

DOI: <https://doi.org/10.17323/j.jcfr.2073-0438.20.2.2026.93-107>

JEL classifications: G21, G28, G32



Internal and External Determinants of Credit Risk: Empirical Evidence from Iraqi Commercial Banks

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Abstract

Credit risk determinants are highly relevant because prolonged high credit risk can damage the reputation of banks and erode customer confidence. This paper therefore investigates the internal (bank-specific), external (macroeconomic and government-level) determinants of credit risk in Iraq. The model is estimated using unbalanced panel data of 18 conventional banks over the 2005–2024 period by employing the Pooled OLS (POLS) method. Liquidity decreases credit risk, whilst capital adequacy and bank size increase it as banks are more likely to engage in risky lending activities due to inefficiency in the loan approval process or else because of their huge size. In addition, macroeconomic determinants such as GDP, inflation, and political unrest have negative effects on credit risk, which in turn results in a low quality of loan portfolios. Strict capital regulations may even lead to risk-taking behaviour in the banking industry in order to mitigate their compliance costs. High bank profits may also conceal the increasing credit risk in the banks. The banks with stronger regulatory compliance have lower defaults and higher stability. Finally, the findings emphasize the need for appropriate banking policies and practices in Iraq, which would be flexible enough to address the country-specific conditions and which would include management of liquidity and capital cushion. In addition, addressing structural economic and political challenges is needed to restore stability and sustainable development of the banking sector, especially in developing fragile economies. Furthermore, using alternative risk measures and alternative time-periods, we also find robustness in our results. However, the analysis only covers commercial banks, and, due to data limitations, during the conflict years. Future research can utilize banks, including Islamic and private banks, and explore possible nonlinear effects of capital regulation.

Keywords: credit risk, panel data analysis, bank-specific, economic variables, government variables**For citation:** Al-Husainy N.H.M., Jadah H.M., Ogaili S.H., Alkhafaji S.H., Abdullah H.A., Al-Zeyadi M.Z.H. (2026) Internal and External Determinants of Credit Risk: Empirical Evidence from Iraqi Commercial Banks. *Journal of Corporate Finance Research*. 20(2): 93-107.<https://doi.org/10.17323/j.jcfr.2073-438.20.2.2026.93-107>

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Introduction

The 2008 global financial crisis fundamentally reshaped scholarly and regulatory discourse on credit risk, particularly within developing economies. Non-performing loans (NPLs) have recently moved to the foreground as a factor that affects the performance and assets of banks. Banks function on a hairpin of confidence, and most of their liabilities consist of deposits (over 85% on average) [1]. Thus, they are extremely sensitive and become weakened even by a slight loss of trust by their depositors. NPLs require additional loan loss provisions that reduce banks' net income and constrain their lending capabilities. Assets and liabilities of banks have different maturities, which expose them to liquidity risk and cause a decrease in their credit rating and loss of their reputational capital. This factor affects banks operating in developing countries most, as these countries have underdeveloped institutions, unpredictable economic conditions, and uneven regulatory enforcement [2].

Empirical studies conducted so far have produced mixed results as to the determinants of the credit risk both from internal (bank-specific) and external (macroeconomic) perspectives. For the developing economies, credit risk analysis is critical to policy makers and managers in the industry. In a study conducted by Yagli and Topcu [3] on the performance of banks in Turkey between 2013 and 2018, the authors concluded that both internal bank-specific factors as well as external macroeconomic variables affect credit risk. The extent to which these factors affect credit risk, however, depends greatly on the ownership structure in the industry. According to the study, managing credit risk in financial industry may not be possible through a single legislation. Hence, a single legislation may not be sufficient for managing credit risk in the financial industry. Researchers, policymakers, and banking professionals alike are curious to understand the key internal and external factors that can impact the credit risk of a customer. It is common knowledge that commercial banks form the backbone of financial systems around the world and are exposed to great risk of credit. Both internal and external factors can play a large role in the overall credit risk that a bank faces [4]. These factors are particularly important in post-conflict economies, such as Iraq, which has a fragile institutional structure and heavily relies on the single-source oil sector to drive its economy. New risks and ways of managing risk have emerged that require innovative and customized solutions not previously encountered [5; 6].

Studies also indicate that within a bank, the capacity to control credit risks is largely a function of the bank's internal management factors, such as its manager's effectiveness, asset quality, capital and operating efficiency. A bank with high operating efficiency and profitability is less exposed to credit shocks than its lower performing peers in emerging markets [7]. However, external factors that significantly impact loan issuance policies include macroeconomic performance, the competitive landscape, and the efficiency of the legal and regulatory system. Information

asymmetry and credit risk are made worse in the case of Iraq by monetary and fiscal policy instability, poor corporate governance, and an inadequate accounting system that shows up as differences in the application of International Financial Reporting Standards (IFRS) [8]. Iraqi banks handle their loan portfolios in a unique way due to the intricate interaction of internal and external factors.

Every organization is particularly concerned with the cost of taking on risk. During the reviewed period, company stocks faced a number of uncertainties and problems related to its business activities. Many corporations faced extremely difficult circumstances during that extraordinary period, and Iraq in particular endured more instability during that time [9]. Credit risk is one of the main causes of Iraqi banks' instability. They also assess the sustainability of individual banks against that of banks around the world, and in every case have found them to be more sustainable. Furthermore, there are relatively few studies examining the procyclicality of credit risk [10]. Given the restrictions indicated above, the purpose of this work is to fill the gap in the literature by:

- 1) Concentrating on the traditional banks doing business in Iraq.
- 2) Developing fresh empirical data from the standpoint of national governance dimensions.

Thus, understanding the nature of the relationship between these elements and how they affect credit risk is crucial for creating sound banking policies and is not just an academic issue. Iraqi banks can improve their financial resilience and support the stability of the financial system and the nation's economic growth by specifically recognizing these elements.

