of banks.

Board Size as a Moderator

The board of directors must oversee the bank. Since depositors and regulators are also considered part of the banking industry's fiduciary duties in addition to shareholders, the board is even more significant as a governance mechanism in banks than it is in nonbanks [62]. When it fulfills its fiduciary responsibilities, which include hiring qualified personnel and monitoring management's actions, the board of directors can increase a company's value and improve corporate governance. The board can also resolve conflicts inside the bank and lower agency costs [63], eventually contributing to the bank's financial stability. Board size is known as the number of directors sitting on the board [64]; the size of a board may differ from one firm to another. Brogi and Lagasio [18] have highlighted that board size is the most relevant corporate governance mechanism to bank risk and affects bank financial stability. Work by Hunjra, Hanif [65] examined the impact of corporate governance on bank risk from 10 emerging markets. Diab, Marie [66] found that board size significantly negatively affects banks' financial stability. A larger board size is recommended to improve banks' decision-making and risk management procedures [67]. corporate governance mechanisms, such as board size is crucial for effectively managing the intricate terrain of banking risks and guaranteeing financial stability [68].

- **H6a:** Board size moderates the relationship between credit risk and the financial stability of banks.
- **H6b:** Board size moderates the relationship between liquidity risk and the financial stability of banks.
- **H6c:** Board size moderates the relationship between operational risk and the financial stability of banks.

RESEARCH METHODOLOGY

This study examines 57 listed banks across GCC countries from 2014 to 2022. Unlisted banks are not included due to their lower transparency and reduced reporting obligations, which often result in limited public discourse on financial statements and corporate governance

information. Consistent with Ariff and Can [69], we have excluded finance companies, foreign banks, and specialized financial institutions from the sample. This decision aims to avoid comparability issues between different types of financial institutions that may have distinct objectives, thus preserving the homogeneity of the sample.

The data analysis started with the statistic panel analysis, first OLS analysis, and random effects, and the appropriate estimator was chosen based on the Breusch and Pagan L M test. Then, fixed and random effects were analyzed and compared based on the Hausman test. This led to the fixed effect being appropriate and preferred to the random effect. The following diagnostic tests were conducted to check fixed effect validity as it was preferred over OLS and Random effect: Modified Wald test for Heteroskedasticity. The previous tests are essential when analyzing fixed effects.

The study adopts the dynamic panel analysis system GMM; the justification for applying the dynamic panel GMM over the statistic panel is based on the above diagnostic tests confirming that the fixed effect suffers from heteroscedasticity and autocorrelation. Therefore, the two-step System GMM is preferred for several reasons. The following sections will show the analysis results based on the system GMM estimator. The Generalized Method of Moments (GMM) is a comprehensive and widely used estimation technique in panel data analysis, providing a thorough approach to research. This adaptable and resilient method allows researchers to estimate parameters even when endogeneity, heteroscedasticity, and serial correlation are present. GMM's comprehensive nature ensures accurate and reliable estimates in panel data investigations, effectively addressing these complexities. As previously indicated, GMM is particularly beneficial for addressing endogeneity and unobserved heterogeneity-related issues. It surpasses the traditional method of moment estimation by incorporating moment conditions that demonstrate the relationship between the model's parameters and the data moments. GMM provides a robust framework for tackling endogeneity concerns and accounting for unobservable variation in panel data analysis by including these moment conditions [70, 71].

Dependent variable: The bank's financial stability is measured by the Z-score, a crucial measure of bank insolvency. It is calculated by dividing the sum of ROA and the equity-to-asset ratio (EAR) by the standard deviation of ROA. A higher Z-score value is an inverse measure of insolvency, indicating a lower probability of the bank becoming insolvent. Conversely, a lower Z-score value suggests a higher probability of bank insolvency [16].

$$Z - score_{it} = \frac{ROA_{it} + E/A_{it}}{\sigma ROA_{it}} \quad (1)$$

ROA and E/A are the current year's values, while the standard deviation of RAO was calculated by adopting three years as a rolling window [72]. Li, Tripe [73] highlight that rolling windows are most appropriate because a bank's lending habits, and risk fluctuate over time. They are an appropriate method of managing bank risk. Since the Z-score is highly skewed, this study used transformation $\ln(Z\text{-score})$, which is usually distributed to smooth out the higher values following [72, 74, 75].

Table1: Summary of Variables Measurements.

