International Journal of New Political Economy 7(1): 171-204, 2026

Investigating the Impact of Oil Price Volatility on the Nexus between the Macroeconomy and the Banking System in Iraq: An MSH-VAR Approach

Zuhair Mahmoud Kazem*[1], Zahra Karimi Takanlou[2], Hossein Asgharpur[3]

ARTICLE INFO

Article history:

Date of submission: 03 November 2025

Date of revise: 27 December 2025

Date of acceptance: 02 February 2026

JEL Classification:

E32, E44, G21, G28, Q43, C32.

Keywords:

Oil price volatility, Iraqi banking system, banking fragility, macroeconomy, MSH-VAR model

ABSTRACT

This study investigates how oil-price volatility shapes the linkages between Iraq's macroeconomic conditions and the banking sector within a Markov-Switching Heteroskedastic VAR (MSH-VAR) framework. Using quarterly data for 2004–2022, it assesses the effects of global oil-price fluctuations on the Banking Fragility Index (BFI), real GDP, and the exchange rate. The regime-switching structure captures asymmetric and state-contingent responses, separating relatively stable phases from more turbulent periods with higher volatility and persistence. The results indicate that oil-price shocks have a strong and statistically significant effect on real GDP, while their immediate impacts on banking fragility and the exchange rate are relatively limited. In the stable regime, Iraq's economy exhibits a greater capacity to absorb positive oil price shocks, leading to smoother and more persistent adjustments in macroeconomic indicators. Conversely, in the unstable regime, negative oil shocks generate asymmetric and pronounced adverse effects, including contractions in GDP, increased banking fragility, and heightened exchange rate volatility. The impulse response functions corroborate these regime-specific patterns and highlight the vulnerability of Iraq's oil-dependent economy to external shocks. These findings underscore the importance of strengthening banking supervision, establishing a financial stabilization fund, improving monetary-fiscal coordination, and promoting economic diversification to enhance resilience and long-term macro-financial stability.

1. PhD student in Economics, Faculty of Economics and Management, University of Tabriz, Tabriz, Iran.
2. Department of Economics, Faculty of Economics and Management, University of Tabriz, Tabriz, Iran.
3. Full Professor, Department of Economics, Faculty of Economics and Management, University of Tabriz, Tabriz, Iran
* **Corresponding Author Email Address**: zuheriq83@gmail.com
DOI: https://doi.org/10.48308/jep.2026.241974.1251

1. Introduction

Oil-price variability is a key determinant of economic outcomes in oil-dependent economies, affecting macroeconomic conditions through supply–demand adjustments, geopolitical developments, and shifts in market sentiment (Jreisat et al., 2022). Iraq is a prominent example of such dependence: oil receipts constitute almost 98% of public revenues and roughly 60% of GDP, leaving both the real economy and the banking system exposed to external oil-market disturbances (Jassim & Bekheet, 2022; Rodhan, 2024). Evidence from the Iraqi context further indicates that oil price swings are a key trigger of banking distress, with effects that can exceed those associated with exchange-rate movements, bank-level failures, or broader macroeconomic shocks (Mahdi & Muhsin, 2023). A distinctive feature of the Iraqi case is the inverse relationship between GDP growth and banking sector performance**: when GDP rises due to higher oil revenues, the banking sector paradoxically weakens. This counterintuitive outcome indicates that oil-driven economic expansion can undermine financial sector stability instead of strengthening it (Ali & Bouabid, 2023). The practical implications of oil dependency are evident in the sharp decline of Iraq's international reserves during oil price downturns. Between 2013 and 2016, reserves plummeted from USD 77.7 billion to USD 45.3 billion, severely constraining banks' access to foreign currency and liquidity (Khalaf et al., 2023). Oil-price variability is a key determinant of economic outcomes in oil-dependent economies, affecting macroeconomic conditions through supply–demand adjustments, geopolitical developments, and shifts in market sentiment (Jreisat et al., 2022). Iraq is a prominent example of such dependence: oil receipts constitute almost 98% of public revenues and roughly 60% of GDP, leaving both the real economy and the banking system exposed to external oil-market disturbances (Jassim & Bekheet, 2022; Rodhan, 2024). Further evidence from the Iraqi context suggests that fluctuations in oil prices are a major cause of financial distress, with consequences that may go beyond those of changes in exchange rates, bank failures, or more general macroeconomic shocks (Mahdi & Muhsin, 2023). The use of high-frequency data and a heteroskedastic

Markov-switching framework, which can differentiate between economic regimes (such as booms and recessions) and capture regime-dependent changes in error variance, a crucial characteristic for extremely volatile, oil-dependent economies, are what make this study significant (Krolzig, 1997). Incorporating heteroskedasticity enhances the precision of estimating oil shock effects on both banking stability and macroeconomic performance, providing policymakers with reliable tools to design more resilient financial frameworks. Accordingly, this paper extends the literature by providing a regime-specific perspective on the macro-financial transmission of oil shocks in Iraq and by drawing policy-relevant implications aimed at mitigating oil dependence and strengthening long-run economic stability. The remainder of the paper is organized as follows: Section 2 presents the theoretical background, Section 3 reviews the empirical evidence, Section 4 describes the methodology, Section 5 reports the estimation results, and Section 6 concludes with policy implications and recommendations.

2. Theoretical Literature

The study's theoretical framework is organized around three interrelated strands that describe how oil-price volatility affects the banking sector, the exchange rate, and overall economic activity.

2.1. Mechanisms through Which Oil Price Volatility Affects the Banking System

Evidence from oil-exporting economies suggests that oil-price volatility affects banking-sector outcomes through several interrelated channels that operate on both sides of banks' balance sheets. One prominent direct channel is deposits: swings in oil revenues modify system-wide liquidity and, in turn, funding conditions for banks. The sensitivity of deposits to oil shocks may vary across different institutional types. As macroeconomic conditions and asset quality vary, banks' readiness and capacity to provide loans are also impacted by variations in oil prices, which can influence credit demand, particularly in oil-intensive industries. One important transmission channel that might either increase or decrease these impacts is monetary policy. During times of hardship brought on by oil, central banks promote growth through lending policy and liquidity management. However, the effectiveness of this channel depends on liquidity conditions: excess liquidity may weaken monetary transmission, whereas liquidity shortages tend to strengthen it (Boukhatem & Jlassi, 2022). The impact of oil-price volatility on banking-sector performance depends importantly on whether oil prices are rising or falling. When oil prices rise, stronger oil revenues typically improve liquidity conditions, allowing governments and firms to strengthen their fiscal positions by limiting deficits and reducing debt burdens, thereby increasing resilience to financial disturbances. In such an environment, credit conditions tend to ease, non-performing loans (NPLs) may fall, and demand for banking products and services often increases (Kafash et al., 2020). Conversely, declining oil prices exacerbate macroeconomic stress, increasing NPLs and reducing efficiency. Empirical studies confirm that negative oil shocks produce stronger and more asymmetric effects than positive ones, particularly in large banks (Al-Odeini, 2016; Ngepah et al., 2022). Moreover, high oil price volatility itself acts as an independent destabilizing factor, creating uncertainty that undermines credit risk assessment and constrains lending activity (Kafash et al., 2020; Al-Odeini, 2016). In summary, oil price volatility affects banking systems through a complex combination of direct financial linkages, credit transmission mechanisms, and monetary policy interactions. These effects are asymmetric and context-specific, reflecting the cyclical and institutional characteristics of oil-dependent economies.

2.2. Oil Price Volatility, Banking Systems, and Exchange Rates

The triangular interaction among oil price volatility, exchange rates, and banking systems generates multidirectional transmission mechanisms that amplify macro-financial shocks through feedback loops (Bolescu, 2019). The transmission mechanism starts with movements in oil prices that directly affect exchange-rate dynamics, given that oil is internationally priced in U.S.

dollars. When oil prices rise, exporting countries accumulate dollar reserves, leading to domestic currency appreciation. When prices fall, importing nations deplete reserves to cover import bills, resulting in depreciation (Bouazizi et al., 2022). These currency shifts affect banking stability through exposure to foreign exchange positions and the financing of oil-related sectors. For example, in Russia, declining oil prices caused currency depreciation and fiscal stress, which in turn undermined banking performance (Bolescu, 2019). Financial market channels reinforce these effects: falling oil prices reduce investor confidence, depress bank stock valuations, and constrain profitability. This relationship is further complicated by interest rates; higher rates increase exchange rate fluctuations and oil volatility, while oil shocks alter interest rate dynamics (Aloui & Anis, 2023). The length and strength of these effects change throughout time. Increased volatility in the short term is frequently followed by a slow long-term convergence to equilibrium (Aloui & Anis, 2023; Bolescu, 2019).