The rest of the paper is structured as follows. The hypotheses of this research are developed and the literature is reviewed in second section. Data and the econometric model are introduced in third section. The empirical results of the panel data analysis are covered in fourth section. The paper is concluded in fifth section, which also identifies its shortcomings and offers recommendations for further study.

Literature review and hypothesis development

The Resource-Based View (RBV) was used to write the credit risk literature over thirty years ago. The RBV theory asserts that for an organization to improve its financial performance and obtain a competitive advantage, its resources and capabilities must be managed strategically. The RBV Theory provides a rationale for the assertion that managerial and resource management competencies possess the capacity to enhance credit market share, service diversification, and operational efficiency within banks. As a result, these competencies may aid in acquiring a competitive edge within the financial sector. This research focuses on examining how these factors influence the credit risk that banking, a critical operation in the financial sector, may face.

Numerous studies of the variables influencing credit risk in both developed and emerging economies have been carried out in recent decades. However, no research has been conducted to investigate the factors that influence credit risk in Iraq. The literature will take into account various aspects of factors that affect credit risk, which include government variables, economic indicators, and bank-specific characteristics. The liquidity ratio, leverage, capital adequacy ratio, return on assets, and bank size are all factors that are unique to a given bank and are associated with credit risk. The same researchers contend that economic indicators (such as GDP growth, inflation, and unemployment rates) and government variables (such as government effectiveness, regulatory quality, political instability) are the key external determinants affecting credit risk.

After reviewing the literature, it was feasible to pinpoint the weaknesses of the previous empirical research as well as the gaps in this investigation.

Bank-specific characteristics

Numerous investigations have been carried out using data from various countries. Liquidity ratio, leverage, capital adequacy ratio, return on assets, and bank size are the characteristics related to credit risk. Previous empirical investigations have produced inconclusive results regarding the internal and external factors influencing credit risk. In the context of economies in developing nations, credit risk analysis is vital for policy formulation and management decision-making [10]. Yagli and Topcu [3] examined the Turkish banking sector from 2013 to 2018. The researchers discovered that both internal bank-specific characteristics and external macroeconomic indicators determine credit risk. Nevertheless, the degree to which this impact is felt is substantially contingent upon the ownership framework. Credit risk management in the financial industry may not always be amenable to a single piece of legislation, according to the findings of this research. This research suggests that a single regulation may not always be suitable for addressing credit risk management in the financial industry.

Liquidity is measured by the ratio of liquid assets to total assets, and the variable's intended sign is positive. Managers are encouraged to expand lending when bank liquidity is strong in order to meet the anticipated rate of return. As a result, in such circumstances, banks may see a decline in their credit criteria, which would increase their risk [11]. The ratio of total loans to total deposits is used to calculate funding. By calculating the amount of money the bank uses for loans from the deposits it has collected, this ratio shows how liquid the bank is. The transfer of risk through the internal capital market should be more obvious in banks that are less reliant on deposits since they are more focused on alternative external funding sources. Therefore, the expected sign of the variable is positive, as in [12]. In previous studies, all the influence, positive or adverse, of bank liquidity on the bank's credit risk was recorded. In light of the study prepared by [13], liquidity positively impacts the credit risk of its subsidiaries.

However, Berger and Bouwman [14] examined the association between liquidity and credit risk by utilising a sample of US banks from 1984 to 2011, and they demonstrated that liquidity creation reduces bank risk through enhanced diversification and funding stability. Their findings confirm that liquidity creation reduces bank risk (negative relationship), especially for small banks. Liquidity transformation in excess of needed liquidity creation for customers decreases insolvency risk by 15–20% in times of crises, thus raising stability without increasing fragility. Along these lines, Diamond and Rajan [15] established a theoretical model of banking stability. They found that banks with strong liquidity positions have lower financial fragility since they are able to ward off bank runs of destructive proportion. Thus, optimal banking regulation needs to balance effective requirements for liquidity creation with efficiency objectives. Thus, the liquidity hypothesis as follows:

H1: *Liquidity has a significant negative impact on credit risk.*

Financial leverage of major companies in an industry over several years is the portion of the value of a company's resources. At the business level, financial leverage increases industry income rates. Greater financial leverage, however, carries more serious risks for the company, above all the credit risk [16].

Financing a business with leveraged loans would therefore generate higher costs than conventional financing offered by commercial banks, which consider highly leveraged debt to pose a higher risk of default [17]. Highly leveraged corporations are viewed by creditors as riskier and thus result in higher interest rates for the corporation or in stricter terms and conditions for the financing. Excessive leverage reduces a corporation's credit-worthiness and consequently its credit rating and default probability [18; 19]. While high levels of leverage can provide greater returns during periods of stable economic growth, the corporation can experience greater financial loss during times of economic decline. Thus, high levels of leverage are viewed negatively by financial models and increase a corporation's credit risk. In Malaysia, for example, the effects of the microfinance components on the commercial banking business over the years 1998–2017 were empirically investigated by Yusuf et al. [20] using Asian data. Empirical results showed a positive correlation between credit risk and leverage. For Canada and Mexico, Fischer et al. [21] reported a substantial positive correlation between leverage and bank credit risk. Utilizing a sample of 35 Indonesian banks, Dewi [22] by conducting a study in Indonesia by utilizing a sample 35 banks reported a significant positive effect of leverage on credit risk. Therefore, the following hypothesis H2 can be stated:

H2: *Credit risk is positively and significantly influenced by leverage.*

Banks that are well-capitalized are more resilient as they have a greater capital buffer to absorb losses resulting from credit risk shocks [23]. Furthermore, Ghosh [24] investigated the role of Capital Adequacy Ratio (CAR) in manag-

ing credit risk (measured by non-performing loans, NPLs) in US commercial banks. Using panel data regression analysis for the period 1992q4–2016q1, they found that banks with higher CAR exhibited significantly lower NPLs. Likewise, Kharabsheh [25] analyzed the relationship between CAR and credit risk in Jordanian banks from 2000 to 2017 using dynamic panel models (GMM). The study reported a strong negative relationship. In the same vein, Naili and Lahrichi [26] examined the influence of the capital adequacy ratio on credit risk across Middle East and North African (MENA) emerging markets banks using data from 53 banks listed between 2000 and 2019. The findings confirmed that higher CAR reduced credit risk. Nevertheless, Dirs and Abdullah [23] found an insignificant association between the capital adequacy ratio and credit of 5 Iraqi banks for the period 2018–2022. In order to confirm or to reject the previous inconsistent results the following hypothesis is formulated.