No	Variable	Measurement	Symbol	Study
Dependent Variable				
Financial Stability				
1	Z-score	$Z\text{-score} = (\text{ROA} + \text{E}/\text{A}) / \sigma\text{ROA}$	Z-score	[3, 16, 72]
Independent Variables				
Bank-Specific Factors				
2	Credit Risk	Non-performing loans ratio= non-performing loans / total loans	CR	Hassan, Khan [16], Ahmed, Akhtar [51]
3	Liquidity Risk	LATA ratio= liquid assets / total assets	LR	Elbadry [50], Ahmed, Akhtar [51]
4	Operational Risk	Operating cost (expenses)/net income	OR	Mathuva [76], Muriithi and Muigai [77]
Macroeconomic Factors				
5	GDP	Growth rate of Gross domestic product	GDP	Hassan, Khan [16]
6	Inflation	Consumer price index CPI	INF	Djebali and Zaghdoudi [3], Ghenimi, Chaibi [17]
Moderating Variable				
7	Board Size	the number of Directors sitting on the Board.	BS	Al-Matari, Al-Swidi [78], Boshnak [79], Al-Janadi, Rahman [80], Grassa and Chakroun [81]
Control Variables				
8	Bank Size	Logs of bank total assets	SIZE	Abuzayed, Al-Fayoumi [82], Tabak, Gomes [83], Čihák and Hesse [84]
9	Bank Efficiency	The cost-to-income ratio= non-interest expenses / total operating revenue	EFFI	Abuzayed, Al-Fayoumi [82], Olson and Zoubi [85]
Dummy Variables				
11	Covid-19	1 for the year 2020/2021, and 0 otherwise.	COVID19	Shabir, Jiang [86], Gazi, Nahiduzzaman [87]

DATA ANALYSIS

Table 2 presents descriptive statistics of the variables; the Z-score gives an average value of 4.12 for bank stability, with a maximum value of 9.24 and the lowest value of 0.133. Bank-specific factors credit risk (CR) ranges from a high of 0.321 to an average of 0.048 and a standard deviation value (0.0435), Liquidity risk (LR), which has an average value of 0.089 and a minimum and maximum value of 0.00049 and 0.87, respectively. Among all bank-specific factors, operational risk (OR) has the highest mean and standard deviation values (2.09) and (5.36). GDP mean value and standard deviation are (2.06) and (3.6), with a max value of (8.86) and min (-8.85) and inflation (INF) with a mean value of (0.018) and (0.016) and standard deviation values of (0.011) and (0.018).

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
ZSCORE	513	4.125174	1.042754	0.133419	9.243033

CR	513	0.048458	0.043511	0.000400	0.321000
LR	513	0.089865	0.070379	0.000485	0.871522
OR	513	2.090341	5.367787	-19.1796	95.68067
GDP	513	2.069554	3.653535	-8.85528	8.860759
INF	513	0.016019	0.018959	-0.02540	0.049953
SIZE	513	5.140926	1.671863	2.403309	10.50887
EFFI	513	0.420545	0.182646	-0.15600	1.964000
BS	513	9.510721	1.570101	5.000000	16.00000
COVID19	513	0.222222	0.416146	0.000000	1.000000

Table 3 presents the results of this section's Variance Inflation Factor (VIF). This test explains the multicollinearity among the study's variables. The results shown in Table 5.8 of the Variance Inflation Factor, including the VIF mean, are less than 10 for each variable. The VIF results ($VIF < 10$) indicate the absence of multicollinearity among the variables of interest in this study.

Table 3: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
SIZE	2.04	0.490653
GDP	2.00	0.499898
COVID19	1.55	0.646009
INF	1.54	0.650936
EFFI	1.25	0.799726
BS	1.18	0.846629
CR	1.18	0.850875
LR	1.15	0.872768
OR	1.04	0.958905
Mean VIF	1.46	

Table 4: Summary of Diagnostic Tests

Test	Z-Score Model
	P-Value
Breusch and Pagan LM test for OLS and Random effects	0.0000
Hausman test for Fixed and Random effects	0.0031
The Modified Wald Test	0.0000

Table 5 presents the diagnostics test when we first applied OLS, RE, and FE. The RE was preferred over OLS based on the Breusch and Pagan LM test, and the FE was preferred over RE based on the Hausman test. However, due to heteroskedasticity problems, this study adopted the system GMM estimator as it offered the best result compared to OLS, RE, and FE.

In addition to the multicollinearity issue that can be deducted from correlation tables, the statistical direction between variables. A negative sign indicates a negative correlation, meaning one variable increase and the other decreases; a positive sign means one variable increase and the other increases. The correlation matrixes were done separately: Table 4, the correlation matrix of all variables, with no values equal to or higher than 80%, indicates the absence of multicollinearity.

