The Impact of Credit Policies on the Credit Risk of Bank Lending in the Iraqi Banking System

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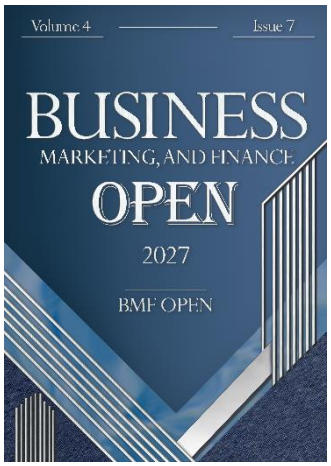

Citation: Altufaili, R., Nadiri, M., Noorbakhsh, A., & Joshaghani, S. H. (2027). The Impact of Credit Policies on the Credit Risk of Bank Lending in the Iraqi Banking System. *Business, Marketing, and Finance Open*, 4(7), 1-18.

Received: 26 May 2026
Revised: 21 August 2026
Accepted: 28 August 2026
Initial Publication: 06 September 2026
Final Publication: 01 December 2027

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Abstract: Credit risk has been one of the most significant challenges facing the Iraqi banking system, influenced by the economy's dependence on oil revenues, weaknesses in informational and institutional infrastructure, and the dual structure of public and private banks. The present study aimed to investigate the impact of credit policies on reducing the risk of bank loans in the Iraqi banking system. In terms of purpose, this research was applied, and in terms of methodology, it employed a descriptive–analytical design with a mixed quantitative and qualitative approach. In the quantitative component, data from 33 banks over the 2015–2024 period were examined, comprising 330 bank-year observations. In the qualitative component, 12 semi-structured interviews and 98 valid questionnaires were analyzed. Data analysis was conducted using a fixed-effects panel model, robust generalized least squares (GLS) estimation, a dynamic generalized method of moments (GMM) model, and three-stage coding. The results showed that the composite credit policy index had a negative and statistically significant effect on the non-performing loan ratio ($\beta = -0.128$, $p < .01$). Capital adequacy, return on assets, economic growth, and oil prices also had risk-reducing effects, whereas inflation and unemployment increased credit risk. The findings further indicated that the effect of credit policies was stronger in private banks than in public banks, while weaknesses in post-lending monitoring, inadequate credit information infrastructure, and technological underdevelopment were among the most important challenges. Overall, the results demonstrated that coordinated improvement of credit policies, together with the strengthening of institutional and informational infrastructure, could lead to a significant reduction in credit risk in the Iraqi banking system.

Keywords: credit policies, credit risk, non-performing loans, Iraqi banking system, credit policy index, panel data.

1. Introduction

Credit risk is one of the most persistent and consequential forms of financial risk confronting banking institutions because it directly affects asset quality, profitability, capital adequacy, liquidity, and ultimately the stability of the financial system. At its core, credit risk arises from the possibility that borrowers may fail to meet their contractual repayment obligations in full and on time, thereby exposing banks to losses in principal, interest income, or both. Because lending remains one of the principal functions of commercial banks, the quality of credit allocation and the effectiveness of credit risk management are central determinants of banking performance. Evidence from international banking systems has consistently demonstrated that higher credit risk is associated with weaker profitability and greater vulnerability of financial

institutions, particularly when deterioration in loan quality coincides with adverse macroeconomic conditions [1]. At the same time, the relationship between financing structure, credit exposure, and bank performance suggests that credit risk cannot be treated merely as an operational outcome; rather, it is closely connected to the broader balance-sheet structure and strategic financial decisions of banks [2]. Consequently, the design and implementation of effective credit policies have become fundamental components of prudent banking governance and financial stability.

Credit policies constitute the institutional framework through which banks determine who is eligible to borrow, under what conditions credit should be extended, how borrowers should be evaluated, what collateral or guarantees should be required, how loans should be priced, and how borrowers should be monitored after loan disbursement. Effective credit policy therefore extends beyond initial loan approval and encompasses the entire credit life cycle, from screening and appraisal to monitoring, restructuring, collection, and recovery. Empirical evidence indicates that the quality of credit risk management practices can significantly influence the financial performance of commercial banks, highlighting the importance of systematic credit appraisal, monitoring procedures, internal controls, and risk-based lending decisions [3]. Similarly, research on bank lending performance has shown that stronger credit risk management contributes to more efficient lending outcomes by reducing problematic exposures and improving the quality of loan portfolios [4]. These findings reinforce the view that credit risk is not solely driven by borrower characteristics or external shocks; it is also shaped by the quality and consistency of the policies adopted by lending institutions.

A particularly important dimension of credit policy is the assessment of borrower creditworthiness. Traditional lending models rely heavily on financial statements, repayment histories, collateral values, income information, and qualitative judgment by credit officers. However, deficiencies in borrower information can generate adverse selection before loan approval and moral hazard after loan disbursement. Information asymmetry is therefore a structural source of credit risk, especially in banking environments where centralized credit information systems are incomplete or where accounting and disclosure practices are weak. Recent developments in alternative credit scoring have demonstrated that the infrastructure through which creditworthiness is calculated can materially affect lending decisions and the distribution of credit access [5]. The increasing use of nontraditional information, computational models, and digital financial data also shows that credit assessment has evolved from a relatively static judgment process toward a more data-intensive system of risk classification. These developments have direct implications for banking systems in which conventional credit information remains fragmented, as stronger informational infrastructure may allow lenders to identify high-risk borrowers more accurately before substantial credit exposure is created.

The rapid expansion of financial technology has further transformed the credit environment. Digital credit, automated underwriting, online lending platforms, alternative data, and micro-lending technologies have reduced transaction costs and expanded access to financial services, particularly among individuals and firms traditionally underserved by formal financial institutions [6]. Fintech and large technology companies have also become important providers of credit, with the growth of digital lending being supported by technological scalability, expanded data availability, and new mechanisms for assessing borrower risk [7]. For conventional banks, these developments create both opportunities and challenges. Technology can strengthen credit policies by facilitating automated risk scoring, real-time monitoring, early-warning systems, and more efficient documentation. At the same time, inadequate technological infrastructure may place banks at a disadvantage by limiting their ability to detect deterioration in borrower quality, integrate credit information, or monitor rapidly changing loan portfolios.

Accordingly, technological capability increasingly represents an integral component of contemporary credit policy rather than a supplementary administrative function.

Collateral and guarantees constitute another major element of credit policy, particularly in banking systems where reliable borrower information is limited. Collateral can mitigate potential losses by providing banks with recoverable assets if borrowers default, but its effectiveness depends on proper valuation, legal enforceability, documentation quality, and the speed with which pledged assets can be seized or liquidated. A credit system that relies excessively on collateral without adequately evaluating repayment capacity may paradoxically increase risk by encouraging banks to approve borrowers whose underlying cash flows are weak. Research adopting a pathological approach to guarantees and collateral in banking facilities emphasizes that weaknesses in the design, evaluation, and enforcement of collateral arrangements can undermine credit risk management and reduce the effectiveness of lending controls [8]. Thus, prudent credit policy requires an appropriate balance between borrower-based assessment and collateral-based protection, supported by an institutional framework capable of enforcing creditors' rights.

