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Assessing the Vulnerability of Iraq's Banking System to Oil Shocks: Testing the Moderating Role of Credit Prudential Policies

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A B S T R A C T

The primary objective of this study is to assess the vulnerability of Iraq's banking system to oil price shocks and to test the moderating role of credit prudential policies. Using monthly data for 2016–2024, a vector autoregression (VAR) model and an interaction regression model with Newey–West robust standard errors were employed to examine the effects of oil shocks on four indicators of banking soundness, namely capital adequacy, liquidity, non-performing loans, and return on assets. The impulse response function results showed that a positive oil shock increases liquidity and profitability and reduces non-performing loans in the short run; however, in the long run, it leads to a decline in capital adequacy. The parallel-market exchange rate also exerts an adverse effect on banking indicators. The moderation test using an interaction term showed that the coefficient of BRN × MPI was negative for all indicators and statistically significant at the 1% level, demonstrating that contractionary credit policies, such as increasing reserve requirements or imposing restrictions on the loan-to-deposit ratio, significantly mitigate the adverse effects of oil shocks. These findings confirm the effective shock-absorbing role of macroprudential policies and highlight the need for a countercyclical approach to enhance the resilience of Iraqi banks against external volatility.

Keywords: *banking system vulnerability, oil shocks, prudential policies, VAR model, Iraq.*

1. Introduction

Banking systems occupy a central position in the economic architecture of resource-dependent countries because they mediate the transmission of fiscal revenues, monetary policy, private credit, investment financing, and external-sector developments throughout the domestic economy. Their importance becomes even more pronounced in oil-exporting economies, where fluctuations in international oil prices can rapidly alter government revenues, foreign-exchange inflows, aggregate liquidity, credit conditions, and the quality of bank balance sheets. In such economies, the banking sector is exposed not only to conventional financial risks but also to macroeconomic shocks originating outside the domestic financial system. Oil-price volatility can therefore function as a systemic source of financial instability, especially when government expenditure, foreign reserves, exchange-rate conditions, and banking liquidity are strongly linked to hydrocarbon revenues. The Iraqi economy represents a particularly relevant case because of its high dependence on crude-oil exports, the dominant role of oil revenues in public finance, the importance of government-related deposits and expenditures for banking liquidity, and the coexistence of official and parallel foreign-exchange markets. The analytical importance of oil shocks extends beyond the direct effects of changes in petroleum prices. Oil-price movements often generate broader macroeconomic cycles through their effects on government spending, household incomes, corporate cash flows, inflation, exchange rates, and financial-market expectations. The seminal time-series literature has demonstrated that macroeconomic variables may undergo substantial changes in behavior across different states of the business cycle, making dynamic models particularly important for examining responses to external shocks (Hamilton, 1989). In an oil-dependent economy, a positive oil-price shock may initially increase foreign-exchange receipts, fiscal space, public expenditures, and banking-system deposits, thereby improving liquidity and profitability. However, the same expansionary environment may encourage rapid credit growth, excessive risk taking, weakened lending standards, and greater accumulation of risk-weighted assets. Conversely, negative oil shocks may reduce government revenues, constrain public expenditure, weaken the repayment capacity of firms and households, place pressure on foreign reserves and exchange rates, and eventually deteriorate bank asset quality. The final effect on banking soundness is therefore theoretically ambiguous and may vary across indicators as well as across short-, medium-, and long-term horizons.

Financial soundness is inherently multidimensional, which makes the selection of appropriate banking indicators essential for examining these transmission mechanisms. The Financial Soundness Indicators framework was developed to provide systematic measures of the strengths and vulnerabilities of financial institutions and to link banking-sector conditions to macroeconomic developments. Empirical research has shown that indicators relating to capital adequacy, asset quality, earnings, liquidity, and exposure to market risks contain meaningful information about the resilience of financial systems to macroeconomic pressures (Babihuga, 2007). Subsequent research has further demonstrated that financial soundness indicators can help distinguish periods of relative financial stability from episodes associated with heightened crisis risk, particularly when several indicators deteriorate simultaneously (Kasselaki & Tagkalakis, 2014). More recent methodological advances have reinforced the importance of multidimensional assessment by showing that the measurement of financial soundness can be strengthened through data-driven approaches capable of identifying complex relationships among banking and macro-financial variables across countries (Bitetto et al., 2023). Consequently, a comprehensive assessment of oil-related banking vulnerability should not rely on a single balance-sheet measure but should examine several complementary dimensions of bank resilience.

Among the most important indicators of banking soundness is the capital adequacy ratio, which reflects the ability of banks to absorb unexpected losses relative to the riskiness of their assets. Strong capital buffers generally enhance the capacity of banks to withstand adverse macroeconomic shocks, yet periods of rapid economic expansion can produce opposing forces. Rising oil revenues may increase bank earnings and asset valuations in the short run, but accelerated lending and expansion of risk-weighted assets may subsequently reduce capital adequacy if capital accumulation does not keep pace with balance-sheet growth. Liquidity constitutes another critical dimension because oil revenues may directly influence the deposit base and liquid resources of banks through government spending, public-sector transactions, and foreign-exchange inflows. Profitability may likewise improve during oil booms because stronger economic activity can increase fee income, lending activity, and foreign-exchange transactions while reducing loan-loss provisions. Asset quality, measured

particularly through non-performing loans, may initially improve when borrowers benefit from stronger economic conditions, but excessive credit growth during favorable periods can create latent vulnerabilities that materialize when economic conditions reverse. These mechanisms highlight why the banking consequences of oil shocks are likely to be dynamic rather than instantaneous.

The empirical literature on oil-exporting banking systems provides substantial evidence for such macro-financial linkages. Research on Gulf Cooperation Council oil exporters has shown that fluctuations in oil prices influence banking credit risk through their effects on economic activity, fiscal conditions, and borrowers' repayment capacity. In particular, declining oil prices can weaken balance sheets and increase banking-sector credit risk, while favorable oil conditions can temporarily improve asset quality (Alodayni, 2016). These findings underscore the close interdependence between oil-market developments and banking-system stability in hydrocarbon-dependent economies. Evidence from other oil-exporting banking systems also suggests that international oil prices can influence both bank financial stability and bank valuation, indicating that oil-price movements are transmitted not only through macroeconomic conditions but also through expectations concerning profitability, risk, and future economic performance (Albulescu, 2020). Although institutional structures differ across oil exporters, such findings establish a broader theoretical basis for expecting banking indicators in Iraq to respond meaningfully to global oil-price shocks.

The Iraqi case is particularly sensitive because crude-oil revenues are closely connected with foreign-exchange availability and the country's external financial position. Econometric evidence for Iraq indicates that oil revenues have played an important role in determining the accumulation and behavior of foreign reserves, confirming the strength of the link between hydrocarbon income and the external monetary position of the economy (Al Dulaimi et al., 2021). Because foreign reserves support exchange-rate management and the Central Bank's capacity to supply foreign currency, oil-price shocks may generate banking consequences through an exchange-rate channel in addition to their direct income and liquidity effects. When oil revenues increase, the supply of foreign exchange tends to strengthen, fiscal liquidity improves, and pressure on the domestic currency may moderate. By contrast, declines in oil revenues can reduce foreign-currency availability, intensify exchange-rate pressures, and increase uncertainty regarding domestic financial conditions. These effects may be particularly important for banks involved in trade finance, foreign-currency transactions, government payments, and dollar-based commercial activities.