2.3. Oil Price Volatility, Banking Systems, and GDP

The relationship between oil-price volatility, the banking sector, and GDP is influenced by feedback mechanisms that create bidirectional interactions across the wider economy. Rising oil prices can suppress overall economic activity and tighten credit markets, weakening both stock performance and banking sector stability. Conversely, during downturns, declining economic activity lowers energy demand and depresses oil prices, intensifying recessions (Mighri & Al-Saqqaf, 2019). This cyclical relationship limits banks' ability to perform their intermediation role effectively. Macroeconomic uncertainty reduces demand for credit, while households and firms may withdraw deposits or shift assets to alternative instruments, further constraining liquidity and credit supply (Farouk & Solang, 2020). Evidence from major events, such as the 2008 global financial crisis and the 2014 oil-price drop, suggests that oil shocks frequently coincide with inefficiencies in the banking industry. Furthermore, domestic macroeconomic variables are more likely to explain bank performance than bank-specific attributes (Jreisat et al., 2022). Furthermore, financial accelerator processes amplify the effects by converting oil shocks into sharp swings in credit supply and investment. Models that include both the oil and banking sectors show that such accelerators greatly exacerbate economic cycles and financial instability (Glynn & Loruso, 2024). Overall, oil price volatility has a cascading and reinforcing influence on banking operations and economic growth, tying financial intermediation to macroeconomic performance in a mutually reliant cycle.

3. Empirical Literature Review

Joseph et al. (2024) presents a systematic review covering 64 studies published between 1980 and 2023 that examine macroeconomic drivers of bank stock returns. Their synthesis identifies interest rates and exchange-rate exposure as particularly influential factors, while suggesting that evidence on monetary policy, gold prices, and oil prices remains less conclusive and merits further research. The review also underscores that bank-specific attributes condition how macroeconomic variables translate into stock-return responses, and it summarizes the main approaches and findings used across the literature. Yokuş (2024) analyzes the main drivers of energy-crisis episodes over the last five decades using a binary logit framework. Using monthly observations from January 1973 to December 2022, the study assesses the predictive content of thirteen indicators. The results suggest that energy crises are primarily linked to supply–demand imbalances (e.g., petroleum inventories and gaps between fossil fuel production and consumption), energy investment activity (such as oil and natural gas drilling), macro-financial disruptions (including inflation, the U.S. dollar index, and measures of global real activity), and geopolitical risk. The model is reported to predict global energy-crisis episodes with roughly 99% accuracy, highlighting the usefulness of these indicators for anticipating and interpreting crisis periods. Ali et al. (2024) examine how economic policy uncertainty (EPU) and oil-price movements influence bank equity performance in twelve major economies over 1985–2022, using causality-in-quantiles techniques together with wavelet coherence analysis. Their results indicate pronounced cross-country heterogeneity and time variation in the estimated effects. Under stressed market conditions, higher EPU is linked to weaker bank stock performance in Brazil, Canada, France, India, Russia, and the United States, while Japan shows an especially strong and persistent negative association. The influence of oil prices is most evident during crisis episodes, and bank stocks tend to co-move significantly with oil price dynamics in most markets, with Brazil as a notable exception. Overall, the findings provide guidance for policymakers and market participants on when and how macro shocks translate into banking-equity fluctuations. Bouazizi et al. (2022) analyze how oil price volatility transmits to foreign exchange and equity markets in developed oil-importing economies. Using daily data for Germany, Japan, and the United States from May 20, 1987, to December 9, 2019, the authors estimate a range of ARMA–GARCH specifications (including standard GARCH, EGARCH, and GJR) to capture conditional volatility. The evidence indicates a meaningful long-run relationship between oil-price volatility and returns in both foreign-exchange and equity markets, with the GJR specification delivering the best overall fit. Moreover, Granger-causality tests and impulse-response analysis suggest that oil volatility has a significant effect on FX and stock returns, although bidirectional causality is not consistently supported. The study also argues that global oil-market volatility carries stronger implications for these assets than domestically measured oil volatility, offering policy-relevant insights for monetary authorities and portfolio managers concerned with exchange-rate management and reserve policies. Shaiban et al. (2021) investigate the impact of oil-price shocks on banking-sector equity performance in advanced and emerging nations between 1995 and March 2021. They use Toda-Yamamoto's (1995) VAR-based causality approach, supplemented with impulse response functions and forecast error variance decomposition. Positive oil-price shocks are often associated with declines in bank equity indices, particularly in the United States, the United

Kingdom, Canada, Japan, Brazil, and Mexico; however, Mexico is noted as an exception. Furthermore, oil prices and interest rates together explain a significant percentage of the volatility in banking equities, emphasizing the need for hedging oil-price exposure for globally diversified investors. Albulescu (2020) examines how international oil price movements affect the financial stability of 17 publicly listed Russian banks over 2008–2016, applying the Panel Mean Group (PMG) estimator. The results suggest that negative oil-price shocks undermine bank stability in the long run, primarily through exchange-rate depreciation, worsening fiscal conditions, and declines in equity prices. In contrast, favorable oil shocks are associated with stronger long-run stability. The estimated short-run effects are not statistically significant, suggesting that both time horizon and model choice matter when evaluating oil-price transmission to banking stability.

El-Chaarani (2019) employs a panel-data approach to investigate how oil-price variations affect bank financial performance in eight oil-producing Middle Eastern economies, including Saudi Arabia, the UAE, Qatar, Bahrain, Kuwait, Jordan, Oman, and Iran, from January 2012 to December 2017. The findings show that fluctuations in oil prices have a major impact on banking performance in Bahrain, Oman, and Iran, but no obvious direct impact in the remaining nations. The study also discovers that country size and the extent of diversification into non-oil businesses influence this link, with more diverse economies having lower bank-performance sensitivity to oil price swings. Ayo-Afendy (2019) uses a panel regression framework to examine how oil prices and selected macroeconomic variables relate to the performance of Islamic banks. The study relies on annual observations for 48 Islamic banks in seven countries—Bahrain, Iraq, Iran, Kuwait, Qatar, Saudi Arabia, and the UAE—over 2007–2016. The results suggest that the oil-price effect is country-specific and depends on the relative market presence of Islamic banking. Where Islamic banks represent a small segment of the banking system, their performance appears largely insulated from oil and macroeconomic fluctuations. By contrast, in Iran—where Islamic banking plays a dominant role in financing economic activity—oil prices are found to significantly affect banking performance. Kandil and Markowski (2018) analyze how the oil price downturn affected 22 domestic banks in the UAE over 15 quarterly observations, using fixed-effects panel specifications. The authors report that declining oil prices are associated with weaker bank outcomes, including lower ROA and ROE as well as slower credit and deposit growth across the sector. Although Islamic banks show relatively stronger expansion in lending and deposits, conventional banks display superior profitability metrics. The study argues that oil shocks impair bank performance by dampening economic activity, tightening fiscal conditions, and compressing corporate profits. Alodayni (2016) examines how the 2014–2015 oil-price slump affected financial stability in GCC countries, using dynamic system GMM, fixed-effects panel estimators, and a panel VAR framework. The study tracks the transmission of oil-price shocks through macroeconomic conditions and, ultimately, to banks' non-performing loans (NPLs). The findings show that NPL dynamics and overall stability are significantly related to oil prices, non-oil GDP, interest rates, equity prices, and housing prices. Higher NPL ratios are also found to restrain credit growth, which can subsequently dampen economic activity—highlighting strong macro-financial linkages between GCC banking systems and the real economy.