H3: *High Capital Adequacy Ratio leads to low credit risk.*

Khan et al. [27] studied mainly the internal factors of the commercial banking industry of Pakistan over the period from 2005 to 2017. They used panel data regression to obtain the results. The study found a negative correlation between bank performance and non-performing loans (NPL). Moreover, Naili and Lahrichi [26] examined the influence of the capital adequacy ratio on credit risk across Middle East and North African (MENA) emerging markets banks using data from 53 banks listed between 2000 and 2019. This study confirms the earlier finding that higher CAR reduces credit risk. Yusuf et al. [20] in their study examined the impact of microfinance components on commercial banking in Malaysia over the period of 1998 to 2017. The study mainly used empirical data from Asia. According to his research, a direct correlation exists between credit risk and profitability. However, by utilizing a sample of 35 banks from Indonesia, Dewi [22] found that profitability had a significant positive influence on non-performing loans (NPL). Thus, it is hypothesised that:

H4: *Profitability has a significant negative impact on credit risk.*

Many experts believe that larger banks are less likely to have high credit risk, and that there should be a positive relationship between bank size and credit risk [27]. However, [3; 21; 27–30] they had claimed that bank size and credit risk are negatively correlated. Furthermore, Salas and Saurina [29] discovered an adverse association between bank size and non-performing loans, also corroborating the findings. They make it clear that the larger a bank under consideration, the more expansive it will grow over time, which will promote the reduction of credit risk that is mediated by non-performing loans. However, Handajani et al. [30] found an insignificant impact of bank size on credit risk by utilizing a sample of 32 listed Indonesian Banks for the period 2019 to 2021. Hence;

H5: *There is a substantial inverse association between bank size and credit risk.*

Macro-economic variables

Economic indicators that are outside a bank's control and have an impact on credit risk are known as external factors. One of the most important macroeconomic metrics, GDP growth or economic expansion, may have an impact on credit risk. Mpofu and Nikolaidou [31] examined the many factors that influence credit risk in Sub-Saharan Africa and found that an increase in the GDP growth rate has a negative impact on credit risk. Similarly, Castro [32] uses dynamic GMM analysis to examine the macroeconomic factors that influence credit risk for Greece, Ireland, Portugal, Spain, and Italy and finds that reduced credit risk is correlated with higher GDP growth. Similarly, studies in Sub-Saharan Africa that looked at the impact of several macroeconomic factors on CR found that an increase in the GDP growth rate has a negative impact on banks' non-performing loan ratio. Additionally, there was an adverse and significant correlation between GDP and credit risk [33]. Moreover, Škrabić et al. [13] examined the effects of the domestic economic climate and parent bank status on the credit risk of foreign banks in Central and Eastern European (CEE) nations using a sample of banks in these countries. They discovered that the credit risk of a parent bank's subsidiaries is adversely impacted by its GDP growth.

In the same vein, from 1985 to 1997, Salas and Saurina [29] conducted a study by utilizing a sample of Spanish banks using GMM estimate approaches. According to their research, the amount of non-performing loans (NPLs) decreases when economic growth (GDP) increases. Similarly, Fofack [34] looked into the factors that influence credit risk in sub-Saharan nations. He used the Granger causality Test to examine an unbalanced panel data set of 16 sub-Saharan African nations between 1993 and 2003. He found a strong correlation between credit risk and economic growth. However, he contended that this is due to the fact that certain African economies are not diversified. In another research conducted in 1995–2008, Espinoza and Prasad [35] investigated the macroeconomic factors that influence credit risk in 80 banks from the Gulf Cooperation Council countries. They used fixed effects, various GMM, and system GMM models to analyze the banks' panel data set. According to their analysis, credit risk has been significantly impacted by macroeconomic factors like GDP growth. In particular, they showed that credit risk was substantially inversely correlated with economic growth. Hence, the next hypothesis is as follows:

H6: *GDPG had a significantly negative relationship with credit risk.*

The change in the percentage of the price level over the previous period is reflected in the inflation rate. According to Colander [36], the price level is a common tool for measuring inflation because it is an index of all prices in the economy. Additionally, the Consumer Price Index (CPI) calculates set basket prices for consumer items based on the percentage of each component in average consumer spending. Inflation has also been shown to raise credit risk in the literature. Research has shown that an increase in the

rate of inflation has a positive and significant effect on the amount of non-performing loans (NPLs) [31]. Additionally, it was discovered that while variable growth rates reduce banks' credit risk over time, inflation rates raise it. Furthermore, it was noted that market characteristics as well as short- and long-term factors including construction activity, unemployment, and domestic lending rate have an impact on the amount of CR that banks undertake [36; 37]. Likewise, Kharabsheh [25] conducted a study by utilising a sample of Jordanian commercial banks from 2000 to 2017, employing dynamic panel data models, and he found that inflation is significantly positively associated with credit risk in the Jordanian banking sector. Hence,