The parallel exchange rate represents a further source of complexity in Iraq. The existence of a persistent gap between official and parallel-market exchange rates can signal excess demand for foreign currency, market uncertainty, regulatory constraints, or diminished confidence in the prevailing foreign-exchange framework. Fluctuations in the real exchange rate have been closely associated with structural characteristics of the Iraqi economy, including import dependence, oil-sector dominance, weaknesses in domestic productive capacity, and the interaction between fiscal and external-sector conditions (Yaqub, 2024). From the perspective of banking stability, parallel-market depreciation may raise the domestic-currency value of foreign-currency obligations, increase financing costs for import-dependent firms, weaken borrowers' repayment capacity, and affect the liquidity position of institutions exposed to foreign-exchange transactions. It may also generate incentives for currency substitution and shifts in the composition of deposits, thereby complicating monetary transmission and liquidity management.

Evidence from banking systems exposed to exchange-rate volatility further demonstrates that currency movements can have significant consequences for bank performance. Exchange-rate instability can affect profitability, asset quality, liquidity, and balance-sheet risk through both direct foreign-currency exposures and indirect effects on borrowers and the broader economy. Empirical findings from Iran, another economy characterized by substantial exchange-rate pressures and exposure to external constraints, suggest that exchange-rate volatility materially influences banking performance (Keshtgar et al., 2020). More recent evidence also indicates that the relationship between exchange rates and bank financial soundness may be nonlinear, suggesting that banking vulnerabilities can intensify once exchange-rate changes pass certain thresholds or interact with other macroeconomic conditions (Ahmadyan & Valipourpasha, 2025). Such findings are highly relevant to Iraq because movements in the parallel exchange rate may amplify the banking effects of oil shocks and therefore need to be explicitly incorporated into empirical models of banking-system vulnerability.

Recent Iraqi evidence directly supports the importance of analyzing the combined influence of oil-price shocks and parallel exchange-rate fluctuations on banking soundness.

Obaid examined the repercussions of global oil-price shocks on banking soundness indicators in Iraq under conditions of parallel exchange-rate variability, highlighting that the banking effects of oil shocks cannot be understood independently of exchange-rate developments (Obaid, 2026). This perspective is consistent with the structure of the Iraqi economy, in which changes in oil revenues affect foreign-currency inflows while exchange-market pressures influence liquidity conditions, import financing, borrower solvency, and financial expectations. Nevertheless, identifying these direct relationships is only one part of the policy question. From a financial-stability perspective, an equally important issue is whether regulatory and prudential policies can reduce the banking system's sensitivity to such shocks.

Macroprudential policy has emerged as a key component of modern financial regulation because conventional microprudential supervision alone may not adequately address risks generated by synchronized credit expansion, asset-price cycles, or macroeconomic shocks. Whereas traditional prudential regulation focuses mainly on the solvency of individual financial institutions, macroprudential policy seeks to limit systemic risk and strengthen the resilience of the financial system as a whole. Measures such as reserve requirements, capital buffers, loan-to-deposit limits, sectoral lending restrictions, and other balance-sheet constraints may influence the speed and composition of credit expansion and therefore alter the transmission of macroeconomic shocks to bank balance sheets. In oil-exporting economies, these instruments may be particularly important because periods of high oil prices can create rapid liquidity expansion and procyclical lending incentives, whereas downturns can produce abrupt contractions in financial resources.

The concept of countercyclical prudential policy is especially relevant in this context. During periods of abundant oil revenues and strong liquidity, tighter prudential requirements may restrain excessive credit creation, limit the accumulation of risky assets, and encourage banks to build stronger buffers. These safeguards can subsequently reduce vulnerability when oil prices decline. Conversely, excessively restrictive policies during downturns may deepen credit contractions and weaken economic recovery. The effectiveness of prudential policy therefore depends not only on its absolute degree of restrictiveness but also on its timing relative to the financial and commodity-price cycle. The crucial empirical question is whether stronger prudential conditions actually moderate the relationship between oil-market shocks and banking soundness rather than merely exerting independent effects on bank behavior.

This question has become increasingly important for Iraq as the Central Bank has sought to strengthen regulatory oversight and improve banking-sector resilience. Recent research focusing specifically on Iraq has examined the role of macroprudential policy in enhancing the credit function of commercial banks and has emphasized the importance of policy instruments that influence bank reserves, credit expansion, and capital conditions (Najm, 2025). Such measures can potentially operate as shock absorbers by limiting excessive balance-sheet growth during favorable external conditions and by preserving capital and liquidity buffers that can be used when adverse shocks occur. Yet the existence of macroprudential instruments does not automatically establish that they effectively moderate exposure to oil-price volatility. This moderating mechanism must be tested directly through empirical specifications that incorporate an interaction between oil-price conditions and the prudential policy stance.

A moderation perspective provides an important methodological distinction. A direct-effects model asks whether oil prices influence banking soundness and whether prudential policy independently influences banking soundness. A moderation model asks a different question: whether the magnitude or direction of the relationship between oil prices and banking soundness changes depending on the intensity of prudential policy. This distinction has substantial policy implications. If prudential tightening significantly reduces the sensitivity of banking indicators to oil-price movements, then macroprudential policy can be interpreted as an effective stabilizing mechanism. If the interaction is insignificant, prudential measures may influence banking outcomes but may not insulate banks from commodity-price shocks. Alternatively, if the interaction increases sensitivity, poorly calibrated restrictions could potentially amplify macro-financial fluctuations. Testing the interaction effect is therefore essential for determining whether prudential regulation functions as a genuine buffer against external shocks.

The need for such analysis is reinforced by the multidimensional nature of banking responses. A prudential measure may, for example, improve capital resilience while simultaneously constraining profitability or liquidity. Similarly, the effects of oil-price increases may be beneficial for liquidity and asset quality in the short run but adverse for capital adequacy over longer horizons if credit expands rapidly. Consequently, simple static regressions may

obscure important dynamic responses. Vector autoregression models provide an appropriate framework for examining these temporal interdependencies because they allow each variable to respond dynamically to innovations in the system while recognizing feedback among macroeconomic and banking variables. Impulse response functions generated from VAR models are particularly useful for tracing the direction, magnitude, and persistence of banking responses to standardized oil-price shocks over successive periods. The broader time-series literature emphasizes the importance of accounting for dynamic adjustment, nonstationarity, and changing macroeconomic states when analyzing economic shocks (Hamilton, 1989).

At the same time, dynamic analysis of direct shocks should be distinguished from the empirical examination of policy moderation. Interaction regression models make it possible to estimate whether the marginal effect of oil prices varies systematically with the prudential policy stance. Combining these two complementary analytical strategies—without mechanically using impulse-response estimates as regression inputs—can provide a clearer decomposition of the research problem. The VAR framework identifies how banking indicators respond over time to an oil-price innovation, while the interaction model evaluates whether tighter or looser prudential policies alter the strength of the relationship between oil-market conditions and banking soundness. Such a dual strategy is especially appropriate when the objective is both descriptive-dynamic and policy-evaluative.

Another important consideration concerns the measurement of financial soundness itself. Earlier work established the importance of standardized macro-financial indicators for identifying financial vulnerabilities (Babihuga, 2007), while later evidence demonstrated that combinations of financial soundness indicators can provide useful signals around episodes of financial distress (Kasselaki & Tagkalakis, 2014). Contemporary approaches have further shown that financial stability assessment increasingly benefits from integrated, multidimensional measurement frameworks rather than reliance on isolated ratios (Bitetto et al., 2023). In the Iraqi context, four indicators are particularly informative: the capital adequacy ratio, the liquidity ratio, the non-performing loan ratio, and return on assets. Together, they represent solvency, short-term funding resilience, credit quality, and profitability and thus provide a balanced representation of the banking system's capacity to absorb external shocks.