The effectiveness of credit policies is also closely linked to bank capital and financial performance. Capital adequacy provides a buffer against unexpected losses and strengthens banks' capacity to absorb deterioration in loan quality. In this context, the relationship between credit risk and capitalization is particularly important because banks with stronger capital positions may be better equipped to withstand shocks while maintaining lending operations. Studies examining the interaction between portfolio composition, efficiency, credit risk, and capitalization show that the impact of risk exposure on banking performance is conditioned by banks' capital structure and the composition of their lending portfolios [9]. Similarly, research using dynamic panel and generalized method of moments approaches has highlighted the relationship between credit risk, capital adequacy, bank size, and ownership structure, indicating that institutional characteristics can materially influence the magnitude and persistence of bank credit risk [10]. These findings are especially relevant for heterogeneous banking systems in which public, private, conventional, and Islamic banks operate under substantially different governance arrangements.

Credit risk is also affected by macroeconomic conditions that influence borrowers' repayment capacity. Economic growth generally improves household income, corporate revenues, employment opportunities, and business profitability, thereby reducing the likelihood of default. Conversely, recessions can increase non-performing loans by weakening cash flows and reducing the capacity of borrowers to meet debt-service obligations. Cross-country evidence demonstrates that macroeconomic variables are significant determinants of credit risk and that sustainable lending requires banks to account for the broader economic environment when designing and adjusting credit strategies [11]. The relationship between macroeconomic conditions and banking risk is particularly important in economies exposed to commodity cycles, external shocks, or high fiscal volatility. In such environments, seemingly sound loans may rapidly deteriorate when changes in economic activity weaken borrowers' income-generating capacity.

Inflation represents one of the macroeconomic factors capable of influencing credit quality through multiple channels. Rising prices can reduce the real purchasing power of households, increase firms' operating costs, create uncertainty in investment decisions, and complicate monetary and financial planning. Although moderate inflation can reduce the real value of debt under some conditions, persistent inflation may weaken repayment capacity when wages and revenues fail to adjust proportionately. Research examining the relationship between taxation and inflation at the regional level illustrates how changes in fiscal and economic conditions can affect price dynamics

and consequently alter the financial environment in which borrowers and lenders operate [12]. For banks, inflation therefore represents not merely a monetary indicator but a risk factor that can influence loan performance, interest-rate conditions, asset values, and borrower behavior.

Unemployment similarly affects the probability of loan default because job loss and reduced household income directly constrain debt-servicing capacity, while weak labor markets can also reduce demand and revenues for businesses. The simultaneous effects of inflation, unemployment, and economic growth are particularly important for credit risk modeling because these variables can interact during periods of economic instability. Consequently, banks that apply rigid credit standards without considering changing macroeconomic conditions may either accumulate excessive risk during economic expansions or unnecessarily restrict lending during downturns. A more adaptive credit policy therefore requires cyclical flexibility, continuous portfolio reassessment, and the incorporation of macroeconomic indicators into credit decisions. Such flexibility is particularly critical in environments characterized by recurrent political, fiscal, or commodity-related shocks.

For oil-dependent economies, fluctuations in energy prices constitute an additional and often dominant source of financial risk. The relationship between energy markets and bank credit risk has received increasing attention because oil-price movements influence government revenues, public spending, corporate activity, investment, employment, and borrower liquidity. Recent evidence indicates that energy-related developments can affect bank credit risk indirectly through changes in economic growth, demonstrating that macroeconomic transmission channels are important in understanding the effect of energy conditions on banking stability [13]. The structure of bank lending to fossil-fuel-related sectors can also expose financial institutions to transition risk, provisioning requirements, and higher credit risk capital charges as economies move toward lower-carbon production systems [14]. These findings imply that the connection between oil markets and banking risk operates through both traditional commodity-price volatility and emerging transition-related financial pressures.

The growing literature on environmentally oriented lending further illustrates how credit policy can influence both borrower behavior and portfolio risk. Green credit policies are designed to incorporate environmental criteria into bank financing decisions, directing capital toward sustainable activities while restricting lending to environmentally harmful projects. Evidence indicates that such policies can alter firms' strategic choices and encourage green innovation, although firms may respond either through substantive technological improvement or through symbolic forms of environmental compliance [15]. Other research likewise shows that green credit policy can encourage enterprise-level green innovation by changing financing incentives and constraints [16, 17]. These studies demonstrate a broader principle that is directly relevant to conventional credit risk management: when credit policy changes the conditions under which firms obtain financing, it can reshape borrower behavior, investment choices, and ultimately the quality of bank loan portfolios.

Credit policies can also affect firms' research and development decisions by changing access to financing under conditions of uncertainty. Evidence from quasi-natural experiments suggests that policy-based credit allocation influences corporate R&D investment and that the magnitude of such effects depends on uncertainty and financing conditions [18]. Likewise, studies of sector-specific dual-credit mechanisms demonstrate that credit-oriented policy frameworks can influence the interaction among technology, market demand, and production decisions [19]. Although these studies are situated in different policy environments, they illustrate the broader capacity of credit policies to shape economic behavior beyond the immediate borrower–lender relationship. In banking, this means that credit policies should be understood not simply as internal risk-control rules but as mechanisms through which financial institutions affect resource allocation, corporate strategy, and the distribution of risk across sectors.

Moreover, the social and governance implications of credit policy have become increasingly important. Studies examining green credit policy have shown that changes in financing conditions can improve corporate social responsibility by creating financial incentives for firms to modify their behavior and strengthen their compliance with broader policy objectives [20]. This suggests that the effectiveness of lending policies depends partly on how well financial incentives are aligned with institutional objectives and regulatory expectations. From a risk management perspective, clear and consistently implemented credit standards can reduce discretionary lending, constrain excessive risk-taking, improve borrower discipline, and enhance the accountability of credit officers. Conversely, politically motivated lending, weak governance, regulatory forbearance, or repeated restructuring of problematic exposures can weaken the informational content of reported non-performing loan ratios and obscure the underlying level of credit risk.

The institutional context is therefore crucial when comparing credit risk across banks. Ownership structure may affect lending incentives, governance quality, political exposure, monitoring rigor, and the treatment of distressed borrowers. Public banks may pursue developmental, social, or fiscal objectives in addition to commercial goals, whereas private banks may face stronger profitability and capital-market pressures. As a result, identical formal credit policies may produce different outcomes depending on organizational incentives and enforcement mechanisms. Evidence on banking performance and credit risk supports the importance of distinguishing between institutional characteristics when assessing risk outcomes [2, 10]. This distinction is especially important in banking systems where a relatively small number of public institutions hold a disproportionate share of banking assets, while numerous private banks operate with smaller balance sheets and potentially different approaches to risk evaluation.