In Iraq, the existing literature has largely focused on the macroeconomic consequences of oil-price volatility, whereas the banking-sector channel has received relatively limited direct attention. For example, Al-Zangana (2017) applies a multivariate autoregressive approach and documents a strong association between oil price movements and GDP over 2003–2015. Similar conclusions are reported by Rodhan (2024), who finds that oil price volatility significantly influences GDP as well as external-sector indicators such as imports, exports, international reserves, and related aggregates. Using an ARDL framework, Al-Jubouri and Abdul Hamid (2020) find positive short- and long-run relationships between oil revenues and economic growth over 2003–2017, while also reporting that oil income largely financed household consumption rather than facilitating structural reforms. In addition, Kazem (2023) estimates that a one-dollar decline in the oil price per barrel is associated with economic losses exceeding USD 1 billion and a widening fiscal deficit. Despite Iraq's position as the world's second-largest OPEC producer and fourth-largest globally, research on its economy remains limited compared to other oil exporters. There is a notable gap concerning the banking sector's vulnerability to oil-induced financial crises. To address this gap, the study applies a Markov-Switching Heteroskedastic VAR (MSH-VAR) model and develops a Banking Fragility Index (BFI) to examine how oil price volatility shapes macro–banking interactions in Iraq. By allowing dynamics to differ across regimes—such as oil-boom and oil-bust phases—the framework captures state-dependent behavior and enables assessment of both direct and indirect transmission of oil shocks to financial stability. The findings are intended to inform policy by supporting efforts to enhance banking-sector resilience, advance economic diversification, and lessen Iraq's reliance on oil-based revenues.

4. Research Methodology

4.1. Data and Stylized Facts

To examine how oil price volatility affects Iraq's banking system, this study relies on quarterly data covering Q1 2004 to Q4 2022. The empirical analysis employs a Markov-Switching Heteroskedastic VAR (MSH-VAR) framework to model multivariate, nonlinear, and regime-dependent interactions among the key macro-financial variables. Oil prices (OP) are treated as the primary external shock to the Iraqi economy and are measured as quarterly averages of global crude oil prices denominated in U.S. dollars. The Banking Fragility Index (BFI) is introduced as a proxy for the overall condition and stability of Iraq's banking system. This composite index captures systemic vulnerability by combining multiple dimensions of financial risk. The BFI is constructed following the approach of Kibritçioğlu (2003), which defines banking fragility in terms of changes in three core indicators:

1. Total bank deposits.

2. Bank credit (claims) to the private sector; and 3. Banks' external (foreign) liabilities.

These variables respectively serve as indirect measures of liquidity risk, credit risk, and exchange rate risk, with fluctuations reflecting variations in the fragility of the banking sector. Given data limitations and Iraq's specific financial structure, this study adapts Kabritchioglu's framework by incorporating Non-Performing Loans (NPLs), total banking sector liabilities, and bank deposits. To ensure comparability across series and avoid scale-driven effects, all variables are transformed into standardized units. The Banking Fragility Index (BFI) is then constructed as the arithmetic average of the standardized values of the three banking indicators. Beyond oil prices and the BFI, the model incorporates two macroeconomic controls: real GDP, which proxies aggregate output, and the exchange rate (ER), which reflects external-sector conditions. The dataset is assembled from official Iraqi sources, including the Central Bank of Iraq, the Ministry of Planning, and the Central Organization for Statistics and Information Technology. These data sources ensure consistency and reliability across the sample period. All variables in the MSH-VAR model are transformed into natural logarithms to stabilize variance, reduce heteroskedasticity, address potential non-linearities, and allow coefficient interpretations as elasticities. Specifically: **Oil Price (OP):** This variable is measured as the natural logarithm of the quarterly average nominal Brent crude oil price in U.S. dollars, denoted ln (OP). Real Gross Domestic Product (GDP): Natural logarithm of real GDP in constant prices (real terms), denoted as ln (GDP). Exchange Rate (ER): Natural logarithm of the official Iraqi dinar per U.S. dollar exchange rate (nominal terms), denoted as ln(ER). Banking Fragility Index (BFI): Natural logarithm of the composite index, denoted as ln(BFI). Prior to taking the logarithm, the BFI is shifted by adding a constant equal to the absolute value of its minimum plus a small positive epsilon (e.g., 1) to ensure all values are strictly positive and the transformation is valid. All variables are employed in logarithmic levels (not first differences or growth rates). This uniform logarithmic level specification ensures complete consistency across all variables, preserves potential long-run relationships, and enables the Markov-switching mechanism to effectively identify regime-dependent dynamics and structural shocks through heteroskedasticity.

4.1.1 Descriptive Statistics

Table 1 reports the descriptive statistics for the level series expressed in natural logarithms over the sample period spanning 2004Q1 to 2022Q4, comprising 76 quarterly observations.

Table (1). Descriptive Statistics of the Logarithmic Variables (Levels)

Variable	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis	Jarque-Bera Test
Ln(OP)	4.239	0.299	3.597	4.696	-0.090	1.959	Rejected***
Ln(BFI)	0.265	0.411	-2.147	1.439	-2.067	17.74	Rejected***
Ln(GDP)	11.94	0.513	10.50	12.55	-1.245	3.642	Rejected***
Ln(ER)	7.181	0.092	7.075	7.332	0.441	1.448	Rejected***

*** The null hypothesis of normality is rejected at the 1% significance level, as evidenced by the skewness, excess kurtosis, and Jarque–Bera statistics.

Note: ln(BFI) is computed after shifting the original standardized Banking Fragility Index by +1.4 to ensure positivity: ln(BFI_shifted) = ln(BFI + 1.4). The minimum value of -2.147 reflects periods of extremely low fragility in the shifted series.

Source: Research Findings

Oil Prices (ln (OP)): The mean of 4.239 corresponds to an average crude oil price of approximately exp (4.239) ≈ $69 per barrel. The standard deviation of 0.299 indicates moderate volatility over the period, consistent with global oil market fluctuations. Near-zero skewness and platykurtic distribution (kurtosis < 3) suggest a relatively symmetric and thinner-tailed series, though normality is still rejected. **Banking Fragility Index (ln (BFI)):** After adding a constant of 1.4 to ensure the index remains strictly positive, ln (BFI) has a mean of 0.265 and a standard deviation of 0.411, indicating considerable dispersion and meaningful variation in banking-sector vulnerability. The strongly negative skewness (-2.067) and extremely high kurtosis (17.742) indicate a highly leptokurtic distribution with fat tails and a predominance of periods of low fragility punctuated by rare but severe spikes—typical of financial fragility indices during oil-driven crises in Iraq. Exchange Rate (ln(ER)): The mean of 7.181 implies an average official rate of approximately exp (7.181) ≈ 1,310 Iraqi dinars per U.S. dollar. The notably small standard deviation (0.092) points to a relatively stable nominal exchange rate, consistent with the Central Bank of Iraq's managed-peg arrangement. The distribution exhibits positive skewness and comparatively low kurtosis, which together supports rejection of the normality assumption. Real GDP (ln (GDP)): The series has an average of 11.943, consistent with sustained long-run expansion in real output. Its standard deviation (0.513) indicates moderate variability, likely tied to oil-revenue dynamics. The distribution is markedly left-skewed (skewness = −1.245) and exhibits substantial excess kurtosis (3.642), implying asymmetric downturns and sporadic severe contractions—patterns consistent with the characteristics of an oil-dependent economy such as Iraq. Overall Conclusion: Excess kurtosis, particularly in ln (BFI), and skewness in ln (GDP) and ln (BFI) are the main causes of all series' substantial deviations from normalcy. The data's nonlinear and regime-dependent dynamics are highlighted by the existence of fat tails, asymmetric distributions, and volatility clustering, which are especially noticeable in banking fragility and real output. Adopting a Markov-Switching Heteroskedastic VAR (MSH-VAR) framework, which is ideal for capturing shifts in volatility regimes and the non-Gaussian transmission of shocks frequently seen in oil-dependent emerging economies like Iraq, is strongly justified by these empirical features.

4.1.2 Evolution of the Variables and Stylized Facts

Figure 1 presents the time-series trajectories of the log-transformed variables in separate panels over the period 2004Q1–2022Q4. The plots reveal key stylized facts and empirical patterns that reinforce the regime-dependent nature of the relationships examined in this study.