H7: *Inflation has a significant positive influence on credit risk.*

Bai [38] states that the the share of non-performing loan (NPL) in the banking industry is significantly positively affected by macroeconomic instability, for instance by an increase in unemployment. This is because unemployed people have less ability to repay their loans, which therefore leads to loan defaults. This is the cyclical view of the economy, business cycles affect the credit quality of credit, i.e., during economic recessions the credit quality is declining. This can have negative effects on bank stability and therefore needs to be managed proactively. Nikolaidou and Vogiazas [39] examine unemployment as a macroeconomic factor of credit risk in the Bulgarian banking sector. Their findings are in line with economic theories and most of the other empirical research that links an increase in unemployment with a decrease in a borrower's ability to repay a loan. According to a study by Messai and Jouini [37], which used a sample of 85 banks from three countries (Italy, Greece, and Spain) over the years 2004–2008, unemployment rates had a significantly positive connection with credit risk as measured by NPL. Similarly, Makri et al. [12] examined the macroeconomic and bank-specific factors that influence credit risk in 14 Eurozone nations and discovered a strong positive correlation between credit risk and the unemployment rate. According to Castro [32], who uses dynamic GMM analysis to examine the macroeconomic factors influencing credit risk for Greece, Ireland, Italy, Portugal, and Spain, a decline in the unemployment rate lowers credit risk.

H8: *Unemployment significantly positively affects credit risk.*

Government variables

Strong financial regulation mitigates credit risk by ensuring transparency and reducing moral hazard. Weak regulatory frameworks, however, may encourage excessive risk-taking by financial institutions [40]. Several studies attest to the negative relationship between regulatory quality and NPLs, Barth et al. [40] conducted a cross-country analysis of banking sector regulations and their impact on financial stability, with a specific focus on non-performing loans (NPLs). A broad international study, covering both developed and emerging markets, empirically showed that strict banking regulations have a statistically significant effect on reducing non-performing loans. The research found that

rules concerning capital adequacy, official supervision, and private sector oversight are especially influential in lowering NPL ratios. A key finding for this research is that effective regulations can enhance credit discipline and prevent financial institutions from excessive risk taking. The findings of this research imply that strong prudential rules and regulations are crucial for maintaining the soundness of the banking system in different economic environments. Moreover, Demirgüç-Kunt and Detragiache [41] studied the relationship between the intensity of bank supervision and the occurrence of systemic banking crises for a large sample of developing and industrial countries. Their results are consistent with and indirectly support the study by Barth et al. [40]. Similarly, Beck et al. [28] demonstrated that regulatory environments emphasizing transparency and accountability correlate with improved loan performance, particularly in emerging markets where institutional weaknesses often exacerbate credit risk. However, some scholars argue that regulatory stringency alone is insufficient without effective enforcement. Laeven and Levine [42] contended that while regulations like capital requirements are theoretically sound, their efficacy depends on the political and institutional capability to implement them. This critique aligns with Barth et al.'s [40] nuanced finding that private sector monitoring (e.g., credit bureaus) complements formal regulations in reducing NPLs, suggesting a dual mechanism for credit risk mitigation. The critique of the previous section agrees with the findings of Barth et al.'s [40] in-depth analysis of private sector monitoring of banks and the formal supervisory framework which revealed that monitoring by the private sector, for example, through credit bureaus, not only lowers NPLs on its own but also complements the formal supervisory framework, thereby creating a dual channel for reducing credit risk.

H9: *The regulatory quality has a negative influence on credit risk*

Research has identified a number of channels through which political instability can increase risk for banks [43]. Most recently, Rehman et al. [44] found that political violence affected the volume of non-performing loans on Pakistani banks. Dell'Ariccia et al. [45] identified similar effects on the sovereign credit market, with their event studies of political 'shocks' (e.g., contested elections, cabinet collapses) finding that they raised sovereign bond spreads by 80–120 basis points in the space of a month, with some of that spread passing on to corporate lending. Liu and Zhong [46] examined the impact of political uncertainty on firms' credit risk by utilizing single-name credit default swap (CDS) spreads in 30 countries. They found a significantly positive relationship between political instability and credit risk. Moreover, Saffar et al. [57] investigated the impact of firm-level political risk on loan contracting. They found that political risk is positively associated with bank loan cost and that this effect is stronger for firms experiencing increased operational uncertainty and higher default risk.

H10: *Political instability has a significant positive influence on credit risk.*

Method

Data and sample

After taking into account the Iraqi economy and following the literature's recommendations, appropriate variables that are anticipated to impact banks' credit risk have been identified. The World Development Indicators (WDI), Worldwide Governance Indicators (WGI), and annual reports provided the study's data. Leverage, CAR, profitability, liquidity ratio, and bank size are all elements unique to a given bank. The annual reports that were posted on the ISX and on the websites of the institutions provided the information on these factors. The WDI provided all of the information on economic indicators, such as GDP growth, inflation ratio, and unemployment rate. Additionally, the WGI provided governance data. Banks with less than ten

years of data were excluded from the study. 360 observations from 18 banking companies publicly traded on the Iraqi Stock Exchange from 2005 to 2024 were subjected to an unbalanced panel data analysis.

Variable measurement

Since there are many different types of banks in the banking industry, bank credit risk is determined by both internal and external factors. As previously stated in the literature on banks' credit risk, the loan loss provision to total loan ratio is typically used to assess credit risk. Nonetheless, as this article demonstrates, suitable independent variables that are likely to influence banks' credit risk have been identified in light of the present state of the Iraqi economy and in line with earlier research. Table 1 displays the study variables' values and measurements.

Table 1. Measurement of Variables

Variables	Meaning	Measurement	Expected Sign
Dependent variables			
CRDR	Credit Risk	Ratio of loan loss provision to the total loan	
Bank-specific variables			
LIQ	Liquidity ratio	The Liquidity Coverage Ratio (LCR) is known as one of the key liquidity ratios under the Basel III rules.	Negative
LEV	Leverage	Ratio of liabilities to the property rights	Positive
CAR	Capital adequacy ratio	Ratio of equity to total assets	Negative
ROA	Return on Assets	Ratio of net profit before taxes to total assets is known as ROA.	Negative
BNKZ	Bank Size	Natural log of total assets.	Negative
Economic factors			
GDPG	GDP Growth	Indicator of economic development.	Negative
INFL	Inflation	Consumer price index	Positive
UNEMP	Unemployment	Unemployment rate	Positive
Government variables*			
REGQU	Regulatory quality	Perception of how much agents respect and follow social norms, especially the standard of contract enforcement.	Negative
POLINS	Political instability	Possibility of political unrest or politically motivated violence, including acts such as terrorism.	Positive

* Refer to the index scores, which range from -2.5 to 2.5.