These considerations are highly relevant to Iraq. The Iraqi banking system operates within an economy historically characterized by substantial dependence on oil revenues, significant public-sector dominance, institutional and informational constraints, and pronounced differences between public and private banks. Changes in oil prices can transmit rapidly to government expenditure, liquidity conditions, business activity, employment, and borrower repayment capacity. At the same time, limitations in centralized credit information, collateral enforcement, technological infrastructure, and post-lending monitoring can reduce the effectiveness of conventional risk-management practices. Under these conditions, non-performing loans are likely to reflect not only individual borrower quality but also the interaction among bank-specific policies, ownership structures, macroeconomic volatility, institutional capacity, and technological development.

This interaction highlights an important analytical issue: examining credit policy through a single indicator may provide an incomplete representation of how banks actually manage credit risk. Credit appraisal, collateral requirements, post-disbursement monitoring, policy flexibility, and technological capability operate as interconnected components. Weakness in one dimension may reduce the effectiveness of the others. For example, rigorous initial screening may fail to prevent deterioration when post-lending monitoring is weak, while sophisticated scoring systems may have limited value when borrower information is incomplete. Similarly, strong collateral requirements may provide little protection when enforcement procedures are inefficient. The empirical literature on credit risk management suggests that an integrated approach is more likely to support sustainable lending and stronger banking performance than isolated control measures [3, 4]. The development of a composite credit policy index can therefore provide a more comprehensive measure of the overall strength of credit governance within banks.

Another methodological consideration concerns the dynamic nature of credit risk. Non-performing loans frequently exhibit persistence because distressed credit exposures cannot be resolved immediately and may continue to affect bank balance sheets across multiple periods. At the same time, reverse causality is possible: banks experiencing high NPL ratios may tighten their credit policies, while weak credit policies may themselves contribute to future NPL accumulation. Dynamic panel techniques are therefore useful for controlling for persistence and potential endogeneity in the relationship between policy and credit risk. The growing application of GMM-based methods in banking research reflects the importance of accounting for these dynamic relationships when examining risk, capitalization, ownership, and performance [10]. Such methods are particularly useful when panel datasets contain repeated observations for a relatively large group of banking institutions across multiple years.

Despite the expanding international literature on credit risk, financial technology, green lending, capital adequacy, macroeconomic determinants, and lending governance, an important gap remains regarding the integrated evaluation of credit policies in the Iraqi banking sector. Previous studies have demonstrated that stronger credit risk management improves bank performance [3], that profitability and credit risk are closely interconnected [1], that macroeconomic factors shape loan quality [11], and that digital technologies are increasingly transforming credit allocation and borrower assessment [6, 7]. Other studies have shown that credit policy can influence borrower innovation, strategic choices, production behavior, and social responsibility [15, 18-20]. Yet relatively limited attention has been devoted to examining how multiple dimensions of bank credit policy jointly affect non-performing loans within the distinctive institutional and macroeconomic conditions of Iraq.

A further gap concerns the integration of quantitative and qualitative evidence. Econometric analysis can estimate the magnitude and statistical significance of relationships among credit policies, bank characteristics, macroeconomic variables, and NPLs, but it cannot fully explain why formally similar policies may function differently across institutions. Qualitative evidence from bank managers and credit specialists can identify mechanisms that are difficult to observe directly in financial statements, including political influence, informal restructuring practices, weaknesses in post-lending supervision, deficiencies in shared credit information systems, shortages of specialized personnel, and technological constraints. Combining these forms of evidence offers a more comprehensive framework for evaluating not only whether credit policies affect risk but also the institutional conditions under which those policies become more or less effective.

Accordingly, the present study addresses credit risk as the product of an interconnected system in which bank-level credit policy, financial characteristics, macroeconomic conditions, ownership structure, institutional capacity, and technological infrastructure jointly influence the quality of lending portfolios. By constructing a Composite Credit Policy Index encompassing borrower assessment, collateral requirements, post-lending monitoring, cyclical flexibility, and technological capability, and by examining this index alongside capital adequacy, profitability, economic growth, oil prices, inflation, and unemployment, the study provides a multidimensional assessment of credit risk in Iraq. The analysis also distinguishes between public and private banks and incorporates dynamic GMM estimation to evaluate the persistence and potential endogeneity of credit risk, while qualitative evidence is used to interpret institutional mechanisms underlying the econometric results. In doing so, the study responds to the growing recognition that effective banking risk management requires not merely stricter lending standards but coordinated improvements in information, governance, monitoring, capitalization, technological capacity, and the responsiveness of credit policy to changing economic conditions [5, 9, 14].

Therefore, the aim of this study was to investigate the effect of credit policies on reducing the credit risk of bank lending in the Iraqi banking system during 2015–2024 by integrating bank-level, macroeconomic, institutional, and qualitative evidence.

2. Methodology

The present study is applied in terms of purpose and descriptive–analytical in terms of its implementation method. The adopted approach combines quantitative and qualitative methods. The quantitative dimension establishes numerical and statistically significant relationships among the variables through advanced statistical analyses and econometric models, whereas the qualitative dimension provides a more context-sensitive understanding of the practical, institutional, and local complexities of the Iraqi banking system through in-depth semi-structured interviews and documentary analysis. Such an integration is particularly necessary for research conducted in developing economies and banking systems characterized by distinctive structural features.

Quantitative component: The statistical population consisted of all active and licensed commercial banks in Iraq, numbering approximately 75 to 80 banks. Using stratified random sampling based on ownership type, asset size, and type of activity, 33 banks were selected for the 2015–2024 period, yielding a total of 330 bank-year observations. The inclusion criteria consisted of holding a valid operating license, having at least five years of continuous operating history, providing audited financial statements for the entire study period, and having total assets of at least IQD 50 billion.

Qualitative component: Twelve semi-structured interviews were conducted with senior banking managers and credit experts. In addition, a researcher-developed questionnaire consisting of 72 closed-ended items across eight sections and three open-ended questions was distributed among 120 employees and managers working in the credit departments of the 33 sampled banks. A total of 98 valid questionnaires were returned, corresponding to a response rate of 81.7%.

Quantitative data were collected from three primary sources: (1) annual and quarterly reports of the Central Bank of Iraq; (2) annual audited financial statements of commercial banks; and (3) reputable international databases, including the International Monetary Fund, the World Bank, and OPEC, for macroeconomic variables. Qualitative data were collected through in-depth interviews, the researcher-developed questionnaire, and a review of official documents and circulars issued by the Central Bank of Iraq.