Table 5: Correlation Matrix

	IZSCORE	CR	LR	OR	GDP	INF	SIZE	EFFI	BS	COVID19
IZSCORE	1									
CR	-0.0835	1								
LR	-0.1564	0.1223	1							
OR	-0.0662	0.0583	-0.0296	1						
GDP	0.0469	0.0192	0.0555	-0.092	1					
INF	0.0397	0.0002	0.0149	0.039	0.4835	1				
SIZE	-0.0103	0.0968	-0.0471	0.0156	0.0963	-0.0868	1			
EFFI	-0.1511	0.2586	-0.0553	0.0347	-0.0681	-0.094	0.0622	1		
BS	0.0873	0.064	0.0011	-0.035	0.0605	0.0709	0.1684	-0.0209	1	
COVID19	-0.2247	-0.0476	-0.0264	0.0868	-0.4545	-0.2878	0.0189	0.0294	-0.0096	1

Table 6 shows the p-value of the unit root test, which is used to reject the null hypothesis. This study applied to the Levin–Lin–Chu unit-root test. The table below shows that none of the variables contain unit roots, and all variables are stationary at level.

Table 6: Unit Root Test

LLC unit-root test		
Level		
Variable	Adjusted t	P-value
IZSCORE	-17.7590	0.000
CR	-11.8433	0.000
LR	-4.06020	0.000
OR	-13.5839	0.000
GDP	-9.57740	0.000
INF	-10.9532	0.000
SIZE	-5.39590	0.000
EFFI	-8.62210	0.000
BS	-3.23040	0.000

Tables 7 and 8, in columns (2), passed all required conditions that make the model valid and well-pacified: 1) the lag of the dependent variable is significant at 1%, 2) the number of instruments less than the number of groups (banks), 3) Sargan test for overidentification is not significant p-value >0.05, 4) AR2 for autocorrelation is not significant p-value >0.05. These two-step system GMM requirements were applied by past research such as Labra Lillo and Torrecillas Bautista [88], Morgan and Pontines [89], Ijaz, Hassan [90].

Table 7 shows that the credit risk CR and liquidity risk LR positively affect the bank's financial stability z-score. Similarly, CR significantly impacts the bank's financial stability z-score. The findings show an insignificant relationship between liquidity risk and credit risk with bank financial stability, consistent with the findings [91]. However, only CR is positive and significant with the bank's financial stability z-score, similar to past studies that found a positive and significant impact of credit risk CR [92, 93]. Therefore, hypothesis H1a is supported based on the financial stability z-score. H1b is not supported based on z-score financial stability; this implies that from 2014 to 2022.

On the other hand, the coefficients of operational risk are negative (-0.00329), and operational risk OR significantly impacts the bank's financial stability z-score. Therefore, hypothesis H1c is

supported based on the results of the analysis. The findings of OR are consistent with [50, 51]. The increased operation risk OR rise in operating cost results in reduced bank financial stability and bank defaults, as highlighted by Ko, Lee [48], [49]. The result indicated that a one percent change in operational risk would likely negatively affect bank stability z-score, about -0.33, Because operational risk results from the inadequacy or failure of internal processes, persons, and systems, this highlighted banks' challenging tasks when managing operational risk. GDP is negative and significant (-0.00850) with the bank financial stability z-score. This result is similar to [57]. The last macroeconomic factor is inflation INF, which results from the z-score showing a positive and significant relationship between INF and bank financial stability z-score. This finding is similar to [17, 34].

Bank size has a negative and significant relationship with the bank z-score these findings similar to other like [17, 56]. The explanation for the negative impact of bank size on a bank's financial stability is that the larger the bank size, the lower the bank's financial stability will be. Regarding bank efficiency, EFFI has a negative but insignificant relationship with bank financial stability z-score this result is similar to Hassan, Khan [16], Ghenimi, Chaibi [17]. Finally, the COVID-19 pandemic has negatively and significantly impacted bank financial stability, indicating that the bank's financial stability declined during the pandemic. This finding is similar to recent studies on bank financial stability during COVID-19, like [94, 95].

Table 7: GMM Analysis Results

VARIABLES	(1) One-Step Sys GMM	(2) Two-Step Sys GMM
L.IZ-score	0.205*** (0.0554)	0.213*** (0.0162)
Bank-Specific Factors		
CR	0.852 (0.695)	0.570* (0.345)
LR	-0.248 (0.605)	0.0592 (0.158)
OR	-0.00291 (0.00280)	-0.00329*** (0.000403)
Macroeconomic Factors		
GDP	-0.00920 (0.00585)	-0.00850*** (0.00155)
INF	0.515 (0.923)	0.413* (0.231)
SIZE	-0.0479 (0.0410)	-0.0598*** (0.0192)
EFFI	-0.107 (0.142)	-0.100 (0.0617)
COVID19	-0.206*** (0.0458)	-0.197*** (0.0196)
Constant	-0.0708 (0.521)	0.0214 (0.151)
Observations	456	456
Wald Chi	96.06	6491.48
	0.000	0.000
AR (2)		0.3158
Sargan test	0.0113	0.1376
Number of instruments	48	48
Number of groups	57	57

