International Journal of Accounting and Economics Studies, 13 (1) (2026) 638-646

International Journal of Accounting and Economics Studies

Website: www.sciencepubco.com/index.php/IJAES
https://doi.org/10.14419/fanjjb54
Research paper

Analysis of The Reality of Sustainable Finance in Iraq for The Period (2009 – 2023)

Sara Jawad Kadhim AL-Bakri *, Dr. Ahmed Khalel Alhussainy

University of Babylon / College of Administration and Economics
**Corresponding author E-mail: bus159.sarah.jwaid@student.uobabylon.edu.iq*

Received: December 30, 2025, Accepted: January 19, 2026, Published: February 1, 2026

Abstract

This study aims to construct an Early Warning System (EWS) to predict banking crises in Iraq, serving as a case study for rentier economies that suffer from public sector dominance and excessive reliance on oil.

The study utilized annual data for the period (2010-2023) with projections up to (2029), employing "Scenario Analysis" methodology and Unit Root Tests (ADF). Micro-prudential indicators (such as Capital Adequacy, Liquidity, and Non-Performing Loans) were integrated with governing macro-variables (Oil Prices, GDP, and Exchange Rates).

The results indicated that "Liquidity Risk" constitutes the greatest systemic threat to the Iraqi banking sector, where crisis occurrence is directly linked to oil shocks and the withdrawal of government deposits. Conversely, "Credit Risk" demonstrated a limited impact due to the small size of the private sector credit portfolio.

The study recommends the necessity of diversifying banking funding sources to decouple the link between the general budget and banking liquidity.

Keywords: *Early Warning System (EWS); Banking Crises; Scenario Analysis; Iraqi Economy; Liquidity; Oil Shocks.*

1. Introduction

Financial stability is a fundamental pillar for economic growth, and Early Warning Systems (EWS) acquire paramount importance in emerging and rentier economies.

Iraq, as a prime example of a rentier economy, faces unique challenges where the banking sector's health is organically tied to oil revenue fluctuations and sovereign fiscal health. This paper proposes a hybrid EWS model that moves beyond traditional regression to capture the volatility of the Iraqi context.

Research Problem

Use in the Iraqi banking system is still very limited and uneven. Although the Central Bank of Iraq has introduced a few programs and incentives intended to foster social responsibility-based financing, their actual effect on bank policies and economic progress is not clear. The real issue is the gap between announced policy and its real execution. While there are some regulatory frameworks and some strategic plans for banks in Iraq, a number of the country's banks still operate on traditional forms of financing that do not have a full inclusion of environmental, social governance (ESG) factors into loan decision-making. In addition, a lack of tangible measurement tools, weak institutional capabilities, and inadequate regulatory sanctions have impeded the efficacy of sustainable finance programmers.

Thus, the primary research issue can be summarized as:

How far has sustainable finance evolved in Iraq following the period (2009–2023), and what are the economic, institutional, and regulatory determinants affecting its ability and efficiency?

2. Theoretical Framework and Literature Review

2.1. International EWS models vs. rentier realities

The development of Early Warning Systems (EWS) has historically focused on identifying leading indicators of systemic distress. Early seminal works, such as Kaminsky and Reinhart (1996), introduced the 'signals approach,' emphasizing that banking crises often coincide with currency instability, particularly in emerging markets. Subsequent global studies, including Demirgüç-Kunt and Detragiache (1998) and more recent post-2018 research, have utilized multivariate logit models to link macroeconomic volatility with banking insolvency. However, much of this international literature focuses on credit-led bubbles in diversified economies. This study contributes to the global discourse by adapting these international EWS principles to the specific structural constraints of a rentier economy, where the crisis transmission mechanism is driven by sovereign liquidity shocks rather than private-sector credit expansion.