Table 1. Research Variables

Variable Type	Symbol	Definition	Unit
Dependent	NPL	Ratio of non-performing loans, defined as loans overdue by more than 90 days, to total loans granted	Percentage
Independent	CPI	Composite Credit Policy Index, calculated as the weighted average of five components: assessment, collateral, monitoring, flexibility, and technology	0–100
Independent	CRR	Required reserve ratio	Percentage
Control	CAR, ROA	Capital adequacy ratio and return on assets	Percentage
Control	GDPG, OILP, INF, UNE	Economic growth, oil price, inflation, and unemployment	Percentage / USD per barrel

The Composite Credit Policy Index (CPI) was calculated as follows:

$$CPI_{it} = 0.25E_{it} + 0.20C_{it} + 0.25M_{it} + 0.15F_{it} + 0.15T_{it}$$

The fixed-effects panel-data model was estimated as follows:

$$NPL_{it} = \alpha_i + \beta_1 CPI_{it} + \beta_2 CRR_t + \beta_3 CAR_{it} + \beta_4 ROA_{it} + \beta_5 GDPG_t + \beta_6 OILP_t + \beta_7 INF_t + \beta_8 UNE_t + \varepsilon_{it}$$

Before estimating the model, panel unit-root tests and Pedroni cointegration tests were conducted to ensure the stationarity of the variables and the existence of a long-run relationship. The choice among fixed-effects, random-effects, and pooled models was made using the F-Limer and Hausman tests. To address heteroskedasticity, robust estimation using generalized least squares (GLS) was employed, and to control for potential endogeneity, the Arellano–Bond dynamic GMM model was also applied as a robustness check.

Data obtained from the interviews were analyzed using the three-stage coding procedure of open, axial, and selective coding in order to identify the major concepts and categories associated with challenges in the implementation of credit policies in Iraq.

Questionnaire reliability was assessed using Cronbach's alpha, which was .925 for the overall instrument and ranged from .768 to .891 for the five individual components. All coefficients exceeded the acceptable threshold of .70 and therefore indicated good to excellent reliability. Internal validity was supported through the use of reliable and audited data sources and the control of confounding variables. External validity was addressed by designing a sample representative of different types of public banks and large, medium-sized, and small private banks, thereby enhancing the generalizability of the findings to the Iraqi banking system as a whole.

3. Findings and Results

The final research sample consisted of 33 active commercial banks in Iraq over the 2015–2024 period, yielding 330 bank-year observations.

Table 2. Distribution of Sampled Banks by Ownership Type

Bank Type	Number	Percentage
Public banks	6	18.2%
Private commercial banks	15	45.5%
Private Islamic banks	12	36.3%
Total	33	100%

Although public banks accounted for only 18.2% of the sample, they held more than 80% of the total assets of the Iraqi banking system, indicating a level of systemic importance that was disproportionately high relative to their small number.

Table 3. Descriptive Statistics of the Econometric Model Variables, 2015–2024 (330 Observations)

Variable	Symbol	Mean	Median	Standard Deviation	Minimum	Maximum
Non-performing loan ratio	NPL	9.82%	7.20%	4.75	2.02%	20.97%
Credit Policy Index	CPI	52.40	51.00	18.35	18.00	89.00
Required reserve ratio	CRR	16.20%	15.00%	1.85	15.00%	18.00%
Capital adequacy ratio	CAR	35.60%	38.00%	12.40	12.50%	41.90%
Return on assets	ROA	1.25%	1.10%	0.85	-0.60%	3.80%
Real GDP growth	GDPG	1.45%	1.80%	5.60	-11.30%	9.80%
Basra crude oil price	OILP	58.70	56.00	18.20	28.00	99.00
Inflation rate	INF	3.15%	2.80%	1.45	0.40%	6.20%
Unemployment rate	UNE	14.80%	14.00%	3.20	10.50%	21.00%

The mean NPL ratio over the study period (9.82%) was considerably higher than the global average (5.38%). The Credit Policy Index (CPI), with a mean of 52.40, was within the "moderate" range, indicating that most Iraqi banks had not yet reached a "strong" or "very strong" level of credit policymaking.