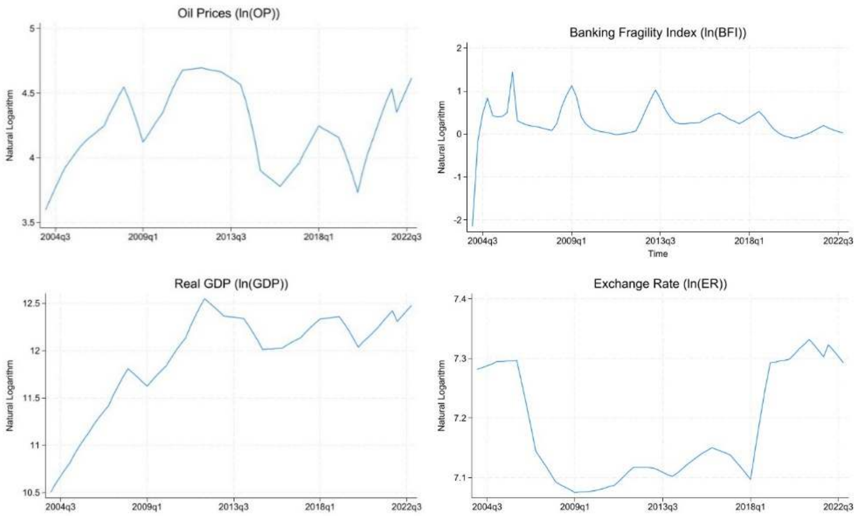

Fig 1. Evolution of Logarithmic Variables

Source: Research Findings

Oil Prices (ln (OP)): The oil-price series exhibits substantial volatility and distinct cyclical behavior. It shows sharp run-ups in the early 2000s and again in the mid-2010s, followed by pronounced declines during the 2008–2009 global financial crisis, the extended oil glut of 2014–2016, and the COVID-19 shock in 2020—each episode being followed by a relatively swift rebound. Overall, these dynamics highlight Iraq’s vulnerability to externally driven oil-market disturbances and suggest the presence of distinct low- and high-volatility regimes. Banking Fragility Index (ln (BFI)): The series features extended intervals of stability (low or negative values post-shifting), punctuated by abrupt and pronounced upward spikes. These spikes coincide precisely with major oil price downturns (particularly early 2010s, 2014–2016, and 2020), exemplifying the episodic vulnerability of Iraq's banking sector to oil-induced shocks—a classic hallmark of financial fragility indicators in oil-reliant economies. Real Gross Domestic Product (ln (GDP)): The trajectory displays a predominant upward trend indicative of long-term growth, interspersed with moderate cyclical fluctuations that align closely with oil price movements. Temporary slowdowns are evident during major oil-price declines—especially in 2014–2016 and 2020—followed by subsequent recoveries, highlighting the pivotal role of oil revenues in sustaining Iraq's economic growth. Exchange Rate (ln(ER)): The exchange-rate series shows very limited variability and appears nearly flat over time, consistent with the Central Bank of Iraq's managed peg to the U.S. dollar. Small departures from this pattern arise mainly during major stress episodes (e.g., in the early and late 2010s), yet the overall trajectory supports the view that the exchange-rate arrangement has been effective in maintaining nominal stability.

4.2. Model Specification

Markov-switching VAR (MS-VAR) models constitute an important extension in multivariate time-series econometrics, as they can represent nonlinear and heterogeneous interactions among variables. The approach builds on Hamilton's (1989) seminal univariate Markov-switching autoregressive framework and its multivariate generalization developed by Krolzig (1997). Unlike standard linear VAR models that impose parameter constancy, MS-VAR specifications allow key parameters to vary across latent regimes. Intercept terms, autoregressive coefficients, and the variance of the innovations can change depending on the prevailing state, which is assumed to follow an unobserved Markov chain. By allowing parameters to vary across states, MS-VAR models can capture structural shifts and nonlinear dynamics that are frequently observed in macro-financial data (Li et al., 2022). For a vector X_t of K endogenous variables, an MS-VAR (p) model can be expressed as follows (Nin & Kamaya, 2020):

$$X_t = \begin{cases} \alpha_1 + \beta_{11}X_{t-1} + \cdots + \beta_{p1}X_{t-p} + A_1 v_t \quad if\ s_t = 1 \\ \vdots \\ \alpha_m + \beta_{1m}X_{t-1} + \cdots + \beta_{pm}X_{t-p} + A_m v_t \quad if\ s_t = m \end{cases} \tag{1}$$

$v_t \sim N(0; I_K)$

Where:

- X_t, is a vector of endogenous variables,
- α_i is the intercept vector,
- β_{pi} are autoregressive coefficients, and
- $A_i v_t$ represents the residual term with regime-dependent covariance structure.

The residual vector $v_t$is assumed to follow a multivariate normal distribution:

$v_t \sim N(0; I_K)$

The covariance matrix of the residuals is given by:

$$\Sigma_i = E\left(A_i v_t v_t^{'} A_i^{'}\right) = A_{AI} E\left(v_t v_t^{'}\right) A_i^{'} = A_i I_K A_i^{'} = A_i A_i^{'} \tag{2}$$

Markov Process for Regime Transitions

The regime indicator $s_t$is latent (unobserved) and is assumed to follow a first-order hidden Markov chain. It is assumed to be independent of past realizations of X_t. The probability of switching from regime $i$at time $t-1$to regime $j$at time $t$is given by:

$$Pr(s_t = j | s_{t-1} = i) = p_{ij} \tag{3}$$

This relationship holds for all $t$and for $i, j = 1,2, \dots, m$. The transition probabilities can be collected in an $m \times m$transition matrix, P:

$$P = \begin{bmatrix} p_{11} & p_{12} & \cdots & p_{1m} \\ \vdots & & \ddots & \vdots \\ p_{m1} & p_{m2} & \cdots & p_{mm} \end{bmatrix} \tag{4}$$

where p_{ij}denotes the probability that the economy is in regime $j$at time t, conditional on being in regime $i$at time $t-1$. The MS-VAR class includes several specifications, distinguished by which parameters are permitted to vary across regimes. In this paper, we adopt the MSH-VAR variant, which is defined by the following features:

- Intercepts and VAR slope coefficients are held constant over time.
- Regime-dependent error covariance matrices.

This taxonomy follows the notation proposed by Krolzig (1997), which distinguishes between:

- MSH models – only the error covariance matrix changes,
- MSIH models – both the intercepts and the covariance matrix change, and
- In MSIAH models, intercepts, VAR coefficients, and covariance matrices are all allowed to vary across regimes.

A key feature of the MSH-VAR specification is the identification of structural shocks through regime-dependent heteroskedasticity in the reduced-form residuals (Lanne et al., 2010). The differences in the covariance matrices Σ(s_t) across Markov regimes provide sufficient statistical variation to uniquely identify the contemporaneous structural impact matrix (up to sign and column permutation) without the need for conventional recursive ordering restrictions or external instruments. This heteroskedasticity-based identification strategy is particularly well-suited to the present analysis, as pronounced oil price volatility in Iraq induces distinct regime shifts in conditional variances, thereby facilitating the reliable recovery of structural impulse response functions.

5. Results and Model Estimation

5.1. Unit Root Test

To examine unit roots in the series, we employ the HEGY procedure of Hylleberg, Engle, Granger, and Yoo (1990). The HEGY test is designed for seasonal time series and allows for the detection of unit roots at multiple frequencies, including (i) the zero (non-seasonal) frequency, (ii) seasonal frequencies relevant for quarterly data, and (iii) semi-annual seasonal frequencies. Unlike conventional tests such as the Augmented Dickey–Fuller

(ADF), which mainly target non-seasonal unit roots, HEGY decomposes persistence across frequency components. This feature makes it particularly suitable for quarterly datasets that may display recurring seasonal or periodic patterns. The HEGY test is used given the quarterly frequency of the data and the possibility of seasonal components; moreover, establishing the integration properties of the variables is required prior to model estimation. The initial HEGY results are reported in Table 2. The evidence indicates that all variables are non-stationary at zero (non-seasonal) frequency, with p-values exceeding the 0.05 level, whereas stationarity is supported at the seasonal and semi-annual frequencies. We use initial differences only to verify the order of integration when there is evidence of a unit root in the non-seasonal (zero-frequency) component. Consequently, the first-differenced series is used to re-estimate the HEGY test. The repeated results suggest that the series are integrated of order one, I(1), in the non-seasonal component because, following differencing, all variables become stationary at the non-seasonal, seasonal, and semi-annual frequencies. Importantly, the loss of the first observation due to differencing applies only to the unit root testing regressions (i.e., the effective sample for the HEGY regressions starts from Q2 2004). The main MSH-VAR model is estimated in log-levels, consistent with the cointegration evidence reported in Section 5.2.