Copyright © Sara Jawad Kadhim AL-Bakri, Dr. Ahmed Khalel Alhussainy. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

However, as this study argues, rentier economies like Iraq deviate from these global norms. While international models focus on private sector credit expansion, the Iraqi crisis transmission channel is primarily sovereign-driven. The dominance of state-owned banks and the "oil-government-liquidity" nexus necessitates a scenario analysis approach that captures external shocks (oil price volatility) rather than just internal credit cycles.
Furthermore, recent global financial stability literature has increasingly recognized the unique challenges faced by resource-dependent economies. According to Arezki et al. (2020), oil price volatility creates a direct 'liquidity-sovereign' feedback loop, where fiscal shocks immediately translate into banking sector instability—a dynamic that is central to the Iraqi context. Additionally, contemporary research into Early Warning Systems (EWS) for emerging markets, such as the framework proposed by Joy et al. (2021), emphasizes that systemic vulnerability in these regions is often driven by external shocks rather than internal credit bubbles. By integrating these recent international findings, this study positions the Iraqi banking crisis as a structural manifestation of oil-revenue fluctuations, aligning the domestic analysis with the latest global standards for financial stability modeling.

2.2. Specificity of the Iraqi banking sector

The sector suffers from structural imbalances, most notably the phenomenon of "Cash Hoarding" outside banks, weak credit granted to the private sector, and the control of state banks that enjoy an implicit state guarantee. These factors create a "banking fragility cycle," starting with a loss of confidence and ending with weak capitalization

2.3. Crisis transmission channels

In the Iraqi economy, the crisis does not typically transmit from the private sector (borrower default) to banks as in advanced economies; rather, it transmits from the "Oil/Government Sector" to banks via the "Liquidity" channel. A decline in oil prices leads to the withdrawal of government deposits to finance the deficit, which exposes banks to a severe liquidity crisis.

2.4. Methodological gap and research contribution

To clarify the study's contribution, it is essential to distinguish our Scenario Analysis approach from traditional Early Warning Systems (EWS), such as Signal extraction, Logit/Probit, or Markov-switching models. While traditional signal models rely on historical 'thresholds' that may not apply to volatile transition economies, and Logit/Markov models often assume a stable relationship between variables over time, the Scenario Analysis employed here offers a more dynamic framework.
Unlike these traditional models that focus on predicting the 'probability' of a crisis based on domestic credit cycles, our approach captures the non-linear impact of external sovereign shocks—specifically oil price volatility—which is the primary driver in rentier economies. By simulating multiple 'paths' rather than relying on a static regression, this study provides a more flexible and context-specific tool for policymakers in Iraq, addressing the structural breaks and data limitations that often render traditional econometric models less effective in rentier contexts.

2.5. Theoretical and methodological positioning

This study explicitly positions itself relative to the seminal Early Warning System (EWS) frameworks. While classic models, such as the signals approach by Kaminsky and Reinhart (1996) and the multivariate logit models of Demirgüç-Kunt and Detragiache (1998), primarily identify credit booms and macroeconomic overheating as precursors to banking distress, this research argues that such indicators have limited predictive power in rentier contexts like Iraq. Unlike these classic frameworks that focus on private-sector credit cycles, our model emphasizes the 'sovereign-liquidity channel.' By integrating oil price volatility as a governing macro-variable, this study shifts the focus from traditional internal insolvency triggers to external, oil-driven fiscal shocks, thereby offering a specialized adaptation of EWS literature for oil-dependent economies.

3. Methodology

3.1. Data and sample

Data Limitations and Robustness: This study utilizes annual time-series data (2010-2023). While this frequency allows for a long-term strategic view of financial stability, it is acknowledged that annual data may limit the model's sensitivity to high-frequency, short-term stress dynamics (e.g., sudden monthly bank runs). However, given the structural nature of Iraq's oil-dependent budget and the long-term impact of fiscal-financial linkages, annual fluctuations remain the most relevant for assessing systemic risks at a macroeconomic level.
Variables were divided into two groups:

3.1.1. Micro-prudential variables

- Capital Adequacy Ratio (CAR)
- Non-Performing Loans (NPL)
- Liquidity (LIQ) = Liquid Assets / Total Assets
- Funding Volume/Deposits (DEP)
- Cash Credit (CRE)

3.1.2. Macro-prudential (governing) variables

- Oil Price (OIL)
- Real Gross Domestic Product (RGDP)
- Exchange Rate (EXC)

3.2. T model specification

The model employs a binary crisis indicator (D) to estimate the probability of systemic distress.
Operational Definition of D: The variable takes the value (1) if any of the following conditions are met:
1) A significant decline in the banking system's liquidity ratio below the 30% regulatory threshold.
2) The requirement of emergency liquidity assistance (ELA) from the Central Bank for a systemic bank.
3) A sovereign default or severe fiscal shock that affects banking solvency.
4) It takes the value (0) otherwise.