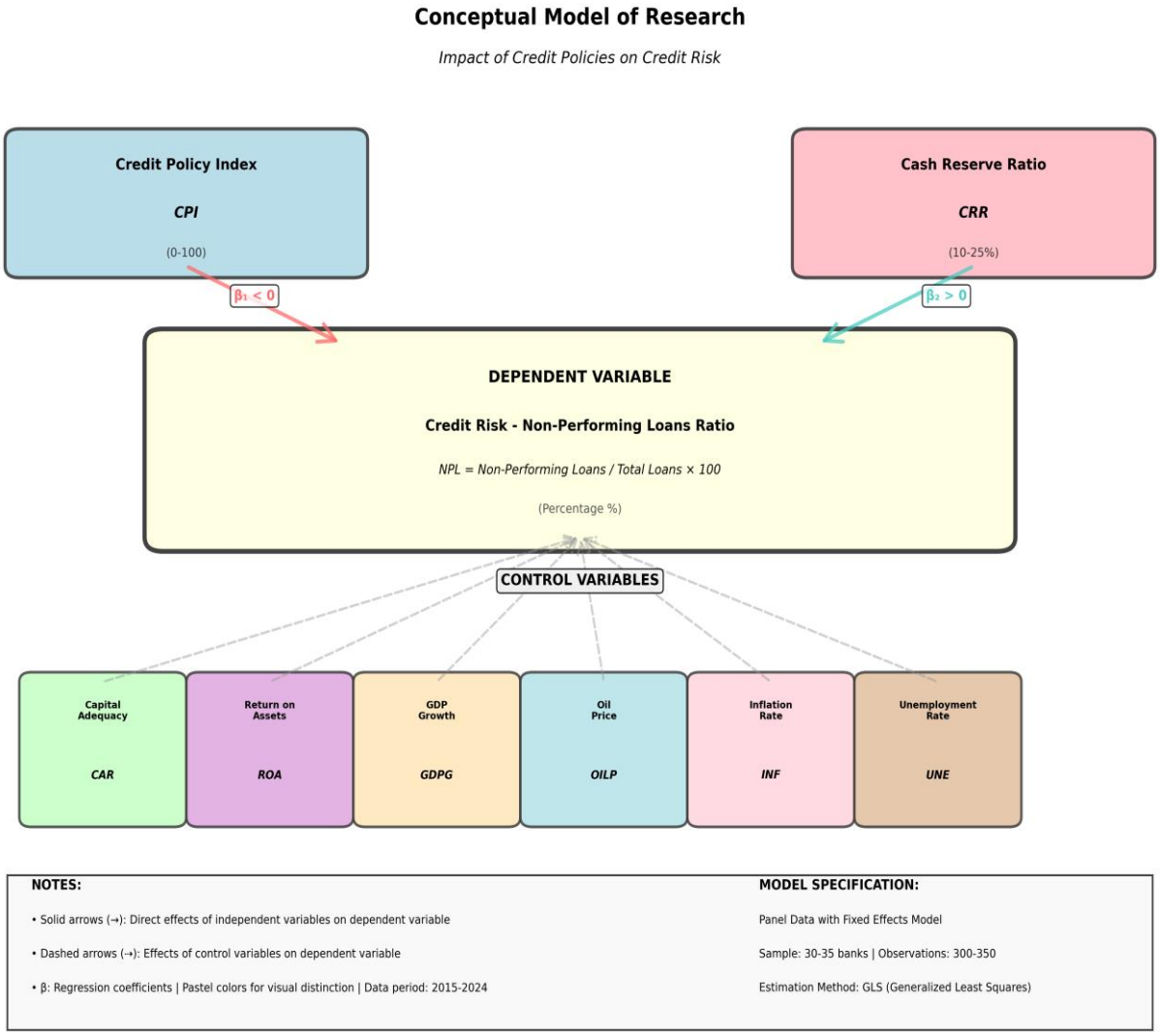

Figure 1. Conceptual Model of the Research

The NPL trend during the 2015–2024 period exhibited an inverted U-shaped pattern: it gradually increased from 9.02% in 2015 to a peak of 20.97% in 2020, coinciding with the COVID-19 crisis and the decline in oil prices to USD 28 per barrel. It then gradually decreased to 6.3% in 2023, followed by a slight increase to 7.14% in 2024, indicating the fragility of the recovery trend.

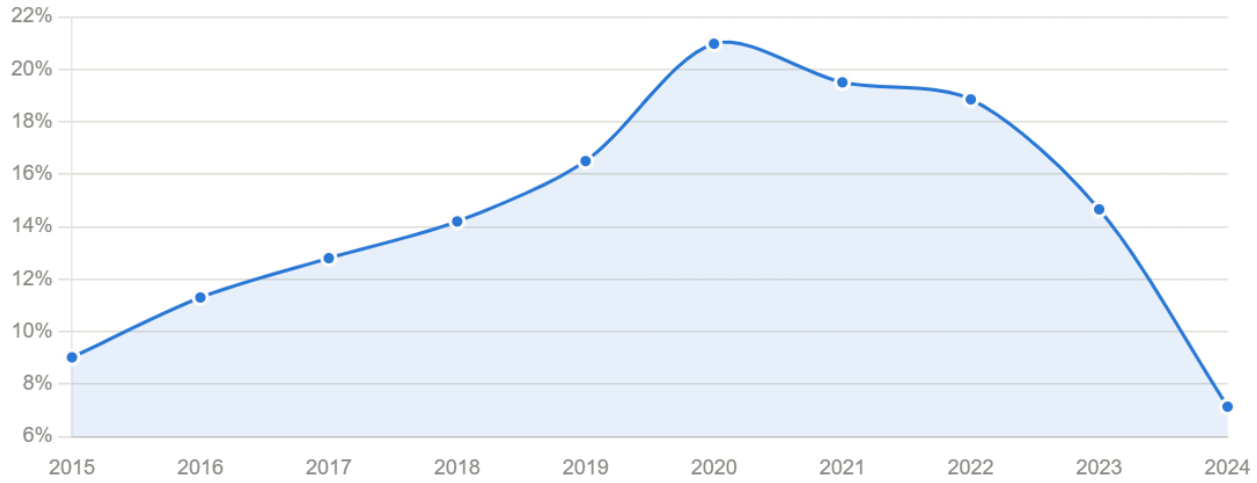

Figure 2. Trend in the Non-Performing Loan (NPL) Ratio of Iraqi Banks During 2015–2024

A clear negative association was observed between oil prices and NPLs. In 2022, when the oil price increased to USD 99 per barrel, the NPL ratio declined to one of its lowest levels during the study period. By contrast, in 2020, when the oil price fell to USD 28 per barrel, the NPL ratio reached its peak.

Table 4. Comparison of NPLs by Bank Type, Average for 2021–2024

Bank Type	Sample Size	Mean NPL	Minimum NPL	Maximum NPL	Mean ROA	Mean CAR
Public banks	6	3.65%	2.02%	6.20%	0.65%	28.5%
Private commercial banks	15	12.80%	7.50%	18.00%	1.55%	38.2%
Private Islamic banks	12	10.50%	5.80%	15.20%	1.40%	41.5%
Total sample	33	9.82%	2.02%	18.00%	1.25%	35.6%

A key point is that the lower NPL ratio of public banks (3.65%) does not necessarily indicate superior risk management. According to the qualitative findings of this study, part of this lower figure resulted from repeated loan restructuring and the concealment of actual overdue claims.

Table 5. Summary of Diagnostic and Model Selection Tests

Test	Purpose	Statistic	p-Value	Result
Levin–Lin–Chu (LLC)	Stationarity of all variables	—	All < .01	All variables stationary at level, I(0)
Pedroni cointegration test (7 statistics)	Long-run relationship	Panel ADF = -3.89	< .01	Cointegration/stable long-run relationship confirmed
F-Limer test	Panel model versus pooled OLS	F = 8.45	.000	Pooled model rejected → panel model selected
Hausman test	Fixed effects versus random effects	$\chi^2 = 32.18$	.000	Random effects rejected → fixed effects selected
Wooldridge test	Serial autocorrelation	F = 2.15	.145	No serial autocorrelation
Breusch–Pagan test	Heteroskedasticity	$\chi^2 = 18.35$	.018	Heteroskedasticity present; corrected using GLS
Jarque–Bera test	Normality of residuals	3.85	.146	Residuals normally distributed
Maximum VIF	Multicollinearity	3.25	—	No severe multicollinearity (VIF < 5)

Accordingly, the fixed-effects panel-data model was selected as the final model.

$$NPL_{it} = \alpha_i + \beta_1 CPI_{it} + \beta_2 CRR_t + \beta_3 CAR_{it} + \beta_4 ROA_{it} + \beta_5 GDPG_t + \beta_6 OILP_t + \beta_7 INF_t + \beta_8 UNE_t + \varepsilon_{it}$$

Table 6. Fixed-Effects Model Estimation Results

Variable	Coefficient (β)	Standard Error	t Statistic	p-Value	Significance Level	Result
Constant (α)	15.42	3.25	4.74	.000	***	—
CPI (Credit Policy Index)	-0.128	0.023	-5.57	.000	***	Supported ($\beta_1 < 0$)
CRR (Required Reserve Ratio)	0.345	0.152	2.27	.024	**	Supported ($\beta_2 > 0$)
CAR (Capital Adequacy Ratio)	-0.085	0.031	-2.74	.006	***	Supported ($\beta_3 < 0$)
ROA (Return on Assets)	-1.235	0.385	-3.21	.001	***	Supported ($\beta_4 < 0$)
GDPG (GDP Growth)	-0.182	0.065	-2.80	.005	***	Supported ($\beta_5 < 0$)
OILP (Oil Price)	-0.045	0.015	-3.00	.003	***	Supported ($\beta_6 < 0$)
INF (Inflation)	0.582	0.215	2.71	.007	***	Supported ($\beta_7 > 0$)
UNE (Unemployment)	0.395	0.128	3.09	.002	***	Supported ($\beta_8 > 0$)

Model fit statistics: $R^2 = .72$ | Adjusted $R^2 = .68$ | $F = 28.45$ ($p = .000$) | Durbin–Watson = 1.85 | Number of observations = 330

The negative and statistically significant coefficient of CPI (-0.128) indicates that each one-unit improvement in the Composite Credit Policy Index significantly reduces the NPL ratio, a finding that supports all three research hypotheses. Among the control variables, ROA, with a coefficient of -1.235, had the strongest risk-reducing effect.