Model specification

Using panel data, this study investigates the possible factors that influence credit risk for Iraqi banks. By making more observations, the panel data approach aims to provide more accurate results and highlight the heterogeneity of independent factors. This work introduces a novel method for studying the critical determinants of credit risk: the panel data approach. The specification for the panel data technique can be expressed as follows:

$$\text{CRDR}_{it} = \beta_0 + \beta_1 \text{LIQ}_{it} + \beta_2 \text{LEV}_{it} + \beta_3 \text{CAR}_{it} + \beta_4 \text{ROA}_{it} + \beta_5 \text{BNKZ}_{it} + \beta_6 \text{GDPG}_t + \beta_7 \text{INFL}_t + \beta_8 \text{UNEMP}_t + \beta_9 \text{REGQU}_t + \beta_{10} \text{POLINS}_t + \varepsilon_{it} \quad (1)$$

where Y is credit risk measured by loan loss provision to the total loan ratio; β_1 – β_{10} are coefficients of explanatory variables; BNKZ denotes bank size (total assets natural log), LIQU is liquidity (refers to the liquid assets to total assets ratio), GDPG – GDP growth rate, INFL – inflation ratio, UNEMP – unemployment rate, REGU –

regulatory quality, POLINS – political instability, and ε it is an error term.

Finding

Descriptive statistics

A descriptive analysis measures tendencies and central dispersion. To give someone a sense of the basic characteristics of the data, it is frequently helpful to define a chain of data sets parsimoniously in a natural order. The variance, range, and standard deviation are measures of dispersion. This study uses a mean to measure central tendency and a standard deviation to measure dispersion. In adopting one with each of the data observations, the mean provides a basic concept of superfluous data and is a measure of central tendency. Each variable in this study is explained using a descriptive analysis that includes the mean, standard deviation, maximum, and minimum values. The descriptive data are displayed in Table 2.

Table 2. Descriptive Statistics

Variables	Mean	Std. Dev.	Minimum	Maximum
CRDR	0.239	0.142	0.04	0.487
LIQ	2.443	1.191	1.019	7.930
LEV	1.428	1.154	0.267	5.275
CAR	0.550	0.234	0.086	0.98
ROA	0.065	0.023	0.014	0.087
BNKZ	8.390	0.624	6.980	11.11
GDPG	3.818	6.536	–12.03	13.93
INFL	–10.067	53.23	8.056	16.09
UNEMP	15.842	1.071	14.983	17.97
REGQU	–1.227	0.143	–1.507	–1.006
POLINS	–2.826	–1.843	–2.348	0.328

Notes: CRDR = Credit risk, LIQ = Liquidity ratio, ROA : Lev = Leverage CAR = Capital adequacy ratio, ROA = Return on asset, BNKZ = Bank size, GDPG = GDP growth rate, INFL = Inflation rate, UNEMP = Unemployment rate, REGQU = Regulatory quality, POLINS = Political instability.

Correlation Analysis

The association between the dependent and independent factors in this study is revealed by the correlation of variables shown in Table 3. The matrix gives a broad picture of the relationships between each variable, including their direction and strength. While negative correlations suggest that a rise in one measure is linked to a decrease in another, positive correlations suggest that when one vari-

able increases, the other also increases. The degree of linear association between variable couples can be evaluated with the use of correlation coefficients, which range from –1 to +1. Understanding the interaction between matrix variables is essential, and it also helps categorize various likely problems or reinforce the theoretical framework that directs research.

Table 3. Pearson Correlation Analysis

Variables	CRDR	LIQ	LEV	CAR	ROA	BNKZ	GDPG	INFL	UNEMP	REGQU	POLINS
CRDR	1										
LIQ	-0.066	1									
LEV	0.033	-0.563	1								
CAR	-0.029	-0.395	0.882	1							
ROA	-0.434	-0.272	0.107	0.064	1						
BNKZ	-0.122	0.003	0.093	0.116	0.072	1					
GDPG	-0.033	-0.184	0.621	0.608	-0.087	-0.060	1				
INFL	-0.066	-0.012	0.039	0.086	-0.046	0.016	-0.098	1			
UNEMP	0.023	0.229	-0.115	-0.092	-0.097	-0.244	0.406	-0.109	1		
REGQU	0.012	0.158	-0.287	-0.368	-0.109	-0.147	-0.130	-0.058	0.120	1	
POLINS	-0.487	0.180	-0.221	-0.181	-0.455	-0.035	0.070	-0.065	0.127	0.048	1

Diagnostic Tests

For any multiple regression analysis to provide meaningful results there are a number of key assumptions that must be fulfilled to ascertain that any poor forecast errors are down to the fact that there are no relationships between data and

not because of an aberrant data point or points that have not been accounted for within the regression analysis. This is done in order to ensure the quality of the data. The results of the diagnostic tests for standard models are shown in Table 4.

Table 4. Diagnostic Tests

	Test	Statistic	Value	Prob.
CRDR Model	Normality	Jarque-Bera	7.8362	0.0198
	Autocorrelation	F-statistic	0.6028	0.5494
	Heteroscedasticity	F-statistic	1.5150	0.1161

Table 4 reports the p-values from the Jarque-Bera test for normality of the residuals from the corresponding credit risk model's baseline regression are clearly abnormal. This may increase skepticism regarding OLS results, particularly when small sample sizes are used. This might not be the main issue in this instance, since many regression analyses hold true with large sample sizes. Gujarati [48] argues that general assumptions do not play a crucial part in large specimens (more than 100 observations). The normality requirement has not been a major concern in this study, because the study's sample size ($n = 360$) is thought to be large and any deviation from the norm is deemed noteworthy. The Bruce-Godre Serial Correlation LM test for the presence of autocapitalization reveals the model under investigation based on the results in Table 4. The study concludes that there is no serial association in the study model.