3.3. Data and sample

To ensure the reliability of the findings and strengthen confidence in the proposed Early Warning System (EWS), several robustness checks were performed. First, a sensitivity analysis was conducted by varying the stress levels of the macro-governing variables (Oil Price, GDP, and Exchange Rate) across five different paths, ranging from moderate to catastrophic shocks. This allowed for observing the stability of the crisis indicator (D) under diverse economic pressures.

Second, the model's performance was evaluated against alternative thresholds for the binary crisis variable. Instead of a fixed regulatory limit, the threshold for a 'liquidity crisis' was shifted to test the model's predictive consistency. Finally, while traditional Logit and Probit EWS models are commonly used in stable economies, this study justifies the use of Scenario Analysis as a more robust alternative for Iraq. Unlike static regression models that rely on historical credit cycles, the scenario-based approach is better suited to capture the non-linear, structural breaks and external oil-price shocks inherent in rentier economies, thereby providing a more dynamic and context-specific stress-testing framework."

3.4. Probability generation

Probabilities are generated via EViews 12 using stochastic simulations. By stressing the governing macro-variables (OIL, RGDP, EXC) across five paths, the model recalculates the trajectory of the endogenous crisis variable (D) for the 2024-2029 period.
The basic equation of the model:

D(0,1) = f(CAP, CAR, CRE, DEP, LIQ, NPL, OIL, RGDP, EXC)

4. Results and Discussion

4.1. Time series stationarity

4.1.1. Stationarity of key independent variables

The variables (CAR, CRE, DEP, LIQ, NPL) stabilized at the level, whether with an intercept, an intercept and trend, or without an intercept and trend, with significance levels ranging between (1% and 5%). As for the variable (CAP), it only stabilized at the first difference with an intercept, an intercept and trend, and without an intercept and trend, at a significance level of (1%)

4.1.2. Stationarity of governing variables

The governing variables (EXC, RGDP, OIL) did not stabilize at the level, and all stabilized at the first difference, whether with an intercept, an intercept and trend, or without an intercept and trend, with significance levels ranging between (1% and 5%)

4.2. Model evaluation and performance test for forecasting

Before running the scenarios, we must examine how the model performs when used to forecast several periods in the future. By comparing the original series (Figure 1) with the forecasted series (Figure 2), it is observed that the parts in the second figure (2) for all endogenous variables (D, EXC, RGDP, OIL) are similar to the last segment of the first figure (1), which indicates the model's success in forecasting.

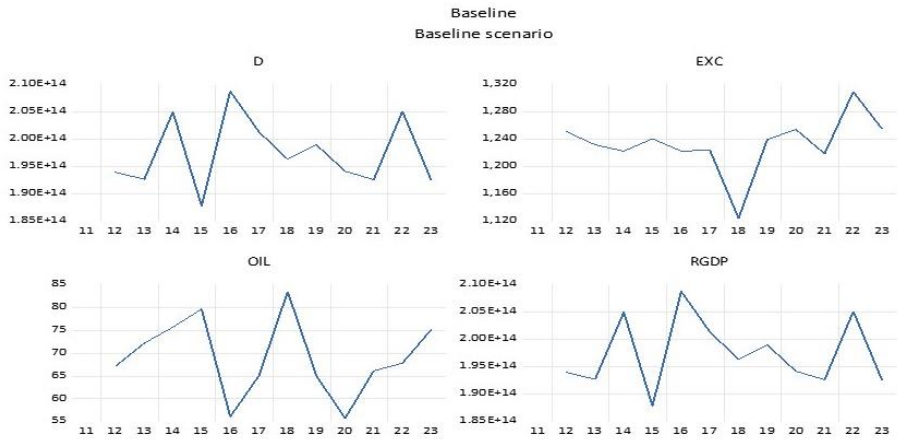

Fig. 1: The Original Series.