Table (2). HEGY Unit Root Test Results

Variable	Non-Seasonal Frequency	Seasonal Frequency	Semi-Annual Frequency
Ln(OP)	-0.3972 (0.6925)	38.4156 (0.0000)	-4.9115 (0.0000)
DLn(OP)	-3.5632 (0.0007)	32.4929 (0.0000)	-4.5950 (0.0000)
Ln(BFI)	-0.9676 (0.3383)	12.5332 (0.0000)	-5.0414 (0.0000)
DLn(BFI)	-5.4155 (0.0000)	12.5792 (0.0002)	-5.0453 (0.0000)
Ln(GDP)	-1.2453 (0.2173)	38.8701 (0.0000)	-4.9540 (0.0000)
DLn(GDP)	-2.4671 (0.0163)	21.4956 (0.0000)	-4.5697 (0.0000)
Ln(ER)	-0.2824 (0.7790)	13.3240 (0.0000)	-3.4810 (0.0010)
DLn(ER)	-2.2630 (0.0280)	13.5430 (0.0000)	-3.5160 (0.0000)

Source: Research Findings

5.2. Cointegration Analysis

To assess whether the variables in log levels share long-run equilibrium relationships, we apply the Johansen (1995) cointegration framework. The VAR is specified with three lags to reduce the risk of residual serial correlation. Augmented Dickey–Fuller tests suggest that all series are integrated of order one, I(1) (additional details are available upon request). As shown in Table 3, both the Johansen trace and maximum-eigenvalue statistics provide evidence of cointegration. The trace test rejects the null hypothesis of $r \leq 3$at the 5% level, indicating at least four cointegrating vectors, while the maximum-eigenvalue test supports at least two cointegrating relationships. This evidence justifies estimating the MSH-VAR in log levels, as it preserves the system's long-run equilibria, while the Markov-switching heteroskedastic structure captures regime-dependent short-run adjustments and volatility shifts associated with oil-price shocks.

Table (3). Johansen Cointegration Test Results

Rank (r)	Trace Statistic	5% Critical Value	p-value	Max-Eigen Statistic	5% Critical Value	p-value
0	76.075	47.21	0.000	33.129	27.07	0.008
1	42.946	29.68	0.001	24.308	20.97	0.016
2	18.638	15.41	0.017	14.204	14.07	0.048
3	4.434	3.76	0.035	4.434	3.76	0.035

Source: Research Findings

5.3. Lag Length Selection and Optimal Number of Regimes

Estimation of the MSH-VAR model involves two key specification decisions: (i) choosing the VAR lag length and (ii) selecting the number of regimes. The lag order is determined using standard selection diagnostics, including the log-likelihood (LL), likelihood-ratio (LR) test, final prediction error (FPE), Akaike information criterion (AIC), Hannan–Quinn criterion (HQ), and Schwarz criterion (SC). As reported in Table 4, the lag-selection criteria consistently favor a first-order VAR. Specifically, **AIC, HQ, and SC attain**

their minimum values at $p = 1$, the **FPE is lowest** at the same lag, and the **LR test** provides strong support for selecting **one lag**. Accordingly, we set the VAR lag length to $p = 1$. With respect to the regime dimension, the model was initially estimated with **three regimes;** however, the limited sample size led to recurrent convergence problems and unstable parameter estimates, preventing reliable inference. Consequently, the final specification was restricted to two regimes, ensuring both estimation stability and interpretability.

Table (4). Optimal Lag Length Selection

Lag	LL	LR	FPE	AIC	HQ	SC
0	467.367	-	1.7e-11	-13.431	-13.380	-13.301
1	505.712	**76.691**	**9.12e-12**	**-14.079**	**-13.822**	**-13.431**
2	508.568	5.711	1.13e-11	-13.698	-13.235	-12.532
3	519.018	20.900	1.16e-11	-13.537	-12.869	-11.853

5.4. Results of the MSH-VAR Model Estimation

This section presents estimates from the MSH-VAR model with one lag and two regimes. As reported in Table 5, the linearity LR test strongly rejects the linear VAR specification. The test statistic is $\chi^2 = 2122.6$ with $p = 0.000$, providing decisive evidence against the null of linearity. This outcome underscores the importance of allowing Markov-switching behavior, since a linear model is unable to adequately represent the underlying macro-financial dynamics. In addition, the two-regime specification exhibits stable convergence, further supporting the suitability of the two-regime MSH-VAR framework for empirical analysis. The time, prevailing macroeconomic climate, and volatility features of the two regimes are what set them apart, according to Table 4 and the variance–covariance evidence presented in Appendix Table A1. While the unstable regime represents periods of increased volatility and crisis circumstances, most notably during the 2008–2009 global financial crisis, the stable regime typically corresponds to relatively calm periods (e.g., the pre-2008 phase, the post-crisis recovery, and certain more recent intervals). The predicted variances are rather tiny in the stable regime, especially for ln(BFI), suggesting suppressed volatility. In contrast, the unstable regime features substantially higher variances, especially for **ln(OP)** and **ln(GDP),** reflecting heightened volatility during stress periods.

To further characterize the timing of regime shifts, we compute smoothed regime probabilities from the **MSH(2)-VAR(1)** model and present them in **Figure 1.** The figure shows which regime dominates over the sample **2004Q2–2022Q4**, and the dating broadly accords with the regime classification in **Table 4.** The estimated transition matrix offers further evidence on regime persistence. The probability of staying in the stable state is relatively high (0.68), implying substantial persistence. By contrast, the probability of staying in the unstable state is much smaller **(0.11)**, implying that instability episodes are typically brief. The transition probabilities from stable to unstable **(0.31)** and from unstable to stable **(0.89)** highlight the frequent switching and the tendency for the economy to revert quickly to stability following shocks, particularly those originating from oil-price movements.

Table (5). Economic Regime Classification and Characteristics

Regime	Economic Conditions	Key Features
Stable Regime	Periods of relative macroeconomic and oil market stability	Stable exchange rates, strong GDP growth, low banking fragility volatility, significant positive impact of oil on GDP and ER
Unstable Regime	Periods of financial and economic turbulence	Higher exchange rate volatility, elevated banking fragility, weaker oil-to-GDP impact, limited or negative economic growth
Transition From / To	**Stable (t+1)**	**Unstable (t+1)**
Stable (t)	0.68	0.31
Unstable (t)	0.89	0.11
Linearity Test and Model Fit		
Linearity LR-test (χ^2):2122.6 , p-value (Linearity LR-test):0.0000		
Log-Likelihood (LL): 845.49 , AIC: -21.716 , SC: -20.408		

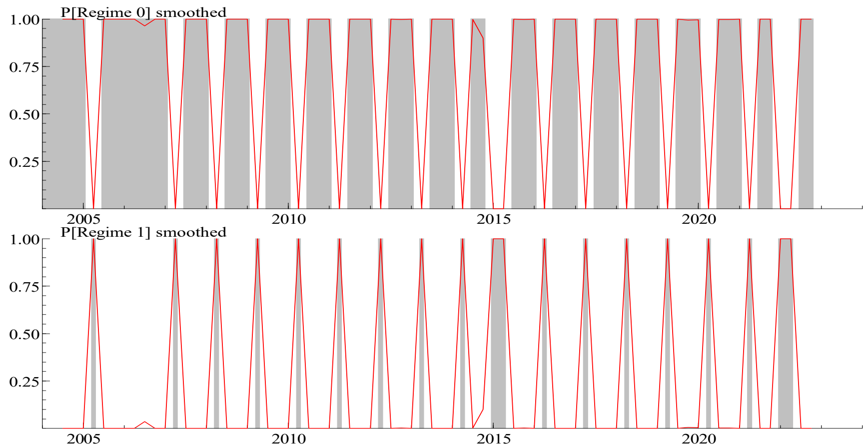

Fig 2. Smoothed Probabilities of Economic Regimes in the MSH(2)-VAR (1) Model
Source: Research Findings