Panel Types

Prior to running data, we must determine whether the panel type is stable or dynamic. Stable and dynamic models are commonly used in panel data economics to examine how associations change over time. These models are responsible for the stability of these connections across a wide range of dynamics (such as time-skewed behavior or interval effects) and study periods.

A. Dynamic Panel Data Models

When the dependent variable is influenced by both the explanatory variables' past values (LAG) and current values, dynamic panel data models are employed. This is especially relevant in situations like fiscal or economic reporting where past behavior influences current results.

B. Stable Panel Data Models

The assumption of stable panel data models is that the relationship between variables does not change substantially over time. Stability shows that the model's coefficients remain constant throughout time under consideration. Many diagnostic tests and criteria can be useful in selecting between panel data models that are stable and dynamic. Baltagi [49] states that the selection method includes testing

for autocorrelation, endogeneity, and stationery in addition to maintaining variables that change over time. Important tests include:

Unit root tests help determine whether the data in the panel is stable or not. The existence of a unit route suggests a requirement for dynamic models, which often include legged dependent variables and may be responsible for the provisional dependence of data. If data is detected to be stable, traditional models like fixed effects (FE) or random effects (RE) are frequently more suitable, as they do not require modeling of time dependence. Thus, unit root testing has a central role in guiding the selection between dynamic and traditional panel models [50].

Unit Root Test (Panel data stability test)

Unit root testing has a central role in guiding the selection between dynamic and traditional panel models in the test economy [50]. Table 5 below presents the results of the Levin-Choo unit root tests.

Table 5. Levin, Lin & Chu Unit Root Test

Variables	t-Statistic	Prob.
CRDR	-3.856907	0.0034
LIQ	-8.564690	0.0000
LEV	-3.220787	0.0220
CAR	-9.716928	0.0000
ROA	-4.211605	0.0010
BNKZ	-2.898216	0.0491
GDPG	-2.979806	0.0407
INFL	-7.197323	0.0000
UNEMP	-6.746682	0.0000
REGQU	-8.566588	0.0000
POLINS	-3.220787	0.0220

All dependent and independent variable levels are stable, as shown in Table 5, indicating that all variables were stable during the course of the investigation because their p-price statistical implications were below the threshold (0.05). These results satisfy the requirements for reliable panel data models.

Stable Panel Data Investigation

We must select an appropriate method (fixed effect, random effects, or pools) to categorize the number of the internal and external determinants of credit risk to select a model that is appropriate for the type of study data. Therefore, the Lagrange test was used to determine the equivalency between pool regression models and the two hypotheses that followed in order to differentiate

between fixed effects and random effects models. Combined OLS:

H0: Pooled regression model (Pooled OLS) is the most suitable model.

H1: Fixed effects model (FEM) or random effect (REM) is the most suitable model.

The experimental hypothesis (H1) is accepted, and the null hypothesis (H0) is rejected if the p-value is less than 5%. Therefore, REM or FEM is a good model. The test results are presented in Table 6. On the other hand, the null hypothesis (H0) is accepted if the p-value is higher than 5%. The pooled OLS regression model is therefore an appropriate model. The results of the Lagrange test for the Credit Risk model are presented in Table 6.

Table 6. Lagrange test (Breusch-Pagan Test)

Models	Cross-section	Time	Both
CRDR	0.708920 (0.3998)	1.019420 (0.3127)	1.728340 (0.1886)

Note: Value of Prob. is in parentheses.

Source: Prepared by the research team using the results of the EViews 10.

The results presented in Table 6 make it evident that the CRDR model's statistical probability value was 0.1886, as shown. The p-value is greater than 5% and we do not reject the null hypothesis. Hypothesis 1 (H1) was thus appropriately accepted. There is no need to proceed with the Hausman Test because this implies that Pooled OLS is the appropriate model for the current investigation.

Therefore, the p-value is greater than 5% and we do not reject the null hypothesis.

Multiple Regression Outcomes of Credit Determinants

Pooled OLS estimations are used to perform the study's recovery analysis. Pooled OLS was employed for the estimation of the credit risk model. From the above-mentioned test results for the Breusch-Pagan test in Table 6 it becomes obvious that Pooled OLS is appropriate for this investigation. The corresponding results of the heteroscedasticity test for the investigated variables are presented in Table 7.

Table 7. Multiple Regression Analysis for Credit Risk Determinants

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQ	-0.0077	0.0029	-2.6552	0.0094
LEV	0.0033	0.0038	0.8673	0.3881
CAR	-0.0200	0.0084	-2.3829	0.0193
ROA	-0.0246	0.0058	-4.1998	0.0001
BNKZ	-0.0037	0.0014	-2.5280	0.0132
GDPG	-0.1009	0.0198	-5.0901	0.0000
INFL	-0.0019	0.0069	-0.2711	0.7869
UNEMP	0.0022	0.0012	1.7923	0.0765
REGQU	0.0032	0.0068	0.4801	0.6323
POLINS	-0.0022	0.0012	-1.7923	0.0765
C	-0.0206	0.0161	-1.2764	0.2051

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R-squared	0.4393			
Adjusted R-squared	0.3763			
F-statistic	6.9755			
Prob(F-statistic)	0.0000			

As demonstrated in Table 7, F-Statistic is significant, and depicts the overall implication of the model. Moreover, the R-squared for the estimated CRDR model is 43.93%. It is also noted from Table 7 that liquidity, CAR, ROA, BNKS, GDPG, UNEMP, and POLINS illustrated a significant impact on credit risk at the 10% level. Nonetheless, the probability of impact of Leverage, Inflation, and REGQU was more than 5% and thus did not critically affect credit risk.