Source: Eviews 12 Software Package.

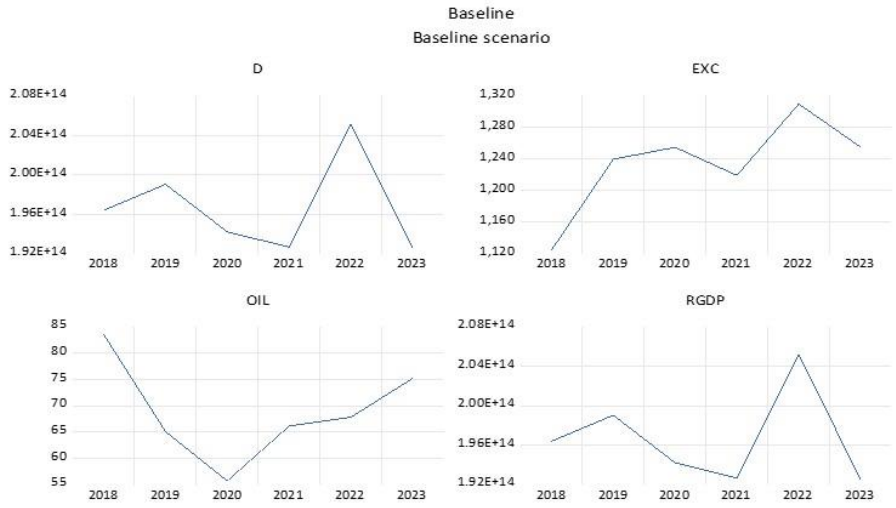

Fig. 2: The Forecasted Series.

Source: Eviews 12 Software Package.

Five paths (scenarios) were tested to stress the variables with decrease/increase ratios ranging between (5% - 30%) to measure their impact on the probability of a comprehensive crisis.

4.3. Results of the first path: credit crunch crisis

The scenario assumed a sharp decrease in Cash Credit (CRE).

4.3.1. Result

The model showed a slight increase in crisis probability, but it did not reach the level of a "Systemic Crisis". Interpretation: While the hypothesis suggests that a sharp drop in CRE represents a Credit Crunch (indicating a loss of confidence or worsening credit/liquidity issues), the expected conclusion from the curve (Figure 3) is a noticeable rise in the probability variable (D) approaching (1). However, the curve of the crisis (D) did not approach (1), indicating that a sharp drop in cash credit is not expected to cause a credit crisis in the Iraqi banking sector. This is logical due to the unique structural characteristics of the financial sector in Iraq, summarized as follows:

4.3.2. Limited impact

The limited effect stems mainly from the small size of loan portfolios in Iraqi banks relative to total assets or GDP, compared to countries relying on private finance.

4.3.3. Immune balance sheet structure

The majority of assets in Iraqi banks (especially state-owned and large ones) are either deposits at the Central Bank of Iraq or sovereign government bonds, which are considered safe (risk-free) and are not directly affected by credit contraction.

4.3.4. Loan nature

Lending is often concentrated in lower-risk areas like trade finance (short-term and secured) or loans to public sector-linked companies, which are less prone to mass default than consumer or SME loans.