The estimation results of Model MSH(2)-VAR(1) for the variables Banking Fragility Index (LnBFI), Exchange Rate (Ln(ER)), Gross Domestic Product (Ln(GDP)), and Oil Price (Ln(OP)) are presented in Table (6). This section provides an analytical discussion of the estimated coefficients and their economic implications for each dependent variable. Banking Fragility Index (Ln(BFI)): Oil prices are associated with a positive but statistically insignificant response of the Banking Fragility Index, indicating that oil-price fluctuations exert only a limited short-run effect on Iraq's banking-sector stability. Any influence is more plausibly transmitted through indirect channels—such as shifts in system liquidity or policy reactions—rather than via immediate, direct financial linkages. The lagged value of the fragility index itself carries a small and negative coefficient, implying that the system exhibits weak self-correcting tendencies—instabilities in one period are not substantially offset in the next. Exchange rate movements also appear to affect banking fragility negatively: a depreciation of the domestic currency seems to ease pressures on banks, possibly through liquidity channels, although this relationship lacks statistical strength. Similarly, GDP growth in the previous period exerts a weak and negative influence on fragility, implying that stronger economic activity does not automatically translate into a more stable banking environment. Overall, the constant term is negligible, indicating minimal effects from unobserved fixed factors. Exchange Rate (LnER): Oil-price changes have a small and statistically insignificant impact on the exchange rate, suggesting that short-run oil-market movements are not directly transmitted to Iraq's currency valuation. Banking fragility is also weakly and insignificantly related, indicating that financial-system stress does not meaningfully spill over into exchange-rate dynamics. The exchange rate exhibits strong persistence over time, as reflected by the large and highly significant coefficient on its lagged term. This result underscores the structural rigidity of Iraq's exchange-rate dynamics and the extent to which past valuations drive current movements. In other words, the exchange rate follows a near-unit-root process, showing considerable inertia against short-run shocks. GDP growth exerts a slight appreciating effect on the domestic currency, consistent with the view that stronger economic fundamentals can modestly support exchange rate stability. The intercept is close to zero, implying no meaningful contribution from time-invariant or exogenous factors.

Gross Domestic Product (LnGDP): Oil prices emerge as the main driver of Iraq's economic performance. Higher oil prices in the preceding period significantly boost GDP growth, underscoring the economy's deep reliance on oil revenues as the primary engine of fiscal and real-sector expansion. This relationship reflects the direct transmission of oil price shocks through public spending, government investment, and aggregate demand. By contrast, banking fragility exerts little to no influence on GDP, indicating that weaknesses in the financial sector do not substantially constrain economic growth. This result is consistent with Iraq's economic structure, in which oil-sector dominance constrains the contribution of financial intermediation to productive activity. Likewise, exchange-rate movements exert only a minor influence on output, since oil revenue inflows largely shield the economy from currency fluctuations. The high persistence of GDP, captured by the large coefficient on its lagged value, indicates that growth patterns are path-dependent and slow to adjust to external shocks. The negative and statistically significant intercept may point to underlying structural constraints—such as institutional inefficiencies, limited diversification, or supply-side bottlenecks—that weigh on long-term economic performance. The MSH-VAR estimates for 2004–2022 yield a set of findings that provide important insights into the oil–banking nexus, showing points of consistency with prior evidence while also revealing notable differences relative to earlier studies. The findings suggest that oil prices exert a statistically significant and direct influence on Iraq's macroeconomic outcomes—most notably real GDP—whereas the estimated effects on the banking sector and the exchange rate are not statistically significant. This aligns with findings from Poghosyan and Hesse (2009), Abdu and Baharun (2016), and Shiban et al. (2021), who showed that in several Middle Eastern and North African countries, oil price fluctuations primarily affect banks indirectly through macroeconomic channels rather than through direct financial linkages. In contrast, studies in Bahrain and the UAE (El-Cherani, 2019; Kandil & Markowski, 2018) Prior studies have documented direct effects of oil-price volatility on bank profitability, liquidity, and leverage. The lack of comparable effects in Iraq may be attributed to an underdeveloped banking system, weak financial intermediation, and limited integration with international financial markets. Moreover, the pronounced persistence in GDP and the exchange rate suggests that Iraq's economy is structurally path-dependent, with fiscal channels playing the dominant role in transmitting oil-price shocks. While oil price although oil-price fluctuations significantly influence fiscal conditions and output dynamics (Roudhan, 2024; Kazem, 2023), they do not exert a direct impact on banking fragility, indicating weak feedback between the financial and real sectors. Overall, the results suggest that oil-price shocks are transmitted mainly through indirect channels—such as investment, production, and policy uncertainty (Ali et al., 2024; Yukosh, 2024)—rather than through direct financial mechanisms. Consequently, economic fluctuations in Iraq appear to be largely fiscally driven, with the banking sector playing a limited role in absorbing or amplifying oil-related shocks.

Table (6). Estimation Results of the MSH(2)-VAR(1) Model

Dependent Variable	LnOP(-1)	LnBFI(-1)	LnER(-1)	LnGDP(-1)	Constant
Ln(BFI)	0.248	-0.018	-0.518	-0.412	0.008
Ln(ER)	0.017	-0.020	***0.995	-0.027	-0.0003
Ln(GDP)	**0.026**	0.006	0.031	***0.953	***-0.003

Notes: Significance levels: ***1%, *5%*

5.5 Impulse Response Analysis

The impulse response functions (IRFs) trace the dynamic reactions of ln(BFI) (banking fragility), ln(ER) (exchange rate), and ln(GDP) (output) to a one–standard-deviation shock in oil prices, ln(OP). As illustrated in Figures 3 and 4, the responses are reported separately for the two economic states identified in the model: the stable and unstable regimes.

In the stable regime, marked by lower conditional variances and muted volatility, the response to an oil-price shock tends to be relatively moderate, positive, and persistent. This state corresponds to intervals in which Iraq is less affected by external disturbances (e.g., global financial stress), and adjustment mechanisms, including central bank policy actions, appear to function more effectively. In this regime, the responses of banking fragility, the exchange rate, and GDP to oil-price innovations indicate a comparatively stable adjustment process. Higher oil prices are associated with gradual and sustained improvements in key macroeconomic indicators, without inducing abrupt fluctuations. This favorable pattern points to a stronger capacity of both the banking sector and the broader economy to accommodate positive oil shocks, plausibly through liquidity and credit transmission that supports real activity. At the same time, the modest size of the responses implies that shocks are absorbed relatively quickly, and the system reverts toward equilibrium, highlighting resilience during tranquil periods. Overall, the stable regime demonstrates that when external pressures are limited, the macro-financial system exhibits both robustness and the ability to translate oil revenue gains into sustained economic and financial stability.

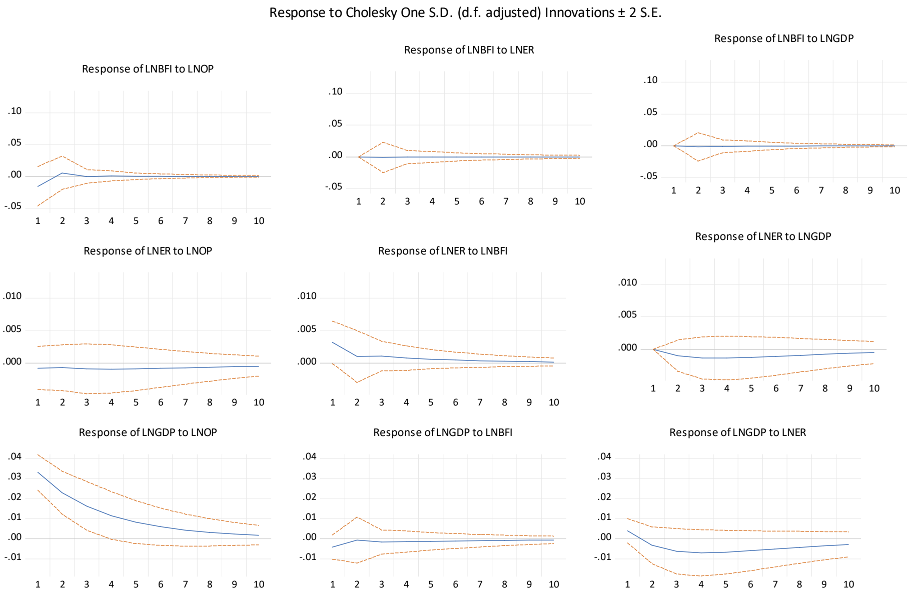

Fig 3. Impulse Responses to Shocks in Regime Zero (Stable Regime)