Table 7. Results of the GLS Model With Robust Standard Errors

Variable	Coefficient (β)	Robust Standard Error	t Statistic	p-Value	Result
CPI	-0.118	0.028	-4.21	.000	*** Significant
CRR	0.312	0.165	1.89	.060	* Weakly significant
CAR	-0.078	0.035	-2.23	.027	** Significant
ROA	-1.185	0.415	-2.86	.005	*** Significant
GDPG	-0.168	0.072	-2.33	.020	** Significant
OILP	-0.042	0.017	-2.47	.014	** Significant
INF	0.545	0.235	2.32	.021	** Significant
UNE	0.368	0.142	2.59	.010	*** Significant

$R^2 = .70$ | Adjusted $R^2 = .66$ | $F = 24.85$ ($p = .000$) | Observations = 330

All coefficients retained their direction and statistical significance, except for CRR, whose significance level declined from 5% to 10%. This result confirms the robustness of the findings from the main model.

Table 8. Results of the Dynamic GMM Model

Variable	Coefficient	p-Value	Result
NPL(t-1)	0.425	.000	Strong dynamic effect indicating persistence of credit risk
CPI	-0.095	.002	Negative effect confirmed
CRR	0.285	.078	Weakly significant
CAR	-0.062	.035	Negative effect confirmed
ROA	-0.985	.018	Negative effect confirmed
OILP	-0.038	.028	Negative effect confirmed
Sargan test (instrument validity)	—	.245	Instruments valid
AR(2) test	—	.185	No second-order serial correlation

The statistically significant coefficient of NPL(t-1) = 0.425 indicates that credit risk has a dynamic and persistent nature: the previous year's NPL level significantly affects the current year's NPL level. Even after fully controlling for endogeneity, CPI retained its negative and statistically significant effect.

An important finding was that the effect of CPI on reducing NPLs was considerably stronger in private banks (coefficient = -0.145) than in public banks (coefficient = -0.085). Conversely, the oil price variable (OILP) had a stronger effect on the NPL ratio of public banks (-0.075 versus -0.032). This pattern was fully consistent with the qualitative findings: political influence and the concealment of non-performing claims in public banks weakened the effectiveness of formal credit policies.

The analysis of 12 semi-structured interviews using three-stage coding identified 72 open codes, 12 axial codes, and ultimately three core categories through selective coding.

Table 9. Core Categories Derived From Selective Coding

Code	Core Category	Related Axial Codes	Brief Description
SE1	Direct credit policies and their effectiveness in reducing risk	S1, S2, S3, S11	Combination of rigorous assessment, credit scoring, post-lending monitoring, and cyclical flexibility
SE2	Institutional and technical infrastructure for credit policymaking	S4, S6, S10, S12	Absence of a credit bureau, weaknesses in the judicial framework for collateral enforcement, and shortage of specialized personnel
SE3	Environmental and structural factors affecting credit risk	S5, S7, S8, S9	Oil dependence, political influence, weak corporate governance, and differences between public and private banks

The first category (SE1) indicates that none of the individual components of credit policy is sufficient on its own. Interview participants consistently emphasized the effectiveness of an integrated combination of these components, a finding that directly supports the third research hypothesis.

The second category (SE2) indicates that even the most effective credit policies cannot be fully implemented in the absence of appropriate informational and judicial infrastructure. The lack of a shared credit information database among banks was repeatedly identified as the most important deficiency.

The third category (SE3) is consistent with the quantitative findings: the dependence of more than 85% of the government budget on oil revenues and political influence within public banks moderate the effectiveness of formal credit policies.

4. Discussion and Conclusion

The present study investigated the effect of credit policies on credit risk in the Iraqi banking system by combining panel-data econometric analysis with qualitative evidence from banking managers and credit specialists. The findings showed that the Composite Credit Policy Index (CPI) had a negative and statistically significant effect on the non-performing loan (NPL) ratio. In the fixed-effects model, the coefficient of CPI was -0.128 ($p < .01$), indicating that improvement in the overall quality of credit policies was associated with a meaningful decline in credit risk. This effect remained negative and statistically significant in both the robust GLS estimation and the dynamic GMM model, where the CPI coefficients were -0.118 and -0.095, respectively. The consistency of the coefficient across alternative estimation techniques strengthens the conclusion that more rigorous, integrated, and technologically supported credit policies can contribute to improving loan portfolio quality in Iraqi banks.

This finding is consistent with previous studies emphasizing the importance of systematic credit risk management for reducing problematic lending and improving banking performance. Temba et al. demonstrated that the quality of credit risk management practices is closely associated with the financial performance of commercial banks, particularly through better screening, monitoring, and control mechanisms [3]. Similarly, Ranji Jafrudi and Pourali found that stronger credit risk management improves lending performance by reducing weaknesses in loan allocation and post-lending control [4]. The present findings extend this evidence by showing

that credit policy should not be understood as a single procedural rule but rather as a multidimensional system combining borrower assessment, collateral management, monitoring, flexibility, and technology. This interpretation is also compatible with Yāvarī et al., who emphasized that weaknesses in guarantees and collateral arrangements can undermine credit risk management when they are not embedded within a comprehensive credit governance framework [8].

The significance of the composite index is particularly important because the qualitative findings indicated that no single component of credit policy was sufficient to control risk independently. Interview participants consistently emphasized that effective risk reduction depended on the simultaneous operation of rigorous credit assessment, reliable collateral procedures, post-disbursement monitoring, policy flexibility, and technological capability. This finding is theoretically important because credit risk is generated at multiple stages of the credit cycle. Weaknesses in initial borrower assessment increase adverse selection, weak collateral procedures reduce recovery capacity, inadequate post-lending monitoring delays the detection of deterioration, inflexible policies prevent timely adjustment to economic shocks, and technological deficiencies limit the availability and processing of relevant borrower information. Therefore, an integrated policy framework is more effective than isolated risk-control practices.