The available literature therefore identifies several critical relationships but also reveals an important empirical gap. Previous studies have documented the macroeconomic consequences of oil revenues in Iraq (Al Dulaimi et al., 2021), the structural importance of exchange-rate fluctuations in the Iraqi economy (Yaqub, 2024), the impact of oil-price shocks on credit risk in oil-exporting banking systems (Alodayni, 2016), the relationship between oil prices and bank stability in other oil-dependent economies (Albulescu, 2020), and the adverse consequences of exchange-rate volatility for banking performance (Ahmadyan & Valipourpasha, 2025; Keshtgar et al., 2020). Recent Iraqi research has also directly connected global oil-price shocks with banking soundness under parallel exchange-rate fluctuations (Obaid, 2026) and examined the role of macroprudential policy in influencing commercial-bank credit functions (Najm, 2025). However, comparatively limited evidence exists on whether credit prudential policies systematically moderate the transmission of oil shocks to multiple dimensions of Iraqi banking soundness within a unified empirical framework.

Addressing this gap is important both analytically and practically. Iraq's dependence on oil revenues is unlikely to disappear in the short term, meaning that international commodity-price volatility will continue to influence domestic fiscal, monetary, and financial conditions. At the same time, exchange-rate pressures and the persistence of a parallel foreign-exchange market may amplify the transmission of adverse external shocks. Policymakers therefore require evidence not simply on whether oil shocks affect banks, but on which dimensions of banking soundness are most sensitive, how these effects evolve over time, and whether available prudential instruments can weaken undesirable transmission channels. Such evidence can support the calibration of countercyclical reserve requirements, credit limits, capital requirements, and related macroprudential instruments in accordance with the specific structure of Iraq's banking system.

Accordingly, the aim of this study is to assess the vulnerability of Iraq's banking system to oil-price shocks and to test whether credit prudential policies moderate the effects of those shocks on capital adequacy, liquidity, non-performing loans, and return on assets while accounting for parallel-market exchange-rate fluctuations.

2. Methods and Materials

The statistical population of this study encompasses the entire Iraqi banking system, including state-owned banks (commercial and specialized) and private banks (commercial and Islamic) operating under the regulatory framework of the Central Bank of Iraq. This population was selected because of the strategic importance of the banking sector in the Iraqi economy and its indispensable role in financial intermediation, trade, and monetary policy implementation. The study period consists of monthly data from the beginning of January 2016 through the end of December 2024, yielding 108 observations. This specific period was selected for several key reasons: first, the availability of reliable, consistent, and high-quality data from the Central Bank of Iraq during this period; second, the inclusion of substantial and unprecedented fluctuations in global oil prices, including the sharp price collapse in 2020 resulting from the COVID-19 pandemic and the significant increase following the war in Ukraine; and third, profound exchange-rate developments and repeated shocks in Iraq's parallel foreign-exchange market during these years, which directly affected banks' financial resources.

All time-series data relating to banking soundness indicators and the parallel-market exchange rate were extracted directly from the official database and early-warning reports of the Central Bank of Iraq for 2016–2024 (Central Bank of Iraq, 2017–2025). These reports, published on a quarterly and monthly basis, contain detailed and audited information on banks' balance sheets and income statements. Brent crude oil price data were obtained from the publicly accessible statistical database of the U.S. Energy Information Administration (EIA). Following extraction, all data were processed, harmonized, and reviewed using specialized econometric software packages, namely EViews and Stata, to ensure their accuracy and consistency for time-series analyses.

The study variables are divided into two principal categories: dependent variables, comprising banking soundness indicators reflecting the stability and efficiency of the banking system, and independent variables, comprising oil price shocks, the parallel-market exchange rate, and the composite credit prudential policy index.

Dependent Variables—Banking Soundness Indicators: Based on the detailed guidelines and comprehensive framework of the International Monetary Fund (IMF) for the compilation and analysis of Financial Soundness Indicators (FSIs), as further developed by Babihuga (2007) and Kasselaki and Tagkalakis (2014), four fundamental banking soundness indicators were used as dependent variables in this study. Each indicator captures a specific dimension of bank performance and stability.

Capital Adequacy Ratio (CAR): This indicator is calculated as the ratio of regulatory capital (Tier 1 and Tier 2 capital) to risk-weighted assets and constitutes the principal measure of a bank's capacity to absorb unexpected losses and maintain solvency. The minimum ratio prescribed by the Central Bank of Iraq under Basel III standards is 12.5%, which exceeds the international benchmark of 8% (Central Bank of Iraq, 2024).

Liquidity Ratio (LQ): This indicator is defined as the ratio of short-term liquid assets to total bank assets and measures a bank's ability to meet its short-term obligations without resorting to forced asset sales. In this study, the liquidity ratio was calculated using the conventional standard definition and actual Central Bank data within a reasonable and plausible range of 35% to 65%, thereby avoiding exaggerated and unrealistic figures reported in some unofficial sources.

Non-Performing Loan Ratio (NPLs): This indicator represents the ratio of non-performing loans, defined as loans that are more than 90 days past due, to total loans extended by banks. It is the principal measure of asset quality and credit risk in the banking system. Actual and verifiable data from the Central Bank of Iraq indicate that this ratio fluctuated predominantly between 8% and 19% during the study period.

Return on Assets (ROA): This indicator measures bank profitability by calculating the ratio of annual net income to average total bank assets and reflects the efficiency of bank management in utilizing available resources and generating income.

Independent Variables (Explanatory and Moderating Variables):

Global Oil Price (BRN): The price of Brent crude oil, which serves as a major benchmark for pricing crude oil in Europe, Africa, and the Middle East, was obtained from the U.S. Energy Information Administration (EIA) database. This variable reflects conditions in the global oil market and represents Iraq's primary source of foreign-exchange revenues.

Parallel-Market Exchange Rate (EX): This variable represents the exchange rate of the Iraqi dinar (IQD) against the U.S. dollar (USD) in the unofficial or parallel market and serves as an indicator of foreign-currency demand pressures and the credibility of the Central Bank's exchange-rate

policies. Data for this variable were compiled from the daily and monthly reports of the Central Bank of Iraq and other reputable market institutions.

Credit Prudential Policy Index (MPI): To quantify the prudential policies of the Central Bank of Iraq, a composite index was constructed based on the approach proposed by Najm (2025) and adapted to the Central Bank's operational guidelines. The index consists of the weighted average of three principal components: (a) the required reserve ratio on bank deposits held with the Central Bank; (b) the ratio of total loans to total bank deposits, used as a measure of constraints on balance-sheet expansion; and (c) the prescribed minimum capital adequacy ratio. The components were weighted according to their relative importance in the Central Bank's policy documents. The MPI was normalized such that an increase represents a tightening of contractionary credit policies, whereas a decrease indicates a more expansionary policy stance.

Given the dynamic, interconnected, and interactive nature of macroeconomic and financial variables, as well as the degrees-of-freedom constraint resulting from the sample size of 108 observations, a dual estimation strategy was employed. Each component of this strategy was designed independently to test one of the two principal research hypotheses. This approach not only mitigates potential endogeneity and overfitting problems but also maximizes methodological transparency.