Source: Research Findings

In the unstable regime—characterized by higher conditional variances, particularly for ln(OP) and ln(GDP), and heightened volatility—the responses to oil-price shocks are stronger in magnitude and less predictable. This state is typically associated with crisis episodes (e.g., the 2008–2009 global financial crisis) or periods of pronounced turbulence in oil markets, when Iraq becomes more exposed to external disturbances. Within this regime, the responses of **ln(BFI), ln(ER),** and **ln(GDP)** are amplified and display asymmetry. For example, adverse oil shocks tend to increase banking fragility, intensify exchange-rate volatility, and reduce GDP. Positive shocks, while potentially boosting economic activity in the short term, are often accompanied by substantial fluctuations. This pattern is consistent with adverse feedback loops between the banking sector and the wider economy, whereby oil-price uncertainty tightens credit conditions and undermines real activity. More broadly, the results suggest that adjustment processes in the unstable regime are weaker and less reliable, leading to shock responses that are both more persistent and more volatile. These findings point to the importance of stronger stabilization policies aimed at improving macroeconomic resilience and reducing the banking system's exposure to externally driven oil shocks.

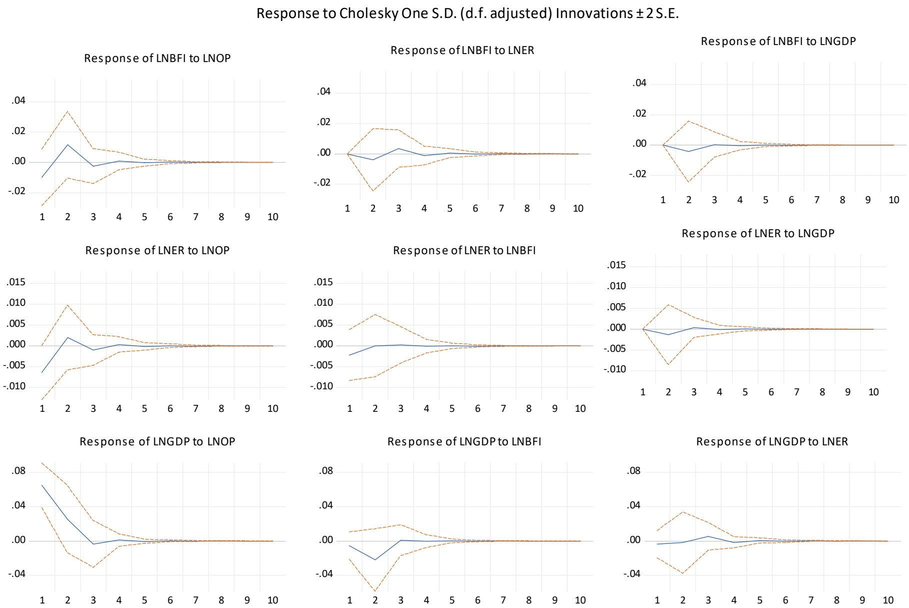

Fig 4. Impulse Responses to Shocks in Regime One (Unstable Regime)

Source: Research Findings

6. Conclusion and Recommendations

This study uses an MSH-VAR framework to examine how changes in oil prices impact the macro-banking relationship in Iraq. The research reveals two latent regimes, namely stable and unsteady, using quarterly data from 2004 to

2022. It also looks at the direct and indirect transmission channels through which oil-price shocks impact the exchange rate (ln(ER)), real production (ln(GDP)), and banking fragility (ln(BFI)). Overall, the findings indicate that while the immediate effects on banking fragility and the exchange rate are relatively small, oil-price volatility predominantly influences Iraq's macro-financial environment through real-economy channels, most notably output dynamics. There doesn't seem to be a direct correlation between the exchange rate and banking fragility. According to the impulse response results, positive oil shocks are moderately but persistently accommodated under the stable regime: increased liquidity and steady production growth support the stability of the banking sector. In contrast, adverse oil shocks result in asymmetric and exaggerated responses under the unstable regime, which is usually associated with crisis conditions or severe oil-price turbulence. This is evident in increased financial fragility, increased exchange-rate volatility, and GDP contractions. These dynamics highlight the fragility of Iraq’s oil-dependent economy and the constrained effectiveness of adjustment mechanisms during episodes of elevated turbulence. The strong persistence observed in GDP and the exchange rate points to a degree of resilience to external shocks. At the same time, the banking sector appears to play only a minor role in shock transmission, reflecting weak financial intermediation and the overriding influence of oil revenues on economic activity. Considering these findings, several policy measures can be proposed to strengthen macro-financial stability in Iraq: Economic Diversification: Reducing dependence on oil revenues (which constitute ~98% of government income) is essential. Policymakers should encourage investment in non-oil sectors—such as agriculture, industry, and tourism—to diversify revenue sources and reduce vulnerability to oil price shocks. Strengthening Banking Supervision and Risk Management: The Central Bank of Iraq should enhance regulatory frameworks, including higher capital requirements and improved credit and liquidity risk management, to bolster banking sector resilience. Establishing a Stabilization Fund: A financial stabilization fund, financed during oil booms, can act as a buffer against price declines, ensuring liquidity support for banks and maintaining foreign reserves. Improving Banking Transparency and Efficiency: Structural reforms are needed to strengthen financial intermediation. Enhancing transparency in bank balance sheets, reducing non-performing loans, and improving access to financial services can increase the efficiency and stability of the banking sector. Managing Exchange Rate Volatility: Given the indirect impact of exchange rates on banking stability, monetary policies should focus on maintaining currency stability against oil price shocks, including managing reserves and using derivative instruments to mitigate exchange rate fluctuations. Implementing these measures can reduce Iraq's oil dependence, enhance banking sector resilience, and promote overall macroeconomic stability. In addition to reducing the negative impacts of oil price shocks, these policies lay the groundwork for more sustainable and resilient economic development amid volatility in global markets.

Funding

This study received no financial support from any organization.

Authors' contributions

All authors had contribution in preparing this paper.

Conflicts of interest

The authors declare no conflict of interest

References

Abduh, M., & Baharoon, A. M. (2016). Oil Prices and Determinants of Islamic and Conventional Banks' Profitability in Saudi Arabia. *Journal of Islamic economics, Banking and finance*.https://doi.org/10.12816/0045548.

Albulescu, C. (2020). Bank financial stability, bank valuation and international oil prices: Evidence from listed Russian public banks. *arXiv preprint arXiv:2004.12791*. https://doi.org/10.48550/arXiv.2004.12791 .

Ali, D. J., Sargon, B., & Hadi, D. M. (2024). The impact of economy policy uncertainty and oil price shocks on G20 banks' stock performance: Wavelet coherence and non-parametric causality in quantiles approach. *Heliyon*, *10*(7).https://doi.org/10.1016/j.heliyon.2024.e28846.

Alodayni, S. (2016). Oil prices, credit risks in banking systems, and macro-financial linkages across GCC oil exporters. *International Journal of Financial Studies*, *4*(4), 23.https://doi.org/10.3390/ijfs4040023,

Aloui, M., & Anis, J. (2023). The Dynamic Relation between the Oil Price Volatility, Stock Market, Exchange and Interest Rate in GCC Countries: Panel Vector Autoregressive (PVAR) Model. *International Journal of Economics & Business Administration (IJEBA)*, *11*(3), 114-128. https://doi.org/10.35808/ijeba/819.

Al-Zanganee, S. A. M. (2017). Impact of crude price volatility on levels of economic activity: Evidence from Iraq. In *7th International Scientific Forum, Isf* (pp. 531-545).https://eujournal.org/index.php/esj/article/view/9225/8766.