The negative relationship between CPI and NPL is also compatible with developments in the literature on information-based lending and digital credit assessment. McCanless showed that credit scoring systems and the calculative infrastructure of lending play an important role in determining how risk is classified and how borrowers are evaluated [5]. Cornelli et al. likewise demonstrated that the expansion of fintech and big-tech credit has been supported by improvements in digital lending infrastructure and the use of data-intensive credit technologies [7]. Alvi further emphasized that digital credit and fintech innovation can expand access to finance through more efficient screening and delivery mechanisms [6]. In the Iraqi banking context, the qualitative findings of the present study suggest that the absence of sufficiently integrated credit information systems and technological limitations weaken banks' ability to translate formal lending rules into effective risk controls. Thus, the negative effect of stronger credit policies may partly reflect the value of improved information processing and more systematic borrower monitoring.

The study also found that capital adequacy had a negative and statistically significant effect on NPLs. In the fixed-effects model, the coefficient of CAR was -0.085 ($p < .01$), and the negative relationship remained statistically significant in both GLS and GMM estimations. This finding suggests that better-capitalized banks tend to experience lower levels of credit risk. Stronger capital positions may improve banks' resilience, reduce incentives for excessive risk-taking, and permit more disciplined loan-loss recognition and risk management. This result is consistent with Roshan and Khodarahmi, who showed that credit risk and capital adequacy are significantly related and that ownership structure and bank size can affect this relationship [10]. Mahadevan et al. similarly demonstrated that capitalization plays an important role in the relationship between portfolio composition, credit risk, and banking efficiency [9]. The present findings therefore support the view that capital adequacy should not be considered solely as a regulatory buffer but also as part of the institutional capacity through which banks manage credit exposure.

Return on assets also had a statistically significant negative effect on NPLs. With a coefficient of -1.235 in the fixed-effects model, ROA exhibited the strongest risk-reducing effect among the control variables. This finding indicates that more profitable banks generally had lower levels of non-performing loans. One explanation is that profitable banks are more likely to possess better management systems, stronger screening mechanisms, higher-

quality loan portfolios, and greater capacity to invest in credit technologies and monitoring. Conversely, banks experiencing weak profitability may be more inclined to engage in higher-risk lending or may lack the financial capacity to maintain effective credit control systems. This result aligns with Kanas et al., who identified a strong relationship between bank credit risk and profitability in international banking samples [1]. It is also consistent with Ahmadi and Kazemi, who showed that financing structure and credit risk are important determinants of banking performance [2]. The present study therefore supports a reciprocal interpretation in which profitability contributes to improved risk-management capacity while lower credit risk, in turn, protects profitability.

The macroeconomic results further demonstrated that economic growth significantly reduced NPLs. The coefficient of GDP growth was -0.182 ($p < .01$) in the fixed-effects model and remained negative and significant in the GLS estimation. This finding is consistent with the expectation that stronger economic activity improves the financial position of firms and households, thereby increasing repayment capacity and reducing default. Arintoko et al. found that macroeconomic conditions significantly affect credit risk and that sustainable lending requires attention to changes in the wider economic environment [11]. Plikas and Kenourgios similarly showed that economic growth can mediate the relationship between energy-sector developments and bank credit risk [13]. In Iraq, where public expenditure, business activity, and banking liquidity are strongly influenced by oil revenues, the credit-risk effect of economic growth is especially important because improvements in output can rapidly strengthen borrower cash flows and reduce repayment difficulties.

Oil prices were also negatively associated with credit risk. The coefficient of OILP was -0.045 in the fixed-effects model, -0.042 in the GLS model, and -0.038 in the GMM specification. These results are consistent with the descriptive evidence showing that the highest NPL ratio occurred in 2020, when oil prices fell sharply, whereas lower NPL levels were observed during periods of stronger oil prices. The finding is economically plausible given the high dependence of the Iraqi economy on oil revenues. Higher oil prices strengthen fiscal revenues, government expenditure, contractor payments, employment, liquidity, and overall business activity, thereby improving the repayment capacity of both firms and households. Plikas and Kenourgios provide related evidence that developments in energy markets can affect bank credit risk through macroeconomic transmission channels, particularly economic growth [13]. Shao et al. also demonstrate that banks' exposure to fossil-fuel-related lending can shape provisioning requirements and credit risk capital needs [14]. Although their focus is on transition risk, their findings reinforce the broader argument that energy-sector conditions can materially affect bank credit portfolios.

At the same time, the present study found that the effect of oil prices differed between public and private banks. Oil prices had a stronger negative effect on NPLs in public banks than in private banks. This result reflects the structural position of public banks within the Iraqi economy, where government-owned institutions are more directly connected to public-sector entities, government contractors, and activities influenced by fiscal expenditure. Consequently, fluctuations in oil revenues can be transmitted more strongly to the asset quality of public banks. This ownership-based heterogeneity is consistent with the broader argument that bank characteristics and ownership structures affect the relationship between risk, capital, and performance [10]. The result also reinforces the need to avoid treating the Iraqi banking sector as institutionally homogeneous.

Inflation had a positive and statistically significant effect on NPLs, with a coefficient of 0.582 in the fixed-effects model and 0.545 in the GLS model. This result indicates that higher inflation was associated with increased credit risk. Inflation can weaken borrower repayment capacity by reducing real income, increasing production costs, creating uncertainty in operating expenses, and disrupting cash-flow planning. It can also increase financing needs

while reducing the real value of wages and business revenues when nominal adjustments are delayed. Ansari Samani and Davoodi demonstrated that inflation is shaped by broader fiscal and economic conditions and can vary significantly across institutional and regional environments [12]. In the present study, the positive association between inflation and NPLs indicates that price instability can contribute to deterioration in loan quality, particularly in an economy where many businesses face limited financial buffers and where bank credit is often sensitive to changes in operating conditions.

Unemployment likewise had a positive and statistically significant effect on NPLs. The coefficient was 0.395 in the fixed-effects model and remained positive in the GLS specification. Higher unemployment reduces household income, weakens consumption, and affects firm revenues, thereby increasing the likelihood of delayed or missed repayments. The joint significance of economic growth, inflation, and unemployment supports the broader macro-financial interpretation of credit risk advanced by Arintoko et al., who found that macroeconomic variables materially affect lending sustainability and credit risk [11]. The findings therefore suggest that Iraqi banks should not rely exclusively on borrower-level information but should also incorporate macroeconomic stress indicators into credit assessment and portfolio monitoring.