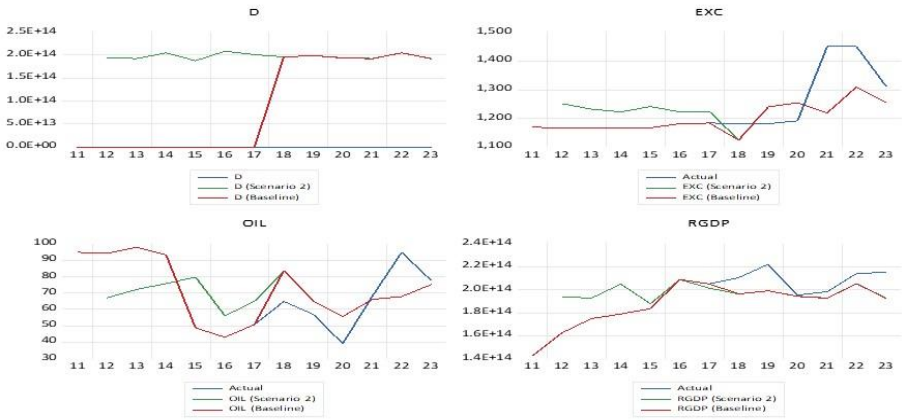

Fig. 3: Credit Crisis.

Source: Eviews 12 Software Package.

4.4. Results of the second path: liquidity crisis

The scenario assumed a decrease in the ratio of Liquid Assets (LIQ).

4.4.1. Result

The curve showed a sharp, rapid rise in the crisis indicator (D) approaching one (1), which means a certain crisis.

4.4.2. Interpretation

The expected conclusion (Figure 4) confirms that the Iraqi banking sector is extremely sensitive to any deterioration in the liquidity indicator. Unlike cash credit shocks (Credit Risk), Liquidity Shocks are the primary and most dangerous channel for triggering a systemic crisis in the Iraqi banking sector. The reasons are:

4.4.2.1. Funding structure

The fundamental reason lies in the financial structure of Iraqi banks, where government deposits dominate funding sources in many of them (especially state-owned banks).

4.4.2.2. Oil dependency

The Iraqi economy overwhelmingly relies on oil revenues, which are the main source of state budget funding and form the largest share of deposits in the banking system.

4.4.2.3. Immediate negative shock

When oil prices drop sharply, the government is forced to withdraw or reduce its massive balances deposited in banks to cover current expenditures (especially salaries). This mass withdrawal represents an immediate and direct negative shock to the volume of available liquid assets, reducing the banks' ability to meet other obligations.

4.4.2.4. As shown in the simulation results

The primary driver is the high concentration of government deposits. This "Funding Risk" directly translates into "Liquidity Risk" when oil prices drop, forcing the government to withdraw balances to cover public salaries. This confirms that liquidity is the causal channel preceding solvency issues in Iraq.

4.4.2.5. Conversely

"Credit Risk" (linked to NPLs) showed lower systemic sensitivity because the credit-to-GDP ratio in Iraq remains among the lowest in the region, meaning the banking sector is not over-leveraged toward the private sector.

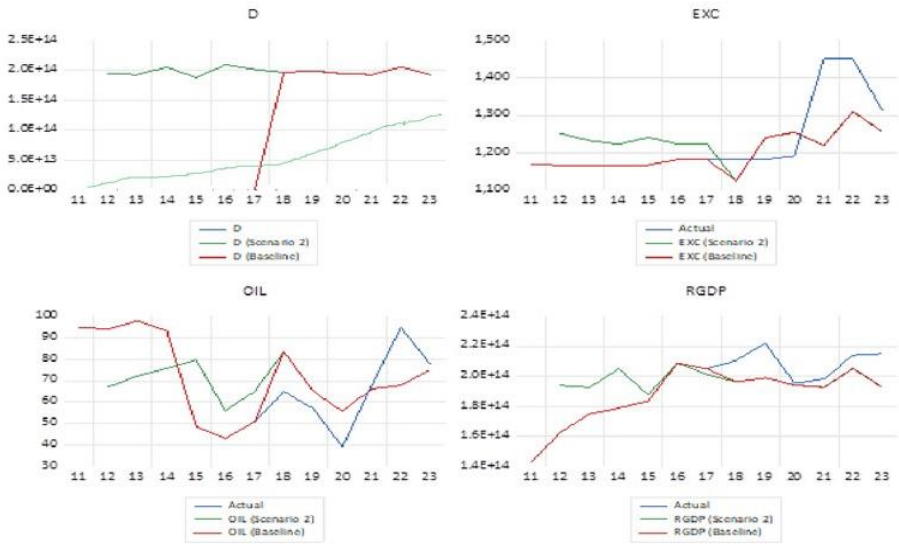

Fig. 4: Liquidity Crisis.