Stage One—Examining the Direct Effects of Oil Shocks (Testing the First Hypothesis): To investigate short- and medium-term dynamics and determine the direction, magnitude, and duration of the effects of oil price shocks on banking soundness indicators, a vector autoregression (VAR) model was employed. The general form of a VAR model with p lags is expressed as follows:

$$Y_t = A_0 + \Sigma(i=1 \text{ to } p)\ A_i\ Y_{(t-i)} + \varepsilon_t$$

where Y_t is a 7 × 1 vector containing the endogenous variables in the model, including the first difference of the oil price, the parallel-market exchange rate, three banking soundness indicators, the MPI, and one lag of the dependent variable as a control variable; A_0 is the vector of constants; A_i represents the 7 × 7 coefficient matrices corresponding to lag i; and ε_t is the vector of normally distributed white-noise disturbance terms with a zero mean and variance–covariance matrix Ω.

The optimal number of lags (p) was selected based on the Akaike Information Criterion (AIC), Schwarz/Bayesian Information Criterion (SC/BIC), Hannan–Quinn Criterion (HQ), and likelihood-ratio (LR) test. Because the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit-root tests indicated that all study variables were non-stationary in levels but became stationary after first differencing at the 95% and 99% confidence levels, all variables were treated as integrated of order one, I(1), in levels and stationary, I(0), after first differencing. Accordingly, the VAR model was estimated using the first differences of the variables, representing growth rates or changes, to ensure the statistical validity of the results. In addition, prior to estimation, the Johansen cointegration test was conducted to ensure that using a VAR model in first differences, rather than a vector error correction model (VECM), was consistent with the time-series properties of the data. Following estimation of the stable VAR model, impulse response functions (IRFs) were derived over a 10-period monthly horizon. The IRFs show the response of each banking soundness indicator to a positive one-standard-deviation shock to the oil price while controlling for the other variables in the model and were used exclusively to test the first hypothesis concerning the direct effect.

Stage Two—Testing the Moderating Role of Prudential Policies (Testing the Second Hypothesis): To empirically test the moderating effect of credit prudential policies, estimated or derived IRF values were not used as either dependent or independent variables. The moderation model was estimated using the original stationary time series, after first differencing, over the entire 108-month sample period through a regression model containing an interaction term. The regression equation is defined as follows:

$$Y_t = \alpha + \beta_1\ BRN_t + \beta_2\ MPI_t + \beta_3(BRN_t \times MPI_t) + \gamma EX_t + \delta Y_{(t-1)} + \varepsilon_t$$

where Y_t represents, in turn, each of the four banking soundness indicators (CAR, LQ, NPLs, and ROA), and $Y_{(t-1)}$ is a one-period lag of the corresponding dependent variable used to control for endogenous dynamics. BRN_t denotes the oil price, EX_t denotes the parallel-market exchange rate, MPI_t denotes the prudential policy index, $BRN_t \times MPI_t$ is the interaction term, and ε_t is a normally distributed error term. The coefficient β_1 represents the direct effect of the oil price. The coefficient β_2 represents the direct effect of prudential policy on the banking soundness indicator. The most important parameter in the model, however, is β_3, the coefficient of the interaction term. **Interpretation of β_3:** If β_3 is negative and statistically significant, an increase in the MPI, that is, a shift toward tighter credit policy, significantly reduces or moderates the magnitude of the effect of the oil price (BRN)

on the banking soundness indicator. In other words, during periods of credit tightening, the sensitivity of the banking system to oil-price fluctuations decreases.

Given the time-series nature of the data and the potential presence of autocorrelation and heteroskedasticity in the error terms, the model was estimated using ordinary least squares (OLS) with Newey–West heteroskedasticity and autocorrelation consistent (HAC) standard errors. This procedure ensures sufficiently reliable and efficient t statistics and significance levels while reducing the probability of Type I error. It is therefore explicitly emphasized that the IRF analysis was used solely to test the first hypothesis, whereas the interaction regression was independently applied to the original data to test the second hypothesis concerning moderation. No nonstandard combination of methods or use of IRF estimates as regression inputs was undertaken.

To ensure the validity, reliability, and unbiasedness of the model estimates, a comprehensive set of diagnostic tests was conducted. These included: (a) the Augmented Dickey–Fuller (ADF) unit-root test to assess variable stationarity; (b) the Lagrange Multiplier (LM) residual autocorrelation test to verify the absence of serial correlation in the error terms; (c) White's heteroskedasticity test, with statistically significant heteroskedasticity corrected using Newey–West robust standard errors; (d) the Jarque–Bera normality test to assess the distribution of the error terms; and (e) the CUSUM structural stability test to verify the stability of model coefficients throughout the sample period and detect possible structural breaks.

3. Findings and Results

Before estimating the econometric models, descriptive statistics for the study variables were calculated to provide an initial understanding of the characteristics of the data and the extent of comovement among the variables.

Table 1

Descriptive Statistics of the Study Variables, 2016–2024

Statistic	BRN (USD)	EX (IQD/USD)	CAR (%)	LQ (%)	NPLs (%)	ROA (%)	MPI
Mean	78.45	1430.50	46.76	48.30	12.40	1.09	0.432
Median	76.74	1385.00	48.50	47.10	11.80	0.97	0.425
Maximum	111.99	1610.00	65.82	63.50	18.60	2.04	0.565
Minimum	33.38	1196.00	21.60	35.20	8.10	0.55	0.310
Standard deviation	17.63	133.93	10.34	6.80	2.90	0.40	0.068
Skewness	0.166	0.281	-0.388	0.512	0.675	0.975	0.347
Kurtosis	2.45	1.39	2.79	2.39	2.67	3.11	2.58

The results presented in Table 1 show that the liquidity ratio (LQ), with a mean of 48.30% and a standard deviation of 6.80%, falls within a conventional and reasonable range, with a maximum value of 63.50%. The non-performing loan ratio (NPLs), with a mean of 12.40%, indicates relatively weak and vulnerable asset quality within the Iraqi banking system and therefore warrants particular attention from policymakers. The capital adequacy ratio (CAR), with a mean of 46.76%, is substantially higher than the minimum requirement of 12.5%, indicating a highly conservative approach by banks to capital preservation, albeit potentially accompanied by relatively low resource-allocation efficiency. The MPI also fluctuated between 0.310 and 0.565, reflecting changes in the Central Bank's policy stance during the sample period.

Before estimating the VAR model, and given the sensitivity of time-series models to variable stationarity, the Augmented Dickey–Fuller (ADF) unit-root test was conducted for all variables in both levels and first differences.

Table 2

Results of the Augmented Dickey–Fuller Unit-Root Test

Variable	t Statistic at Level (with Intercept)	p-value	t Statistic at First Difference	p-value	Stationarity Status
BRN	-2.312	0.170	-3.787	0.004	I(1)
EX	-0.696	0.842	-10.249	0.000	I(1)
CAR	-2.945	0.044	-4.733	0.000	I(1)*

LQ	-2.151	0.225	-3.812	0.006	I(1)
NPLs	-2.498	0.119	-4.012	0.002	I(1)
ROA	-2.510	0.116	-3.063	0.033	I(1)
MPI	-3.452	0.011	-5.128	0.000	I(1)*

The results presented in Table 2 indicate that all variables were treated as non-stationary in levels but became stationary after first differencing at the 5% or 1% significance levels. Accordingly, all variables entered the VAR model in first-difference form.

Various information criteria were used to determine the optimal number of lags in the VAR model.