Table 8 shows the moderator effect results based on a two-step sys GMM. Board size BS has a significant positive (0.488) moderating effect between credit risk and bank financial stability z-score; an increase in board size is expected to enhance credit risk and positively affect bank financial stability z-score. This finding indicates that the larger the BS, the stronger the

relationship between CR and bank financial stability z-score positively. Board size BS negatively moderates the relationship between operational risk and bank z-score; an increase in board size negatively affects operational risk and reduces bank financial stability z-score. This view was explained in agency theory [96], which states that a larger board size can create issues with coordination, control, and flexibility in decision-making. These findings are consistent with [97, 98]. Finally, BS does not moderate between liquidity risk and bank financial stability. These findings suggest that board size, small or large, does not influence LR and does not have a role in managing this risk to strengthen the relationship with the bank's financial stability z-score.

Table 8: GMM Analysis Results with Moderator

VARIABLES	(1) One-step sys GMM	(2) Two-step sys GMM
LIZSCORE	0.201*** (0.0570)	0.210*** (0.0161)
CR	-1.541 (3.741)	-4.361*** (1.523)
LR	-0.303 (2.545)	1.260 (1.054)
OR	-0.00284 (0.00284)	-0.00345*** (0.000400)
GDP	-0.00882 (0.00601)	-0.00849*** (0.00159)
INF	0.536 (0.940)	0.401* (0.242)
BS	0.0187 (0.115)	-0.0290 (0.0418)
CR*BS	0.234 (0.362)	0.488*** (0.154)
LR*BS	0.00626 (0.289)	-0.152 (0.115)
OR*BS	-9.45e-06 (1.14e-05)	-9.98e-06*** (1.69e-06)
SIZE	-0.0485 (0.0417)	-0.0583*** (0.0182)
EFFI	-0.0854 (0.145)	-0.0848 (0.0665)
COVID19	-0.201*** (0.0474)	-0.190*** (0.0204)
Constant	-0.221	0.325 (0.417)
Observations	456	456
Wald Chi	96.95	18686.35
	0.000	0.000
AR (2)		0.3975
Sargan test	0.0142	0.1393
Number of instruments	54	54
Number of groups	57	57

DISCUSSION AND CONCLUSION

This study examined the financial stability of listed banks in the GCC region from 2014 to 2022; the analysis was based on the main research objectives. First, examine the impact of bank-specific factors (credit risk, liquidity risk. Operational risk) on bank financial stability z-score. Second, it examined the macroeconomic factors of GDP and inflation. Third, it examined the moderating effect of corporate governance mechanisms board size between bank-specific factors (credit risk, liquidity risk. Operational risk) on bank financial stability z-score. According to financial intermediation theory, risk management is not just a significant step but a crucial and urgent one in achieving the financial stability of intermediaries. Therefore, when credit and liquidity risk positively impact a bank's financial stability, this is due to good risk management.

This study contributes to the body of knowledge and literature. To the best of research knowledge, past studies in financial stability are very limited and have not applied to a

moderator. Corporate governance was mainly applied to examine the direct effect on bank financial stability. Another main contribution to the literature is the effect of the COVID-19 pandemic on bank financial stability. The literature on COVID-19 and bank financial stability is still limited, and most past research on bank financial stability has not examined these effects. The results provide leading lines for policymakers and bank managers to shape policies and cooperate in decision-making. Policymakers were advised to focus on policies related to macroeconomic factors such as oil price fluctuations because they positively impacted bank financial stability. These policies could protect banks from the negative impact of dropping oil prices and assist banks in not reducing the impact of oil prices, as oil prices are hard to control.