Bouabid, A., & Ali, S. H. (2023). Measuring the Relationship Between Economic Crises and Investment Portfolios-A Sample Study of Iraqi Banks. *International Journal of Professional Business Review: Int. J. Prof. Bus. Rev.*, *8*(7), 28. https://doi.org/10.26668/businessreview/2023.v8i7.1889.

Bouazizi, T., Mrad, F., Hamida, A., & Nafti, S. (2022). Effects of conditional oil volatility on exchange rate and stock markets returns. *International Journal of Energy Economics and Policy*, *12*(2), 53-71. https://doi.org/10.32479/ijeep.12826.

Boukhatem, J., & Djelassi, M. (2022). The bank-lending channel of monetary policy transmission in a dual banking system: empirical evidence from panel VAR modeling. *Cogent Economics & Finance*, *10*(1), 2107765. https://doi.org/10.1080/23322039.2022.2107765.

Effendi, K. A. (2019). Oil prices and macroeconomic on the Islamic banking performance in OPEC member countries. *International Journal of Energy Economics and Policy*, *9*(1), 200-204.https://doi.org/10.32479/ijeep.7098.

El-Chaarani, H. (2019). The impact of oil prices on the financial performance of banking sector in Middle East region. *El-CHAARANI H.,(2019), The Impact of Oil Prices on Stocks Markets: New Evidence During and After the Arab Spring in Gulf Cooperation Council Economies, International Journal of Energy Economics and Policy*, *9*(4). https://doi.org/10.32479/ijeep.8075.

Farouq, I. S., & Sulong, Z. (2020). The impact of economic growth, oil price, and financial globalization uncertainty on financial development: Evidence from selected leading african countries. *International Journal of Business*, *7*(5), 274-289. https://doi.org/10.18488/journal.62.2020.75.274.289.

Gelain, P., & Lorusso, M. (2024). Oil Price Fluctuations, US Banks, and Macroprudential Policy.https://doi.org/10.26509/frbc-wp-202233r.

Hamilton, J. D. (1983). Oil and the macroeconomy since World War II. *Journal of political economy*, *91*(2), 228-248. https://doi.org/10.1086/261140.

Hamilton, J. D. (1989). A new approach to the economic analysis of nonstationary time series and the business cycle. *Econometrica: Journal of the econometric society*, 357-384. https://doi.org/10.2307/1912559.

Hesse, H., & Poghosyan, T. (2016). Oil prices and bank profitability: Evidence from major oil-exporting countries in the Middle East and North Africa. In *Financial Deepening and Post-Crisis Development in Emerging Markets: Current Perils and Future Dawns* (pp. 247-270). New York: Palgrave Macmillan US. https://doi.org/10.5089/9781451873672.001.

Jassim, R. Y., & Bekheet, H. N. (2022). The Effectiveness of Monetary Policy in Neutralizing Oil Price Fluctuations on the Gross Domestic Product in Iraq for the Period (1990-2019). *Journal of Economics and Administrative Sciences*, *28*(132), 1-26.https://doi.org/10.33095/jeas.v28i132.2268.

Joseph, A., E, G., Radhakrishnan, R., & Jain, R. (2024). Macro-financial nexus: a systematic review on the impact of macroeconomic factors on bank stock returns. *Cogent Economics & Finance*, *12*(1), 2354101. https://doi.org/10.1080/23322039.2024.2354101.

Jreisat, A., Rabbani, M. R., Omran, S., Al-Mohamad, S., & Bakry, W. (2022). An examination of the banking efficiency of the BRICS countries: A perspective derived from the oil price volatility. *Cogent Economics & Finance*, *10*(1), 2142315. https://doi.org/10.1080/23322039.2022.2142315.

Kadhim, R. (2023). The Impact of Fluctuation of the International Oil Prices on the Public Budget of Iraq (An Analytical Study During the Period from (2001-2019). *Estudios de economía aplicada*, *41*(2), 5. https://doi.org/10.25115/sae.v41i2.7022.

Kaffash, S., Aktas, E., & Tajik, M. (2020). The impact of oil price changes on efficiency of banks: An application in the Middle East oil exporting countries using SORM-DEA. *Rairo-Operations Research*, *54*(3), 719-748. https://doi.org/10.1051/ro/2019009.

Khalaf, H. H., Al-Azzawi, A. A. H., & Taha, Z. E. (2023). Sustainability of the banking system and the role of monetary policy: Financial liberation in Iraq. *Heritage and Sustainable Development*, *5*(1), 119.https://doi.org/10.37868/hsd.v5i1.175.

Khandelwal, P., Miyajima, K., & Santos, A. (2017). The impact of oil prices on the banking system in the Gulf Cooperation Council. *Journal of governance & regulation*, (6, Iss. 2), 32-47.https://doi.org/10.22495/jgr_v6_i2_p4.

Kibritçioglu, A. (2003). Monitoring banking sector fragility. *The Arab Bank Review*, *5*(2), 51-66.

Krolzig, H. M. (1997). The markov-switching vector autoregressive model. In *Markov-switching vector autoregressions: Modelling, statistical inference, and application to business cycle analysis* (pp. 6-28). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-51684-9_2

Lanne, M., Lütkepohl, H., & Maciejowska, K. (2010). Structural vector autoregressions with Markov switching. *Journal of Economic Dynamics and Control*, *34*(2), 121-131.https://doi.org/10.1016/j.jedc.2009.12.001.

Li, M. F., Hu, H., & Zhao, L. T. (2022). Key factors affecting carbon prices from a time-varying perspective. *Environmental Science and Pollution Research*, *29*(43), 65144-65160. https://doi.org/10.1007/s11356-022-20376-x.

Lütkepohl, H., & Netšunajev, A. (2018). The relation between monetary policy and the stock market in Europe. *Econometrics*, *6*(3), 36. https://doi.org/10.3390/econometrics6030036.

Mahdi, Z. A., & Muhsin, I. F. (2023). The Impact of Financial Crises on The Parties Involved in the Construction Project. In *E3S Web of Conferences* (Vol. 427, p. 04011). EDP Sciences. https://doi.org/10.1051/ e3sconf/ 202342704011.

Mighri, Z. A., & Alsaggaf, M. I. (2019). Asymmetric Threshold Cointegration and Nonlinear Adjustment between Oil Prices and Financial Stress. *International Journal of Energy Economics and Policy*, *9*(3), 87-105.https://www.econjournals.com/index.php/ijeep/article/view/7643.

Nain, Z., & Kamaiah, B. (2020). Uncertainty and effectiveness of monetary policy: a Bayesian Markov switching-VAR analysis. *Journal of Central Banking Theory and Practice*, *9*, 237-265.https://doi.org/10.2478/jcbtp-2020-0030.

Ngepah, N., da Silva, M. L. A., & Saba, C. S. (2022). The impact of commodity price shocks on banking system stability in developing countries. *Economies*, *10*(4), 91. https://doi.org/10.3390/ economies10040091.

Rodhan, M. A. (2024). Macroeconomic impacts of oil price shocks: evidence from Iraq by using vector autoregressive model. *International Journal of Energy Economics and Policy*, *14*(3), 162-170. https://doi.org/10.32479/ ijeep.15681.

Shaiban, M. S., Li, D., & Hasanov, A. S. (2021). Energy and bank equity interactions. *Frontiers in Energy Research*, *9*, 595060. https://doi.org/ 10.3389/fenrg.2021.595060.

Yokuş, T. (2024). Early warning systems for world energy crises. *Sustainability*, *16*(6), 2284.https://doi.org/10.3390/su16062284.

Appendix:

Table (1): Variance-Covariance Matrix of the MSH-VAR(1) Model

Stable Regime

Variable	LnOP	LnBFI	LnER	LnGDP
LnOP	2.8220e-05	-	-	-
LnBFI	5.2593e-05	0.013	-	-
LnER	2.8670e-06	0.0003	1.7278e-05	-
LnGDP	5.1805e-06	-0.0001	-7.6318e-06	8.6258e-06

Unstable Regime

Variable	LnOP	LnBFI	LnER	LnGDP
LnOP	0.019	-	-	-
LnBFI	-0.0014	0.001	-	-
LnER	-0.0009	-4.4960e-05	0.0005	-
LnGDP	0.0011	-0.0009	-0.0004	0.0082

Source: Research Findings