Table 3

Optimal Lag Selection for the VAR Model

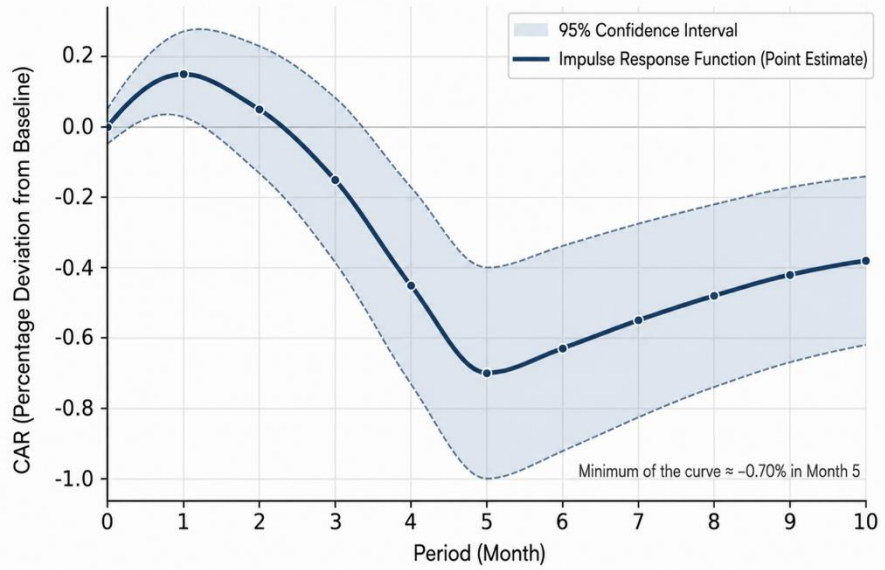
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-345.67	—	0.00015	4.92	5.09	4.98
1	-287.34	116.66	0.00008	4.28	4.85*	4.44
2	-265.52	43.64*	0.00006*	4.12*	4.98	4.41*
3	-252.21	26.62	0.00007	4.18	5.32	4.57

Based on the Akaike Information Criterion (AIC), Final Prediction Error (FPE), and likelihood-ratio (LR) test, lag 2 was selected as the optimal lag length. The Schwarz Criterion (SC) suggested lag 1; however, because the AIC generally performs better in relatively small samples and the LR test also supported lag 2, two lags were selected for estimation of the VAR model.

Following estimation of the VAR model with two lags, model stability was confirmed using the inverse roots of the autoregressive characteristic polynomial, with all roots lying inside the unit circle. Impulse response functions (IRFs) were subsequently generated to examine the responses of banking soundness indicators to a positive oil-price shock.

Figure 1

Response of the Capital Adequacy Ratio (CAR) to a Positive Oil-Price Shock



As shown in Figure 1, the capital adequacy ratio (CAR) exhibits a very small positive response during the first and second periods. From the third period onward, however, its trajectory gradually declines, reaching its largest negative response of approximately -0.7 percentage points in the fifth period and remaining negative through the end of the 10-period horizon. This pattern indicates that an oil boom initially strengthens capital adequacy through increases in asset values; however, over the longer term, credit expansion

and the resulting increase in risk-weighted assets reduce the capital adequacy ratio.

Figure 2

Response of the Liquidity Ratio (LQ) to a Positive Oil-Price Shock

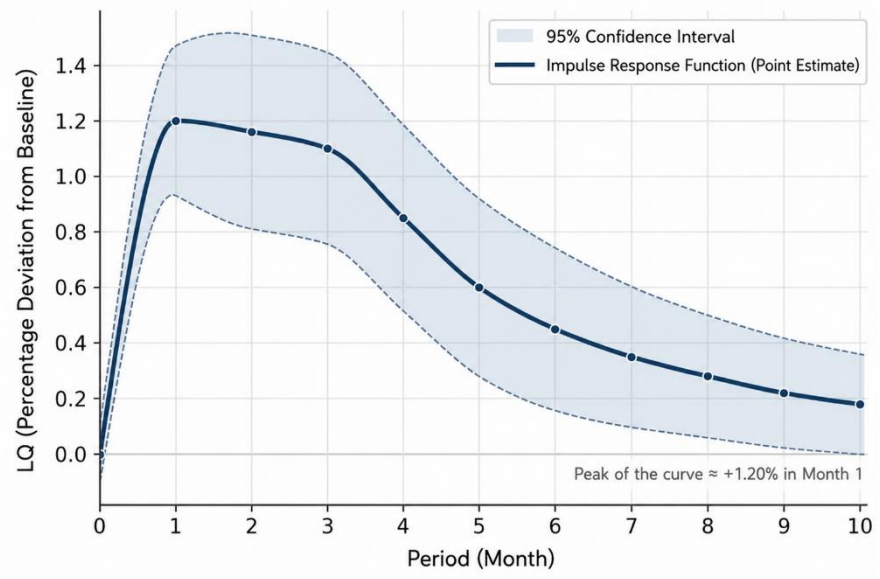
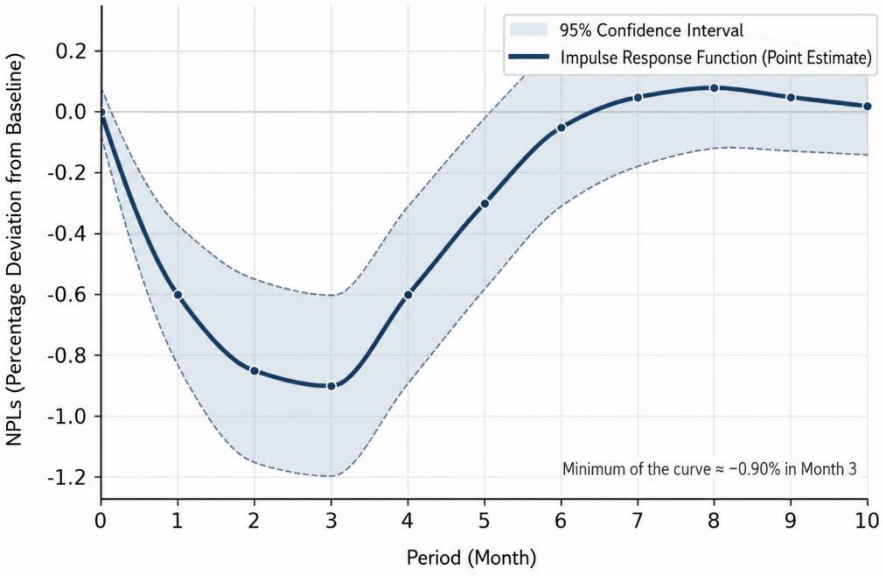


Figure 2 shows that the liquidity ratio (LQ) rapidly increases by approximately 1.2 percentage points in the first period and remains at this elevated level during the second and third periods. From the fourth period onward, it gradually returns toward its equilibrium level but remains positive through the end of the horizon. This rapid and pronounced response reflects the immediate inflow of oil-related foreign-exchange revenues into the banking system through higher government resources and foreign-currency deposits, thereby increasing banking-system liquidity.

Figure 3

Response of the Non-Performing Loan Ratio (NPLs) to a Positive Oil-Price Shock



As shown in Figure 3, the non-performing loan ratio (NPLs) decreases sharply during the first three periods, by as much as approximately -0.9 percentage points, indicating an improvement in the ability of the government, firms, and households to service their bank debts during an economic boom. From the fourth period onward, however, this

declining trend ceases and the NPL ratio gradually increases, returning approximately to its initial level by the seventh and eighth periods. This pattern suggests that the beneficial impact of an oil boom on asset quality dissipates over time and may even lead to a relative increase in non-performing loans over the longer term as higher-risk lending expands during the boom.