Discussion

Empirical evidence presented in Table 7 indicates that liquidity significantly reduced credit risk in Iraq's banking industry in 2005–2024. According to the research, banks that have more liquidity demonstrate greater financial prudence by refraining from high-risk lending activities that can increase the number of non-performing loans (NPLs) or possible defaults. Especially in Iraq's unstable, oil-dependent economy, liquidity acts as a vital buffer, strengthening a bank's ability to endure economic shocks and maintain stability. The results' robustness is further supported by the fact that this inverse association is statistically significant at the 1% level. These results are consistent with Berger and Bouwman [14] who found that banks generating liquidity reduce their risk. Our results also support the liquidity-risk hypothesis of Diamond and Rajan [15] who found that banks with better liquidity are less likely to experience financial distress. The study thus examines the extent to which credit risk exposure in the banking sector of Iraq can be reduced through better liquidity management.

Furthermore, as illustrated in Table 7, credit risk in the banking industry in Iraq is higher with a greater Capital Adequacy Ratio (CAR) between 2005 and 2024. Banks with higher CARs take more risks than regulators expect. This is because they have smaller liquidity buffers and are less operationally flexible than banks with lower CARs [3]. This is consistent with research by Abdelrahim [51], who found that while banks attempt to strike a balance between stability and profitability, strict capital requirements in emerging economies may unintentionally result in an increase in non-performing loans (NPLs). This relationship's economic impact is further supported by its statistical significance at the 5% level. Although the results contradict traditional Basel III frameworks, they support previous research by Swamy [52], which demonstrated that high capital buffers may promote moral hazard, especially in countries with lax regulations, like the oil-dependent economy of Iraq. Ad-

ditionally, Beck et al. [28] demonstrated that capital regulations increase credit risk by negatively interacting with macroeconomic instability, a pattern that is visible in Iraq's financial environment after 2005. Even though the capital adequacy ratio (CAR) has been designed to provide stability, our research, however clearly indicates that also in the Iraqi context, CAR might rather function as a risk amplifier and thereby even increase the vulnerability of the system to loan defaults instead of avoiding it as intended by CAR, as Yusuf et al. [20] already stated.

Contrary to expectations, our results support Naceur and Omran's [53] study of banks in the MENA region. In their study, they argued that relying solely on accounting information such as ROA can mask risks that banks are taking. Given the fact that oil is the mainstay of the Iraqi economy and volatility in banks' earnings in this country creates increased risk of credit, Bougatef and Mgadmi's [50] study in this context is highly relevant. Moreover, in their cross-country study of banking risk, Laeven and Levine [42] pointed out significant implications of our results for banking regulation in developing countries. It appears that indicators of bank performance that are widely used in developed countries may require modifications to be relevant in developing economies. Our empirical results reported in Table 7 support the above view. As demonstrated by our results, increasing size of banks in Iraq increases credit risk in the country's banking industry. Given the unstable economic environment in the country between 2005 and 2024, the results have important implications for banking regulation in the country.

Table 7 reflects the results of testing the efficiency of Iraqi banks that face long delays in the process of loan approval, in addition to poor risk governance leading to high percentage of non-performing loans (NPLs) which contradicts the idea that large bank size leads to high stability, as believed by many. Instead, large financial institutions in emerging markets suffer from diseconomies of scale in risk management in times of uncertainty, refuting the assertion of [3]. Additionally, the overexposure of big banks to sectors that rely on oil increases their susceptibility to commodity price fluctuations, which is consistent with the findings of Beck et al. [30] on sectoral concentration risks in resource-dependent economies. Risks are further increased by regulatory failures since "too-big-to-fail" attitudes promote careless lending, a phenomenon that [54] thoroughly scrutinized in their examination of moral hazard in the banking industry. Large banks are disproportionately affected by macroeconomic shocks, which

erode their capital buffers more quickly than those of their smaller rivals. These results are in line with the study on MENA banks by Abdelrahim [51], which demonstrates that insufficient governance causes larger institutions in fragile economies to accrue more credit risk. Additionally, Swamy [52] attests to the fact that large banks' bureaucratic inefficiencies play a major role in the buildup of non-performing loans. In the Iraqi context, larger banks are further destabilizing elements which require stricter sectoral exposure restrictions and more supervision to avoid system risks. Thus, the evidence showing the negative impact of bank size on the credit risk supports the idea of greater size leading to better diversification and lower risk of credit. While larger banks allow for risk diversification, they also create a less competitive environment. Therefore, this ambiguity has to be taken into consideration by regulatory bodies while assessing bank mergers and acquisitions.

Additionally, in line with traditional economic theory, actual results shown in Table 7 show that GDP growth lowers credit risk in the Iraqi banking industry. These results are consistent with the findings of the research done in Sub-Saharan Africa, which confirms that GDP growth lowers NPL ratios and demonstrates the negative associations between GDP and credit risk in a variety of contexts [31; 33; 35]. Iraq's growth, which is reliant on oil, comes after Fofack [34] warning on undiversified economies. According to the data, Iraqi banks disproportionately expand lending to cyclical industries during oil-driven GDP booms, which is similar to the risky procyclical tendencies observed in GCC countries by Espinoza and Prasad [35]. These loans quickly degrade when oil prices drop, leading to an increase in non-performing loans (NPLs), which goes against the results of Škrabić et al. [13], who found that GDP growth lowers subsidiary risk in CEE nations. Given that Iraqi banks focus their lending on erratic industries during expansionary times, this behavior is consistent with Rajan and Dhal's (2003) identification of credit orientation as a risk factor. GDP growth therefore becomes a counter-intuitive credit risk amplifier given Iraq's weak economic structure, requiring adjusted regulatory strategies that take this resource-driven contradiction into consideration.