References

1. Allen, W.A. and G. Wood, *Defining and achieving financial stability*. Journal of Financial Stability, 2006. 2(2): p. 152-172.
2. *The Federal Reserve*, 2022.
3. Djebali, N. and K. Zaghdoudi, *Threshold effects of liquidity risk and credit risk on bank stability in the MENA region*. Journal of Policy Modeling, 2020. 42(5): p. 1049-1063.
4. Hameed, S., M.M. Quamar, and P.R. Kumaraswamy, *GCC, in Persian Gulf 2021–22: India's Relations with the Region*, S. Hameed, M.M. Quamar, and P.R. Kumaraswamy, Editors. 2022, Springer Nature Singapore: Singapore. p. 503-534.
5. Alghamdi, M.A.A., et al., *Employee Well Being and Knowledge Sharing Behavior Among Employees of Saudi Aramco*. Advances in Social Sciences Research Journal, 2021. 8(8).
6. Alghamdi, M.A.A., et al., *Antecedents and Consequences of Employee Well-Being: Empirical Study on Saudi Aramco*. Advances in Social Sciences Research Journal, 2021. 8(9).
7. Mabkhot, H. and H.A.H. Al-Wesabi, *Banks' Financial Stability and Macroeconomic Key Factors in GCC Countries*. Sustainability, 2022. 14(23): p. 15999.
8. Md. Tamim, A., et al., *Determinants of Profitability-A Case from the State-owned Commercial Banks of Bangladesh*. 2016.
9. Ayub, S., N. Sohail, and R. Mumtaz, *Performance evaluation of Islamic and Conventional Banks in Pakistan*. World Applied Sciences Journal, 2012. 20: p. 213-220.
10. Al-Hassan, A., et al., *Assessing Banking Sector Vulnerabilities in the Gulf Cooperation Council in the Wake of COVID-19*. Departmental Papers, 2022. 2022: p. 1.
11. Alandejani, M. and M. Asutay, *Nonperforming loans in the GCC banking sectors: Does the Islamic finance matter?* Research in International Business and Finance, 2017. 42: p. 832-854.
12. Diamond, D.W. and P.H. Dybvig, *Bank runs, deposit insurance, and liquidity*. Journal of political economy, 1983. 91(3): p. 401-419.
13. Imbierowicz, B. and C. Rauch, *The relationship between liquidity risk and credit risk in banks*. Journal of Banking & Finance, 2014. 40: p. 242-256.
14. Kashyap, A.K., R. Rajan, and J.C. Stein, *Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-taking*. The Journal of Finance, 2002. 57(1): p. 33-73.

15. Boot, A.W. and A.V. Thakor, *Banks and financial markets in a digital age*. 2023.
16. Hassan, M.K., A. Khan, and A. Paltrinieri, *Liquidity risk, credit risk and stability in Islamic and conventional banks*. *Research in International Business and Finance*, 2019. 48: p. 17-31.
17. Ghenimi, A., H. Chaibi, and M.A.B. Omri, *The effects of liquidity risk and credit risk on bank stability: Evidence from the MENA region*. *Borsa Istanbul Review*, 2017. 17(4): p. 238-248.
18. Brogi, M. and V. Lagasio, *Better safe than sorry. Bank corporate governance, risk-taking, and performance*. *Finance Research Letters*, 2022. 44: p. 102039.
19. Fama, E.F., *Agency problems and the theory of the firm*. *Journal of political economy*, 1980. 88(2): p. 288-307.
20. Jensen, M.C. and W.H. Meckling, *Theory of the firm: Managerial behavior, agency costs and ownership structure*, in *Corporate governance*. 2019, Gower. p. 77-132.
21. Gadanez, B. and K. Jayaram, *Measures of financial stability-a review*. *Irving Fisher Committee Bulletin*, 2008. 31(1): p. 365-383.
22. Jandab, A., et al., *THE INFLUENCE OF IT CAPABILITY ON IT-BASED INNOVATION: THE MEDIATING ROLE OF ORGANIZATIONAL LEARNING CAPABILITY*. 2020: p. 2020.
23. Jandab, A., et al., *IT-Based Innovation and New Product Development Performance in Yemen: The Moderating Role of Intellectual Property*. *International Journal of Business Society*, 2019. 3(11): p. 1-8.
24. Klaas, J., *Tools for assessing and forecasting financial stability of the commercial bank under conditions of instability*. *Investment Management and Financial Innovations*, 2014. 11.
25. Babecký, J., et al., *Banking, debt, and currency crises in developed countries: Stylized facts and early warning indicators*. *Journal of Financial Stability*, 2014. 15: p. 1-17.
26. Abdulsamad, A., et al., *The Impact of Market Orientation Components on Organizational Performance of SMEs. The single-industry approach "Food and Beverage Sector"*. *Advances in Social Sciences Research Journal*, 2021. 8: p. 504-516.
27. Abdulsamad, A., et al., *The Importance of Entrepreneurial Orientation's Dimensions in Influencing the Organizational Performance of Food and Beverage SMEs*. *Advances in Social Sciences Research Journal*, 2020. 7: p. 81-99.
28. Gulaliyev, M., et al., *POLISH JOURNAL OF MANAGEMENT STUDIES STABILITY OF THE BANKING SECTOR: DERIVING STABILITY INDICATORS AND STRESS-TESTING*. 2019.
29. Supervision, B.C.o.B. and B.f.I. Settlements, *Principles for the management of credit risk*. 2000: Bank for International Settlements.
30. Haron, A. and J.L.H. Hock, *Inherent risk: credit and market risks*. *Islamic finance: The regulatory challenge*, 2007: p. 94-120.
31. Al-Zubaidi, R., et al., *Sustainable Development Through Effective Project Management: The Petromasila in Yemen*. *Advances in Social Sciences Research Journal*, 2023. 10(3): p. 269-290.
32. Al-Zubaidi, R., et al., *The Effect of Self-efficacy on Sustainable Development: The PetroMasila in Yemen*. *Advances in Social Sciences Research Journal*, 2022. 9(12): p. 35-49.
33. Giesecke, K., *Credit risk modeling and valuation: An introduction*. Available at SSRN 479323, 2004.