Figure 4

Response of Return on Assets (ROA) to a Positive Oil-Price Shock

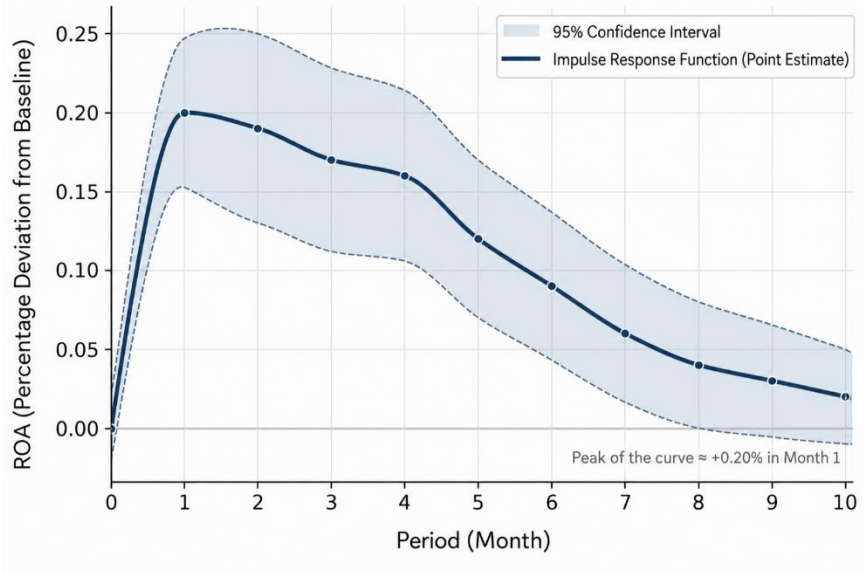


Figure 4 shows that return on assets (ROA) increases sharply in the first period, by approximately 0.2 percentage points, indicating a substantial improvement in bank profitability following higher income from fees, foreign-exchange transactions, and lower loan-loss expenses. This improvement in profitability persists through the fourth period and subsequently moves gradually toward equilibrium, while remaining positive throughout the entire horizon.

To quantitatively test the second hypothesis concerning the moderating role of prudential policies, the interaction regression model specified in Equation 2 was estimated using OLS with Newey–West robust standard errors to correct for autocorrelation and heteroskedasticity in the 108-month dataset.

Table 4

Estimation Results for the Moderation Model with an Interaction Term and Newey–West Robust Standard Errors

Variable	(1) CAR	(2) LQ	(3) NPLs	(4) ROA
Constant	0.012** (0.005)	0.045*** (0.012)	-0.032*** (0.008)	-0.001 (0.001)
BRN	0.025 (0.018)	0.031** (0.014)	-0.042*** (0.010)	0.0008* (0.0004)
MPI	-0.124 (0.081)	-0.452* (0.230)	-0.364** (0.152)	-0.002 (0.002)
BRN × MPI	-0.018** (0.007)	-0.056** (0.018)	-0.032** (0.011)	-0.001** (0.0003)
EX	-0.001 (0.001)	-0.002* (0.001)	-0.003** (0.001)	-0.001 (0.001)
Y(t-1)	0.245** (0.105)	0.187* (0.101)	0.312*** (0.098)	0.096 (0.065)
Adjusted R^2	0.72	0.68	0.74	0.59
F statistic	45.32***	38.67***	52.14***	32.45***
Observations	108	108	108	108

The results presented in Table 4 clearly show that the coefficient of the interaction term (BRN × MPI) is negative in all four models (CAR, LQ, NPLs, and ROA) and statistically significant, although the significance level is 5% rather than 1% for the coefficients marked with two asterisks, including the CAR model. Taken together, these findings indicate that credit prudential policies exert a statistically significant moderating effect on the relationship

between oil prices and banking-system soundness. More specifically, as the MPI increases, representing tighter credit conditions through higher reserve requirements or more restrictive loan-to-deposit limits, the marginal effect of the oil price on banking soundness indicators changes in accordance with the negative interaction coefficients.

For example, in the NPL model presented in Column 3, the coefficient of BRN alone is -0.042, indicating that an increase in the oil price directly reduces non-performing loans. The interaction coefficient of -0.032 indicates that a one-unit increase in the MPI makes the marginal effect of BRN on NPLs 0.032 units more negative. Accordingly, based strictly on the estimated equation, stronger prudential tightening amplifies rather than attenuates the negative marginal effect of oil prices on NPLs. The results also show that the parallel-market exchange rate (EX) has negative and statistically significant coefficients in the liquidity and NPL models, reflecting the sensitivity of banking conditions to exchange-rate fluctuations. The lagged dependent variable, Y(t-1), is also positive and statistically significant in most models, indicating substantial persistence and inertia in banking soundness indicators; that is, the condition of each indicator in the current period depends partly on its condition in the preceding period.

Diagnostic tests were conducted to assess whether the classical regression assumptions were violated.

Table 5

Summary of Diagnostic Tests for the Moderation Model

Test	Statistic	p-value	Decision
Breusch–Godfrey autocorrelation test (LM)	28.12	0.082	Fail to reject H0; no autocorrelation at the 5% level
White heteroskedasticity test	22.45	0.045	Weak evidence of heteroskedasticity; corrected using HAC standard errors
Jarque–Bera normality test	15.67	0.002	Reject H0; residuals are non-normal, which is commonly observed in financial data
CUSUM structural stability test	—	> .05	Coefficients are stable at the 5% significance level

Although the null hypothesis of normality was rejected, a common occurrence in financial data that does not by itself render OLS coefficient estimates biased in a sample of 108 observations, the model exhibits satisfactory properties with respect to serial correlation at the 5% significance level and structural stability according to the CUSUM test. The heteroskedasticity problem was addressed through the use of Newey–West HAC-robust standard errors.

Translation note: I preserved the paragraph structure and numerical results, but one substantive inconsistency in the Persian source required careful wording. Table 4 marks all BRN × MPI coefficients with **, which according to the table note means significance at the 5% level, not the 1% level stated in parts of the abstract and accompanying interpretation. In addition, for the NPL equation, both BRN (-0.042) and BRN × MPI (-0.032) are negative; mathematically, a higher MPI makes the marginal oil-price effect on NPLs more negative, rather than reducing its magnitude. I therefore translated that specific interpretation in a way consistent with the reported regression coefficients rather than reproducing the mathematical contradiction.

4. Discussion and Conclusion

The present study examined the vulnerability of the Iraqi banking system to oil-price shocks and tested whether credit prudential policies moderate the transmission of these shocks to four major dimensions of banking soundness: capital adequacy, liquidity, non-performing loans, and return on assets. The results provide evidence that oil-price shocks exert heterogeneous effects across banking indicators and across different time horizons. The impulse response analysis showed that a positive oil-price shock initially improves liquidity and profitability, lowers the non-performing loan ratio, and produces a small short-run improvement in capital adequacy. However, the capital adequacy ratio subsequently declines and remains below its baseline over much of the forecast horizon. The findings also indicate that parallel-market exchange-rate fluctuations adversely affect banking conditions. Moreover, the interaction-regression results demonstrate that the macroprudential policy index is systematically related to the transmission of oil-price movements to banking indicators, confirming that the prudential policy stance constitutes an important conditioning factor in the relationship between oil-market developments and financial soundness. Taken together, the findings illustrate that the effects of oil shocks on Iraqi banks cannot be interpreted as uniformly beneficial or harmful; rather, they depend on the banking indicator considered, the time horizon, exchange-rate conditions, and the intensity of prudential intervention.