The dynamic GMM results provided additional evidence regarding the persistence of credit risk. The lagged NPL coefficient was 0.425 ($p < .01$), demonstrating that past levels of non-performing loans significantly influenced current levels. This persistence is important because credit deterioration is not immediately reversible. Once problem loans accumulate, they may remain on balance sheets for several periods because of restructuring, slow recovery procedures, weak collateral enforcement, or delayed recognition of losses. The persistence identified in the present study also suggests that preventive credit policy is particularly important. When risk is allowed to accumulate, later corrective measures may be less effective and more costly. Roshan and Khodarahmi's use of GMM methods to examine credit risk in banking similarly highlights the importance of accounting for dynamic persistence and endogeneity when modeling bank risk [10]. The fact that CPI remained significant after controlling for lagged NPLs further strengthens the interpretation that credit policies exert an independent risk-reducing effect.

An additional important finding was that the risk-reducing effect of CPI was stronger in private banks than in public banks. The coefficient was -0.145 for private banks compared with -0.085 for public banks. The qualitative analysis provides a plausible explanation for this difference. Interview participants indicated that political influence, repeated restructuring of problematic loans, and concealment or delayed recognition of distressed exposures may weaken the practical enforcement of formal credit policies in public banks. Thus, a technically sound policy framework may produce weaker outcomes when governance and enforcement mechanisms are compromised. This interpretation is consistent with studies emphasizing that ownership structure affects the relationship between bank risk and performance [10]. It is also compatible with the broader evidence that credit policy is most effective when lending incentives, monitoring systems, and institutional accountability operate consistently.

The qualitative findings further identified three central categories: direct credit policies and their effectiveness in reducing risk, institutional and technical infrastructure, and environmental and structural determinants of credit risk. The first category confirms the quantitative finding that integrated credit policies matter. The second shows that strong policies cannot be implemented effectively without a reliable credit bureau, enforceable collateral systems, specialized personnel, and adequate banking technology. The third demonstrates that oil dependence, political influence, weak corporate governance, and ownership differences condition the effectiveness of formal

lending controls. These qualitative results complement the econometric analysis by showing that institutional capacity mediates the translation of formal credit standards into actual risk outcomes.

The findings can also be interpreted in light of the broader literature on policy-driven credit allocation. Studies of green credit policy have shown that lending rules can alter firm behavior, innovation decisions, and strategic choices [15-17]. Zhang and Kong demonstrated that credit policy can affect firms' R&D investment under uncertainty [18], while Kong et al. showed that credit-oriented policy mechanisms can influence technology, markets, and production decisions [19]. Chen et al. similarly found that credit policy can improve corporate social responsibility by changing financing incentives [20]. Although these studies examine different policy objectives, they support the underlying mechanism observed in the present research: credit policy changes borrower and lender behavior by altering access conditions, monitoring intensity, incentives, and financing constraints. Therefore, stronger credit policy in Iraqi banks can reduce NPLs not only through better screening but also by shaping borrower discipline and the ongoing relationship between banks and clients.

Taken together, the results indicate that credit risk in Iraq is not driven by a single institutional or macroeconomic factor. Instead, it emerges from the interaction of internal banking policies, capital strength, profitability, macroeconomic performance, oil dependence, inflation, unemployment, ownership structure, technological capability, and institutional quality. The robustness of the CPI coefficient across fixed-effects, GLS, and GMM models provides particularly strong evidence that credit policy quality is a central determinant of NPL performance. However, the qualitative findings also show that policy design alone is insufficient. Effective implementation requires reliable information systems, enforceable collateral arrangements, trained credit personnel, technological modernization, post-lending monitoring, and governance structures that limit political interference. In this sense, the findings support an integrated approach to credit risk management rather than a narrow focus on isolated regulatory ratios or individual lending procedures.

The present study had several limitations that should be considered when interpreting the findings. First, although the panel included 33 banks over a ten-year period, the sample did not include every licensed financial institution operating in Iraq, and limitations in the availability and comparability of audited financial data may have affected sample coverage. Second, some aspects of credit policy, particularly the quality of monitoring, technological capability, and flexibility, were necessarily operationalized through composite indicators and questionnaire-based measures, which may not fully capture differences in implementation quality across banks. Third, the qualitative component was based on 12 interviews and 98 valid questionnaires, and although these provided valuable institutional insights, participants may have been influenced by organizational interests or social desirability in discussing politically sensitive issues, loan restructuring, and weaknesses in credit governance. Fourth, the use of annual data may have concealed short-term fluctuations in NPLs, liquidity, oil prices, inflation, and policy responses. Finally, the observational design does not allow definitive causal claims, even though fixed-effects estimation, GLS robustness checks, and dynamic GMM were used to reduce concerns related to omitted heterogeneity, heteroskedasticity, and endogeneity.

Future studies should extend the analysis by using longer time periods, quarterly or monthly banking data, and larger samples that include additional commercial, Islamic, and specialized banks. Researchers could also disaggregate the Composite Credit Policy Index and estimate the independent and interactive effects of borrower assessment, collateral quality, post-lending monitoring, technological capability, and policy flexibility on NPLs. Further research should examine whether these relationships vary according to bank size, capitalization, ownership, geographic coverage, Islamic versus conventional banking models, or exposure to specific sectors such

as construction, trade, energy, and small and medium-sized enterprises. More advanced dynamic approaches, including system GMM, panel threshold models, panel vector autoregression, and nonlinear specifications, could be used to assess asymmetric responses to oil-price shocks, inflation, and economic downturns. Future qualitative studies could also include regulators, borrowers, external auditors, legal experts, and representatives of credit information institutions to provide a broader understanding of the institutional mechanisms underlying loan default and recovery. Cross-country comparative research involving Iraq and other oil-dependent Middle Eastern banking systems would also help determine which findings are specific to Iraq and which reflect broader regional patterns.

Bank managers and regulators should prioritize the development of an integrated credit risk management framework rather than relying on isolated lending controls. Banks should strengthen borrower screening, standardize credit scoring, improve collateral valuation and legal documentation, establish systematic post-disbursement monitoring, and invest in digital early-warning systems that detect deterioration in borrower performance before loans become non-performing. The Central Bank and banking institutions should accelerate the development of a comprehensive interbank credit information infrastructure that allows timely access to borrower indebtedness, repayment history, guarantees, and related-party exposures. Public banks should strengthen governance safeguards, transparency, and independent credit decision-making to reduce political influence and repeated restructuring of problematic facilities. Banks should also incorporate oil-price scenarios, inflation, unemployment, and economic growth into stress testing and portfolio monitoring, particularly for sectors that are highly sensitive to government expenditure and commodity cycles. Finally, continuous professional training should be provided to credit officers in financial analysis, cash-flow-based lending, collateral assessment, digital credit scoring, sectoral risk analysis, and early identification of problem loans so that improvements in formal policy are translated into more effective day-to-day credit decisions.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

Acknowledgments

Authors thank all participants who participate in this study.

Conflict of Interest

The authors report no conflict of interest.

Funding/Financial Support

According to the authors, this article has no financial support.

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