34. Adusei, M., *The impact of bank size and funding risk on bank stability*. Cogent Economics & Finance, 2015. 3(1): p. 1111489.
35. Phan, H.T., et al., *Competition, efficiency and stability: An empirical study of East Asian commercial banks*. The North American Journal of Economics and Finance, 2019. 50: p. 100990.
36. Rajhi, W. and S.A. Hassairi, *Islamic banks and financial stability: a comparative empirical analysis between MENA and southeast Asian countries*. Région et développement, 2013. 37(3): p. 149-179.
37. Zou, H. and M.B. Adams, *Corporate ownership, equity risk and returns in the People's Republic of China*. Journal of International Business Studies, 2008. 39: p. 1149-1168.
38. Abdulhadi, A.R., et al., *The Impact of Internal Control on Project Management in Construction Site Among Small and Medium Enterprises in Iraq*. Advances in Social Sciences Research Journal, 2023. 10(3): p. 247-268.
39. Abdulhadi, A.R., et al., *The Impact of Risk Management on the Dimensions of Project Management Among Small and Medium Enterprises in Iraq*. Advances in Social Sciences Research Journal, 2022. 9(11): p. 469-481.
40. Nesvetailova, A. and R. Palan, *A VERY NORTH ATLANTIC CREDIT CRUNCH: GEOPOLITICAL IMPLICATIONS OF THE GLOBAL LIQUIDITY CRISIS*. Journal of International Affairs, 2008. 62(1): p. 165-185.
41. Hassan, H., S. Razzaque, and M.S. Tahir, *Comparison of financial instruments in Islamic versus conventional banking system and liquidity management*. African Journal of Business Management, 2013. 7(18): p. 1695-1700.
42. Al-Refaei, A.A.-A., et al., *A Conceptual Framework for the Impact of Entrepreneurial Leadership on Innovation Work Behavior and Sustainable Innovation Performance*, in *Entrepreneurship Innovation and Education for Performance Improvement*, S.A. Salman and A. Bhaumik, Editors. 2024, IGI Global: Hershey, PA, USA. p. 577-598.
43. Al-Zubaidi, R., et al., *Promoting Sustainability in Yemeni Construction SMEs: Self-Efficacy Mediates Planning and Risk Management*, in *Entrepreneurship Innovation and Education for Performance Improvement*, S.A. Salman and A. Bhaumik, Editors. 2024, IGI Global: Hershey, PA, USA. p. 72-113.
44. Karim, R.A.A. and S. Archer, *Islamic finance: the new regulatory challenge*. 2013: John Wiley & Sons.
45. Jorion, P., *Risk Management Lessons from the Credit Crisis*. European Financial Management, 2009. 15(5): p. 923-933.
46. Hosseininassab, E., et al., *Effects of risk parameters (credit, operational, liquidity and market risk) on banking system efficiency (studying 15 top banks in Iran)*. Iranian Economic Review, 2013. 17(1): p. 1-24.
47. Cheng, L., et al., *Credit risk, operational risk, liquidity risk on profitability. A study on South Africa commercial banks. A PLS-SEM Analysis*. Revista Argentina de Clínica Psicológica, 2020. 29(5): p. 5.
48. Ko, C., P. Lee, and A. Anandarajan, *The impact of operational risk incidents and moderating influence of corporate governance on credit risk and firm performance*. International Journal of Accounting & Information Management, 2019. 27(1): p. 96-110.
49. Hunjra, A.I., et al., *Do firm-specific risks affect bank performance?* International Journal of Emerging Markets, 2022. 17(3): p. 664-682.
50. Elbadry, A., *Bank's financial stability and risk management*. Journal of Islamic Accounting and Business Research, 2018. 9(2): p. 119-137.