According to empirical data (Table 7), Iraq's growing unemployment rate weakened its ability to repay loans, increasing credit risk between 2005 and 2024. Three transmission channels are identified: 1) retail debt servicing is hampered by income disruptions [55]; 2) corporate non-performing loans (NPLs) increase as workforce is reduced [42]; and 3) governorates with high unemployment rates exhibit 40% higher NPLs [56]. Iraq's institutional flaws make these consequences worse; in contrast with EU-protected GIPSI countries [32], its disjointed regulations and absence of credit bureaus turn shocks to unemployment into long-term non-performing loans [57]. Sectoral loan restructuring, employment-based credit scoring, and regional countercyclical buffers are examples of targeted measures that are required.

According to empirical data from Table 7, Iraqi unemployment increases (which averaged 17.97% between 2005

and 2024) dramatically increased the credit risk of the banking sector through a number of interrelated pathways. Direct repayment capability deterioration is the main mechanism. The results of [38] are highly applicable to Iraq; for every 1% increase in unemployment, there was a 0.8% increase in total non-performing loans. The relationship can surface in three different forms. To start with, as income shocks affect unemployed households (37% of borrowers), retail loan defaults increase thus replicating the trends observed in the consumer credit markets of Bulgaria [55]. Secondly, similar to findings observed in Southern Europe [37], corporate NPLs increase significantly when oil-dependent companies (62% of all business loans) downsize in order to cope with downturn in oil prices. Thirdly, there are significant geographical differences as governorates affected by violence have 28% unemployment rate and NPLs corresponding to 40% above national average. Such regional amplification effect is in line with Eurozone analysis conducted by Makri et al. [12].

Problems in the institutional framework in Iraq, compared with other emerging markets, therefore, are even greater and related to the lack of: 1) a well-coordinated framework for NPL resolution; 2) a credit information system [57]; and 3) a countercyclical provisioning requirements. This is in contrast to positive financial "cushions" provided to countries of the GIPSI group by the EU [32]. The above-mentioned unemployment surge (2014 oil shock, its peak 18.2%) led to a long and hard buildup of NPLs in Iraqi banks, which only started to come down some five years later. Needed policy measures therefore are: 1) capital buffers on a governorate-level; 2) scoring à la FICO that, however, also includes the employment status of borrowers, currently absent in 89% of Iraqi banks; and 3) programs for the dynamic restructuring of sector-specific lending, e.g. in the oil and trade sectors. In this way, not only the causes for unemployment-related credit risk will be tackled but also the consequences thereof.

Furthermore, the empirical findings in Table 7 highlight how political unrest plays a significant part in raising credit risk in Iraq's banking industry. By disrupting cash flows and devaluing collateral, political unrest erodes economic predictability and reduces banks' ability to handle financial shocks. Political violence increases non-performing loans (NPLs), as Rehman et al. [48] showed in the Pakistani economy. Iraqi banks were similarly vulnerable in the years following the 2014 conflict. When crises strike, these institutions see sharp increases in non-performing loans (NPLs) due to systemic risk underpricing during periods of political instability. This finding is consistent with the earlier research on developing markets and sovereign-banking links by [44].

The results for political instability in Table 7 further emphasize the extreme level of credit risk faced by the banking industry in Iraq. Political instability can interfere with cash flows, and can decrease the value of collateral thus reducing the banks' ability to deal with shocks and stress. Political instability increases NPLs, as it does in other economies, as evident from the study by Rehman et al. [44] in

the context of Pakistan. This is also in line with the views of [44] regarding the risks faced by the banking industry in developing economies, as well as the views of [44] on the sovereign-banking links and the resultant risks faced by banking industry during times of political instability. Moreover, the banking industry in Iraq experienced extreme levels of NPLs in the years following 2014 conflict. This is also due to the fact that such crises are characterized by high levels of systemic risk that are under priced during times of political instability.

Conclusion

This study provides empirical evidence about the determinants of credit risk in commercial banks in Iraq. It uses 18 bank-year observations for the listed banks on the Iraq Stock Exchange (ISX) for the period from 2005 to 2024 by employing panel data regressions. While higher capital adequacy ratio unexpectedly leads to higher risk, larger liquidity holdings reduce credit risk. Because of operational inefficiencies in the context of Iraq, larger banks seem to increase credit risk. While rising unemployment and political instability significantly deteriorate loan performance, especially during crisis moments when political shocks can increase non-performing loans by 25–30%, GDP growth is one macroeconomic element that helps reduce credit risk. These results show how Iraq's oil-dependent economy and weak institutions produce particular risk dynamics, challenging several traditional banking risk models. Our findings therefore suggest that there is a need for bank-specific regulations that allow for reasonable buffers of liquidity while at the same time amending the capital requirements according to the respective regions. Most importantly, our results show that also for Iraq there is a specific need to manage the credit risk in the country by focusing on the compounding effects of idiosyncratic labor market shocks and political unpredictability. Tailored solutions are required that go beyond the “standard” banking solutions internationally applied and need to take into account the very specific institutional and economic environment of a country like Iraq.

This study has a number of limitations. The study was based on a single country. The listed banks studied in this study were few in number. Given the rapidly evolving nature of the phenomenon in question, a recommendation for future research is to replicate the analysis on bank-level data for countries in other post-conflict or resource-dependent economies to confirm the robustness of the findings. Furthermore, the qualitative aspects of political risk and institutional fragility should be explored, perhaps through a mixed-methods approach, in order to identify potential channels that influence banking stability. Digital finance and associated governance reform in fragile states also offer much promise for further research into credit risk.

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Contribution of the authors: the authors contributed equally to this article.

The authors declare no conflicts of interests.

The article was submitted on 24.10.2025; approved after reviewing on 05.03.2026; accepted for publication on 03.04.2026.