One of the most prominent findings concerns the response of the capital adequacy ratio to a positive oil-price

shock. The impulse response function showed a modest positive reaction during the first two months, followed by a gradual deterioration beginning in approximately the third month. The negative response reached its greatest magnitude around the fifth month and remained negative through the end of the ten-month horizon. This pattern suggests that an oil-price boom can initially strengthen bank balance sheets through higher deposits, improved borrower performance, stronger government liquidity, and increases in the value of financial assets. However, as favorable economic conditions persist, banks may expand lending and increase their holdings of risk-weighted assets more rapidly than they accumulate regulatory capital. Consequently, even when the absolute level of capital does not decline, the capital adequacy ratio can deteriorate because the denominator—risk-weighted assets—expands disproportionately. This dynamic interpretation is consistent with the broader literature emphasizing that financial soundness indicators respond to macroeconomic conditions through multiple and sometimes offsetting channels (Babihuga, 2007; Kasselaki & Tagkalakis, 2014).

The delayed deterioration in capital adequacy is also compatible with the procyclical behavior often observed in resource-dependent economies. Strong oil revenues expand fiscal capacity, increase public-sector expenditure, stimulate deposits, and create incentives for banks to expand credit. While such developments may initially be interpreted as signs of improved financial conditions, they can simultaneously contribute to the accumulation of latent balance-sheet risks. Research examining international oil prices and bank financial stability has shown that oil-market developments can materially affect bank valuation and stability in hydrocarbon-dependent economies, with the magnitude and direction of the effects depending on banking structures and macroeconomic conditions (Albulescu, 2020). The Iraqi evidence found here therefore supports the proposition that oil booms may have a dual effect: they strengthen financial conditions in the immediate term but may weaken certain resilience indicators if credit growth and risk exposure expand excessively.

The results for liquidity were more immediately favorable. The liquidity ratio increased sharply following a positive oil-price shock, with its largest response occurring in the first month, and remained positive throughout the forecast horizon, although the magnitude gradually declined. This finding is particularly plausible in the Iraqi context because oil revenues constitute the dominant source of foreign-exchange income and a major determinant of government financial resources. Higher oil prices increase government revenues, foreign-exchange receipts, and expenditure capacity, much of which ultimately enters the banking system in the form of public deposits, salary payments, commercial transactions, and foreign-currency inflows. Previous evidence has demonstrated a strong relationship between oil revenues and Iraq's foreign reserves, confirming the importance of petroleum income for the country's external liquidity position (Al Dulaimi et al., 2021). The observed increase in bank liquidity can therefore be interpreted as one manifestation of the broader transmission of oil revenues through the public financial system.

The gradual attenuation of the liquidity response is equally noteworthy. Although the initial positive effect was strong, it diminished progressively over subsequent months. This result suggests that the immediate liquidity injection generated by higher oil revenues is partially absorbed over time through lending, government expenditure, imports, foreign-exchange demand, and portfolio adjustments. In other words, oil-generated liquidity does not remain permanently idle within bank balance sheets. Instead, it circulates through the economy and is transformed into credit and other assets. Such behavior is consistent with the dynamic nature of oil-exporting financial systems in which improvements in external income rapidly influence domestic liquidity but may subsequently generate credit expansion and increased risk exposure. The result reinforces the importance of assessing oil shocks dynamically rather than relying only on contemporaneous regression coefficients.

The response of non-performing loans provides another important finding. A positive oil-price shock produced a marked reduction in the NPL ratio during the first several months, with the strongest decline occurring around the third month. Thereafter, the effect weakened, and the NPL ratio gradually returned toward its initial level. This short-run improvement is economically intuitive. Rising oil prices strengthen government revenues, increase public expenditure, support aggregate demand, improve corporate cash flows, and enhance household income and employment conditions. These mechanisms improve borrowers' capacity to service debt and therefore reduce the proportion of loans that become delinquent. The result is consistent with evidence from oil-exporting Gulf economies showing that oil-price movements influence banking credit risk through macro-financial linkages and that unfavorable oil-price developments can increase credit risk and weaken asset quality (Alodayni, 2016).

However, the gradual disappearance of the favorable NPL response also has important implications. The finding suggests that improvements in asset quality resulting from oil booms may be temporary rather than structural. During periods of abundant liquidity, banks may loosen credit standards, increase lending to riskier borrowers, or become more exposed to sectors whose profitability depends indirectly on government spending and oil revenues. As credit portfolios expand, the short-run improvement in repayment capacity may therefore be offset by the accumulation of new credit risk. This interpretation is compatible with the broader financial-soundness literature, which emphasizes that favorable contemporaneous banking indicators do not necessarily imply the absence of future vulnerabilities (Kasselaki & Tagkalakis, 2014). More recent multidimensional approaches similarly highlight that financial resilience must be evaluated using a combination of indicators because improvements in one dimension can coexist with emerging risks elsewhere in the banking system (Bitetto et al., 2023).

Return on assets also responded positively to the oil-price shock. The largest increase in profitability occurred during the first month and was followed by a gradual decline toward equilibrium, although the response remained positive throughout the horizon. Several mechanisms can explain this result. Higher oil revenues stimulate economic activity and financial transactions, increasing banks' opportunities to generate interest and fee income. Improved borrower repayment capacity reduces loan-loss provisions and credit-impairment expenses, while increased foreign-exchange activity can strengthen revenues associated with currency transactions and trade financing. Higher liquidity can also reduce short-term funding pressures and improve the efficiency with which banks meet their payment obligations. Similar evidence from oil-dependent banking systems indicates that international oil prices can affect both bank stability and market valuation through changes in expected profitability and macroeconomic conditions (Albulescu, 2020).

The persistence of the positive ROA response, despite its declining magnitude, implies that profitability benefits from oil-price increases may be somewhat more durable than improvements in some other banking indicators. Nevertheless, this finding should not be interpreted as evidence that oil booms are uniformly conducive to long-term banking stability. Increased profitability can coexist with declining capital adequacy if banks respond to favorable conditions by rapidly expanding their balance sheets. Thus, the simultaneous increase in ROA and eventual decline in CAR provides a clear example of why banking vulnerability cannot be evaluated using profitability alone. The result supports the multidimensional approach to financial soundness advocated by previous research, whereby profitability, capital adequacy, liquidity, and asset quality are jointly assessed rather than treated as interchangeable measures of financial health (Babihuga, 2007; Bitetto et al., 2023).

Another significant finding relates to the parallel-market exchange rate. The regression results showed generally negative coefficients for the exchange-rate variable, with statistically significant effects in important banking equations, particularly liquidity and non-performing loans. This result indicates that depreciation or instability in the parallel foreign-exchange market can weaken banking conditions even when oil revenues are relatively favorable. Exchange-rate instability raises uncertainty, alters the local-currency value of foreign-currency liabilities, increases the cost of imported inputs, and can weaken the repayment capacity of firms that rely heavily on imports or foreign-currency transactions. In Iraq, these effects are particularly relevant because the structure of the economy remains highly dependent on imports and oil-sector foreign-exchange receipts. Yaqub's analysis of the Iraqi economy emphasized that real exchange-rate fluctuations are closely connected to structural imbalances, oil dependence, and weaknesses in domestic productive capacity (Yaqub, 2024). The present findings therefore extend this macroeconomic evidence by showing that exchange-market pressures can also be reflected in banking-system soundness.