Source: Eviews 12 Software Package.

4.5. Results of the third path: solvency crisis

The test assumed a decrease in Capital (CAP) and its adequacy (CAR)

4.5.1. Result

Moderate impact. It did not lead directly to system collapse.

4.5.2. Interpretation

While reducing capital and its adequacy represents direct pressure, it is not expected that reducing capital or deteriorating the CAR ratio would be the direct and main cause of a systemic and comprehensive solvency crisis in the banking sector. The reasons behind the weakness of this relationship are:

4.5.2.1. Liquidity precedes solvency

In the oil-dependent Iraqi economy, the severest risks are often related to Liquidity rather than Solvency resulting from capital reduction. A sharp liquidity crisis may force banks into "Fire Sales" of good assets at low prices, which subsequently translates into capital erosion. In other words, liquidity is the causal channel, and solvency is the subsequent result.

4.5.2.2. Implicit government guarantee

Large state banks control a significant part of the sector's assets. These banks operate under an implicit government guarantee, meaning the government (the owner) is expected to recapitalize any state bank facing a severe solvency problem to prevent systemic failure.

4.5.2.3. Low risk weights

Most Iraqi banks invest a large portion of their assets in government instruments or cash assets with low or zero risk weights according to Basel standards, making the need for capital raising less urgent compared to other countries.

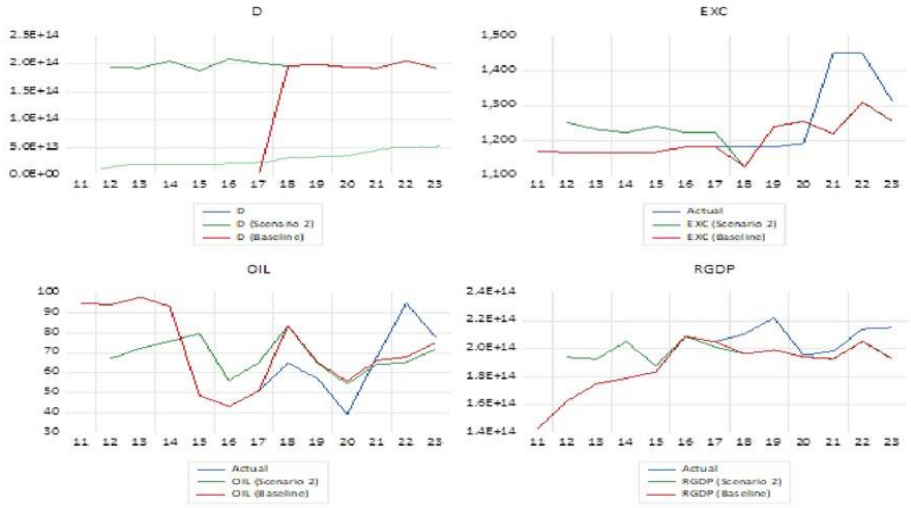

Fig. 5: Solvency Crisis.

Source: Eviews 12 Software Package.

4.6. Results of the fourth path: asset quality crisis

4.6.1. Result

Moderate impact. Does not cause collapse.

4.6.2. Interpretation

Although a gradual and continuous increase in NPLs (from 5% to 30%) would lead to a significant loss of capital and thus a high probability of crisis (D), the gradual increase in NPLs did not cause a systemic crisis. This is attributed to four key structural and institutional factors:

4.6.2.1. Structural composition and risk centralization

State banks (like Al-Rafidain and Al-Rasheed) control the largest share of assets and deposits and accumulate the largest proportion of historical NPLs. These banks operate under a direct and implicit government guarantee, preventing their NPLs from leading to collapse, as the government intervenes to recapitalize them.

4.6.2.2. Weak private credit

Cash credit granted to the private sector represents a very small percentage of GDP or total bank assets. Even with an NPL ratio of 30%, the absolute volume of losses (Loss Given Default) is still marginal compared to the sector's total safe assets.