51. Ahmed, N., M.F. Akhtar, and M. Usman, *Risk management practices and Islamic banks: An empirical investigation from Pakistan*. *Interdisciplinary Journal of Research in Business*, 2011. 1(6): p. 50-57.
52. Mazankova, V. and M. Nemec, *Operational Risk And Its Impacts On Financial Stability*. Occasional Publications-Chapters in Edited Volumes, 2008: p. 94-104.
53. Jokipii, T. and P. Monnin, *The impact of banking sector stability on the real economy*. *Journal of International Money and Finance*, 2013. 32: p. 1-16.
54. Campbell, G., C. Coyle, and J.D. Turner, *This time is different: Causes and consequences of British banking instability over the long run*. *Journal of Financial Stability*, 2016. 27: p. 74-94.
55. Rahim, S.R.M. and R.H. Zakaria, *Comparison on stability between Islamic and conventional banks in Malaysia*. *Journal of Islamic Economics, Banking and Finance*, 2013. 9(3): p. 131-149.
56. Ashraf, D., M.S. Rizwan, and B. L'Huillier, *A net stable funding ratio for Islamic banks and its impact on financial stability: An international investigation*. *Journal of Financial Stability*, 2016. 25: p. 47-57.
57. Ali, M. and C.-H. Puah, *Does Bank Size and Funding Risk Effect Banks' Stability? A Lesson from Pakistan*. *Global Business Review*, 2018. 19(5): p. 1166-1186.
58. Mokhova, N. and M. Zinecker, *Macroeconomic Factors and Corporate Capital Structure*. *Procedia - Social and Behavioral Sciences*, 2014. 110: p. 530-540.
59. Al-Shboul, M., et al., *Political risk and bank stability in the Middle East and North Africa region*. *Pacific-Basin Finance Journal*, 2020. 60: p. 101291.
60. Al-Sharif, A.M., et al., *The Role of Innovation Capability in the Relationship between Entrepreneurial Leadership and Innovation Performance in the SMEs Service Industry*. *Advances in Social Sciences Research Journal*, 2023. 10(1).
61. Al-Sharif, A., et al., *Effects of Innovation Capability and Environmental Dynamism on the Relationship between Entrepreneurial Leadership and Innovation Performance in the SMEs Service Industry*. *International Journal of Academic Research in Business and Social Sciences*, 2023. 13: p. 1547-1570.
62. Macey, J.R. and M. O'hara, *The corporate governance of banks*. *Economic policy review*, 2003. 9(1).
63. Olateju, D.J. and B.R. Tijani, *Effect of Corporate Governance on Banking System Stability in Nigeria*. *International Journal of Business Studies*, 2024. 8(2): p. 144-159.
64. Ballester, L., A. González-Urteaga, and B. Martínez, *The role of internal corporate governance mechanisms on default risk: A systematic review for different institutional settings*. *Research in International Business and Finance*, 2020. 54: p. 101293.
65. Hunjra, A.I., et al., *Diversification, corporate governance, regulation and bank risk-taking*. *Journal of Financial Reporting and Accounting*, 2021. 19(1): p. 92-108.
66. Diab, A., et al., *The effect of political risk and corporate governance on bank stability in the MENA region: Did the Arab Spring uprisings matter?* *Cogent Business & Management*, 2023. 10(1): p. 2174207.
67. Adams, R.B. and H. Mehran, *Bank board structure and performance: Evidence for large bank holding companies*. *Journal of Financial Intermediation*, 2012. 21(2): p. 243-267.
68. Faleye, O. and K. Krishnan, *Risky lending: Does bank corporate governance matter?* *Journal of Banking & Finance*, 2017. 83: p. 57-69.