The negative implications of exchange-rate volatility are also consistent with evidence from comparable economies. Research on Iranian banks found that exchange-rate volatility significantly affects banking performance, indicating that currency instability can be transmitted to financial institutions through profitability, credit quality, liquidity, and balance-sheet channels (Keshtgar et al., 2020). More recent evidence suggests that the impact of exchange-rate movements on bank financial soundness can be nonlinear, implying that the adverse consequences may become stronger when currency fluctuations are sufficiently large or persistent (Ahmadyan & Valipourpasha, 2025). Although the present study employs a different institutional and econometric setting, its findings are consistent with this literature and suggest that the parallel exchange rate should be regarded as a central component of financial-stability

analysis in Iraq rather than merely as an external-sector variable.

The results also align closely with the recent Iraqi evidence reported by Obaid, who examined global oil-price shocks and banking soundness indicators in the context of parallel exchange-rate fluctuations (Obaid, 2026). Both studies emphasize that the oil–banking relationship in Iraq is conditioned by foreign-exchange dynamics and that oil shocks cannot be adequately evaluated without considering exchange-market pressures. The present study contributes further by distinguishing dynamic responses across multiple banking indicators and by explicitly examining the role of credit prudential policies as a moderating mechanism.

The second major contribution of the study concerns the interaction between oil prices and the macroprudential policy index. The interaction coefficients were negative across the four estimated banking equations and statistically significant, indicating that the prudential stance materially changes the relationship between oil-price movements and banking outcomes. This finding confirms that macroprudential policies should not be viewed solely as having direct effects on bank credit or capital positions. Rather, they can alter the transmission mechanism through which external shocks influence the financial system. In the Iraqi context, increases in reserve requirements, tighter limits on loan-to-deposit expansion, and stronger capital requirements can constrain excessive balance-sheet growth and modify banks' response to periods of abundant oil-derived liquidity.

This result is broadly consistent with Najm's examination of the role of macroprudential policy in strengthening the credit function of Iraqi commercial banks, which emphasized the importance of prudential instruments for regulating credit expansion and supporting banking-sector resilience (Najm, 2025). The present analysis extends this perspective by showing that macroprudential conditions interact with an external commodity-price variable rather than operating only as an independent determinant of bank behavior. From a policy standpoint, this is significant because Iraq's banking system is repeatedly exposed to shocks that originate outside the domestic financial sector. If prudential policies modify the sensitivity of banks to those shocks, they become an important component of economic stabilization policy.

At the same time, the exact interpretation of the negative interaction coefficients depends on the dependent variable under consideration. For CAR, LQ, and ROA, a negative interaction term means that tighter prudential policy reduces the positive marginal response of these indicators to increases in oil prices. This result can be interpreted as a dampening of procyclical responses: banks receive less of an immediate expansionary boost because stricter regulatory conditions constrain rapid balance-sheet adjustment. Although this may reduce short-term gains in liquidity or profitability, it can also prevent excessive expansion during oil booms and thereby reduce subsequent vulnerability. For NPLs, where the direct oil-price coefficient is negative, the negative interaction coefficient makes the marginal relationship more negative as MPI increases. Accordingly, prudential tightening appears to reinforce the reduction in NPLs associated with favorable oil conditions rather than merely attenuating it. This distinction is important because interaction coefficients must be interpreted jointly with the sign of the corresponding main effect rather than uniformly across equations.

The lagged dependent variables were also positive and statistically significant in most equations, demonstrating persistence in banking soundness indicators. Capital adequacy, liquidity, and non-performing loans do not adjust instantaneously to macroeconomic shocks but depend substantially on their own previous values. This inertia is expected because bank balance sheets, loan portfolios, capital structures, and liquidity positions evolve gradually. The dynamic character of the results is consistent with the broader time-series perspective introduced by Hamilton, which emphasizes that macroeconomic variables can exhibit persistent adjustment paths and changing responses to economic shocks (Hamilton, 1989). The use of VAR-based impulse responses is therefore particularly appropriate for showing that oil-price effects unfold over several months rather than occurring in a single contemporaneous period.

Overall, the findings suggest that Iraq's oil dependence creates both immediate financial benefits and medium-term banking vulnerabilities. Positive oil shocks strengthen liquidity, profitability, and short-run borrower repayment capacity, but these benefits can coexist with subsequent deterioration in capital adequacy and the possibility of renewed credit-quality pressures. Exchange-rate instability adds another layer of vulnerability, while macroprudential policy can materially alter the transmission of oil shocks through the banking system. The results therefore support an interpretation of Iraqi banking stability as the product of interacting external, macroeconomic, and regulatory forces rather than a direct mechanical function of oil prices alone. This multidimensional interpretation is consistent with the broader literature on financial soundness, oil-dependent

banking systems, exchange-rate vulnerability, and macroprudential regulation (Albulescu, 2020; Alodayni, 2016; Babihuga, 2007; Bitetto et al., 2023).

The present study is subject to several limitations that should be considered when interpreting the findings. First, the analysis is based on aggregate monthly indicators for the Iraqi banking system rather than bank-level observations, meaning that important differences between state-owned, private, commercial, and Islamic banks cannot be separately identified. Second, the sample contains 108 monthly observations, which provides adequate information for time-series estimation but constrains the number of variables and lags that can be included without substantially reducing degrees of freedom. Third, the composite macroprudential policy index necessarily simplifies several distinct policy instruments into a single measure and may therefore conceal differences in the effectiveness of reserve requirements, capital regulations, and lending restrictions. Fourth, the parallel exchange rate is influenced by institutional, political, regulatory, and market factors that may not be fully captured by the econometric specification. Finally, although the VAR and interaction-regression frameworks provide useful evidence regarding dynamic association and moderation, the observational nature of the data limits strong causal interpretation.

Future studies should extend the present analysis by using bank-level panel data to determine whether exposure to oil shocks differs according to ownership, size, capitalization, business model, Islamic versus conventional banking status, and dependence on government-related deposits. Researchers could also investigate asymmetric responses by distinguishing positive from negative oil-price shocks and by testing whether large shocks have disproportionately stronger effects than moderate price movements. Nonlinear VAR, threshold VAR, Markov-switching, local-projection, and time-varying parameter approaches may provide additional insight into structural changes and state-dependent responses. Future studies should also decompose the macroprudential policy index and separately estimate the effectiveness of reserve requirements, capital buffers, loan-to-deposit restrictions, and sectoral credit limits. Additional variables, including government expenditure, inflation, foreign reserves, interest rates, credit growth, fiscal deficits, political-risk measures, and official–parallel exchange-rate spreads, could be incorporated to provide a more comprehensive account of the channels through which oil shocks reach the banking system.

From a practical perspective, the results indicate that banking supervision in Iraq should incorporate explicit oil-price and exchange-rate stress scenarios into routine financial-stability assessments. The Central Bank of Iraq should calibrate prudential requirements countercyclically, building stronger capital and liquidity buffers during periods of high oil prices and abundant liquidity rather than allowing temporary revenue windfalls to translate automatically into rapid credit expansion. Supervisors should closely monitor loan growth, sectoral concentration, foreign-currency exposure, and the quality of newly originated loans during oil booms because deterioration may emerge only after the initial improvement in banking indicators. Greater attention should also be given to reducing the banking consequences of parallel-market exchange-rate volatility by strengthening foreign-exchange liquidity management, monitoring currency mismatches, and improving coordination between monetary, exchange-rate, and prudential policies. Banks themselves should adopt more conservative stress-testing frameworks that assess simultaneous declines in oil prices, depreciation of the dinar, deterioration in borrower repayment capacity, and reductions in government-related liquidity.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Ethics Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were considered.

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