4.6.2.3. Accounting treatments and regulatory forbearance

Banks, especially state ones, may form large provisions to absorb losses before they directly reach capital. The absence of market discipline limits the rapid propagation of the crisis.

4.6.2.4. Dominance of liquidity risk

The systemic risk does not lie in the quality of the private loan portfolio (credit shock) but in the funding structure reliant on volatile public deposits from a single source (oil).

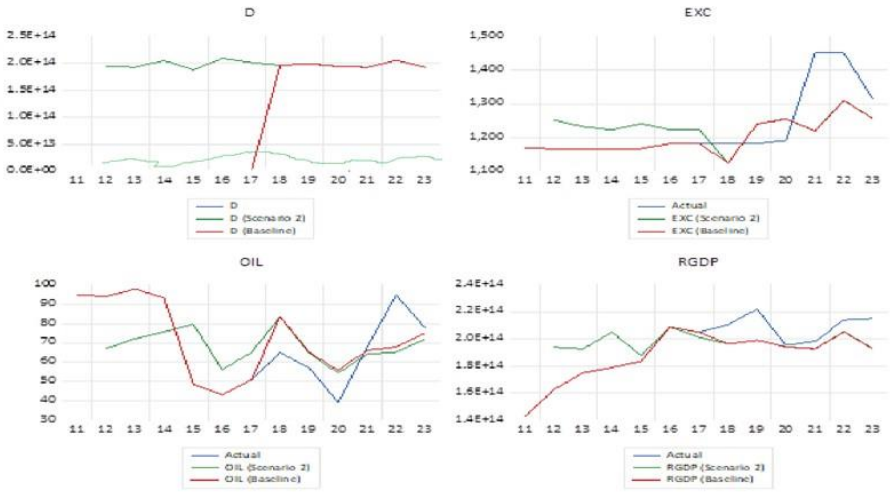

Fig. 6: Asset Quality Crisis.

Source: Eviews 12 Software Package.

4.7. Results of the fifth path: funding volume crisis

Terminology has been standardized to ensure conceptual clarity. 'Funding Risk' strictly applied to the instability of the deposit base (liability side), specifically the concentration of government deposits. In contrast, 'Liquidity Risk' refers to the banking sector's subsequent inability to meet obligations (asset side) following a funding shock. This distinction clarifies the causal link between oil-price volatility and banking distress in the Iraqi context.

4.7.1. Result

Weak impact. Does not cause collapse.

4.7.2. Interpretation

The result, showing that a reduction in total deposits (DEP) by up to (30%) does not cause a sharp crisis, is interesting but justified by structural and supervisory mechanisms. This system's ability to absorb the shock is due to:

4.7.2.1. Liquidity hoarding

The Iraqi banking sector is accustomed to uncertainty, leading banks to maintain very high ratios of assets as cash or deposits with the Central Bank, far exceeding regulatory requirements. This large balance of liquid assets acts as a large "buffer" to absorb the initial shock of deposit withdrawal.

4.7.2.2. Strong central bank intervention

The Central Bank of Iraq (CBI) has powerful tools to inject liquidity and maintain market stability, such as easing reserve requirements or using monetary policy tools. The currency auction is the main mechanism for injecting foreign currency and Iraqi Dinar liquidity into the system.

4.7.2.3. Limited impact on investment

Since a large part of the deposits is "dormant" and the volume of cash credit (CRE) is small relative to the deposit volume, a 30% drop in deposits means that the massive cash surplus has only been reduced to a large surplus, but it does not lead to a severe funding shortage for lending to the point of triggering a crisis, as private lending is weak initially.