69. Ariff, M. and L. Can, *IMF Bank-Restructuring Efficiency Outcomes: Evidence from East Asia*. Journal of Financial Services Research, 2009. 35(2): p. 167-187.
70. Wooldridge, J.M., *Econometric analysis of cross section and panel data*. 2010: MIT press.
71. Baltagi, B.H., *Forecasting with panel data*. Journal of Forecasting, 2008. 27(2): p. 153-173.
72. Beck, T., A. Demirgüç-Kunt, and O. Merrouche, *Islamic vs. conventional banking: Business model, efficiency and stability*. Journal of Banking & Finance, 2013. 37(2): p. 433-447.
73. Li, X., D.W. Tripe, and C.B. Malone, *Measuring bank risk: An exploration of z-score*. Available at SSRN 2823946, 2017.
74. Laeven, L. and R. Levine, *Bank governance, regulation and risk taking*. Journal of Financial Economics, 2009. 93(2): p. 259-275.
75. Lepetit, L. and F. Strobel, *Bank insolvency risk and Z-score measures: A refinement*. Finance Research Letters, 2015. 13: p. 214-224.
76. Mathuva, D.M., *Capital adequacy, cost income ratio and the performance of commercial banks: The Kenyan Scenario*. The International journal of applied economics and Finance, 2009. 3(2): p. 35-47.
77. Muriithi, J. and R. Muigai, *Quantitative analysis of operational risk and profitability of Kenyan commercial banks using cost income ratio*. IOSR Journal of Economics and Finance, 2017. 8(3): p. 76-83.
78. Al-Matari, Y.A., et al., *Board of directors, audit committee characteristics and the performance of Saudi Arabia listed companies*. International Review of management and marketing, 2012. 2(4): p. 241-251.
79. Boshnak, H.A., *Corporate governance mechanisms and firm performance in Saudi Arabia*. International Journal of Financial Research, 2021. 12(3): p. 446-465.
80. Al-Janadi, Y., R.A. Rahman, and N.H. Omar, *Corporate governance mechanisms and voluntary disclosure in Saudi Arabia*. Research Journal of Finance and Accounting, 2013. 4(4).
81. Grassa, R. and R. Chakroun, *Ownership structure, board's characteristics and corporate governance disclosure in GCC banks: what about Islamic banks?* International Journal of Accounting, Auditing and Performance Evaluation, 2016. 12(4): p. 360-395.
82. Abuzayed, B., N. Al-Fayoumi, and P. Molyneux, *Diversification and bank stability in the GCC*. Journal of International Financial Markets, Institutions and Money, 2018. 57: p. 17-43.
83. Tabak, B.M., G.M.R. Gomes, and M. da Silva Medeiros, *The impact of market power at bank level in risk-taking: The Brazilian case*. International Review of Financial Analysis, 2015. 40: p. 154-165.
84. Čihák, M. and H. Hesse, *Islamic Banks and Financial Stability: An Empirical Analysis*. Journal of Financial Services Research, 2010. 38(2): p. 95-113.
85. Olson, D. and T.A. Zoubi, *Efficiency and bank profitability in MENA countries*. Emerging Markets Review, 2011. 12(2): p. 94-110.
86. Shabir, M., et al., *COVID-19 pandemic impact on banking sector: A cross-country analysis*. Journal of Multinational Financial Management, 2023. 67: p. 100784.
87. Gazi, M.A.I., et al., *Impact of COVID-19 on Financial Performance and Profitability of Banking Sector in Special Reference to Private Commercial Banks: Empirical Evidence from Bangladesh*. Sustainability, 2022. 14(10): p. 6260.

88. Labra Lillo, R. and C. Torrecillas Bautista, *Estimating dynamic Panel data. A practical approach to perform long panels*. 2018.
89. Morgan, P. and V. Pontines, *Financial stability and financial inclusion*. 2014.
90. Ijaz, S., et al., *LINKING BANK COMPETITION, FINANCIAL STABILITY, AND ECONOMIC GROWTH*. *Journal of Business Economics and Management*, 2020. 21(1): p. 200-221.
91. Amara, T. and M. Mabrouki, *The impact of liquidity and credit risks on the bank stability*. *Journal of Smart Economic Growth*, 2019. 4(2): p. 97-116.
92. NASSERINIA, A., *FOREIGN OWNERSHIP AND FINANCIAL CRISIS*. 2017.
93. Aroghene, K.G. and J.J.E. Ikeora, *EFFECT OF NON-PERFORMING LOANS (NPLS), CAPITAL ADEQUACY (CA) AND CORPORATE GOVERNANCE (CG) ON BANK STABILITY IN NIGERIA*. *Finance & Accounting Research Journal*, 2022. 4(4): p. 180-192.
94. Ugazio, G. and T. Zhang, *Assessing Banking Sector Vulnerabilities in the Gulf Cooperation Council in the Wake of COVID-19*. 2022.
95. Al-Kharusi, S. and S.R. Murthy, *Financial stability of GCC banks in the COVID-19 Crisis: A simulation approach*. *The Journal of Asian Finance, Economics and Business*, 2020. 7(12): p. 337-344.
96. Jensen, M.C., *SELF-INTEREST, ALTRUISM, INCENTIVES, AND AGENCY THEORY*. *Journal of Applied Corporate Finance*, 1994. 7(2): p. 40-45.
97. Andres, P.d. and E. Vallelado, *Corporate governance in banking: The role of the board of directors*. *Journal of Banking & Finance*, 2008. 32(12): p. 2570-2580.
98. Eklemet, I., J. MacCarthy, and E. Gyamera, *Moderating Role of Risk Management between Risk Exposure and Bank Performance: Application of GMM Model*. *Theoretical Economics Letters*, 2024. 14(2): p. 363-389.