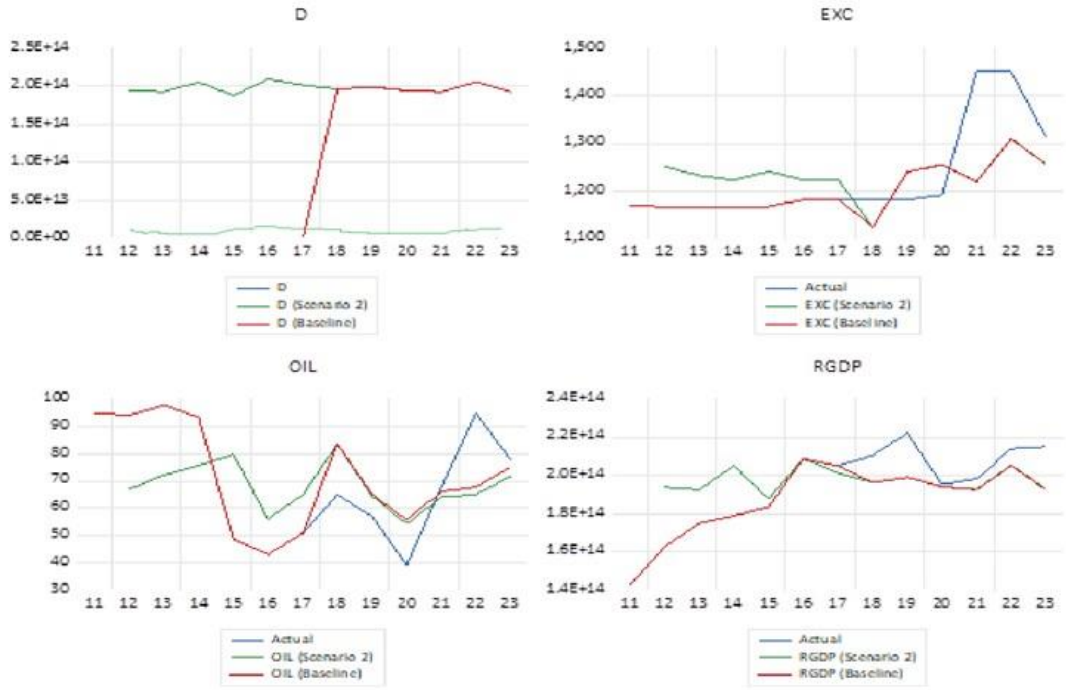

Fig. 7: Funding Volume Crisis.

Source: Eviews 12 Software Package.

4.8. Analytical synthesis of results

The comprehensive aggregate analysis reveals that the Iraqi banking system's stability is inherently sensitive to the 'liquidity-sovereign' nexus. While Path 1 (Credit Risk) and Path 4 (Asset Quality) show marginal systemic impact, Path 2 (Liquidity Risk) acts as the primary transmission channel for financial distress. This suggests that banking vulnerability in Iraq is not a product of typical private sector defaults, but a direct consequence of oil-price volatility destabilizing government funding. Consequently, the high correlation between fiscal shocks and banking liquidity necessitates a shift in regulatory focus from traditional credit-risk mitigation to broader macro-prudential liquidity management, ensuring that state-bank solvency remains decoupled from fluctuations in the general budget.

4.9. Summary of findings

The table below illustrates the summary of the scenario impacts:

Table 1: Illustrates the Summary of the Scenario Impacts

Path	Type of Crisis	Direct Impact	Systemic Crisis Probability
First	Credit (CRE)	Loan losses	Weak
Second	Liquidity (LIQ)	Immediate payment failure	Very High (The Biggest Risk)
Third	Solvency (CAR)	Capital erosion	Moderate
Fourth	Asset Quality (NPL)	Increased losses	Moderate
Fifth	Deposit Volume (DEP)	Liquidity pressure	Weak (Due to Liquidity Hoarding)

5. Conclusions

5.1. The true systemic risk

The primary risk in Iraq lies in the "Liquidity" trajectory, which is a dependent variable of external shocks (Oil Prices).

5.1.1. Limited credit risk

Contrary to traditional theories, private credit default does not generate a systemic crisis in Iraq due to the shallow depth of financial intermediation.

5.1.2. Nature of crisis

The banking crisis in Iraq is essentially a "Sovereign" and "Internal" crisis stemming from the organic link between state finances and the banking sector, and is not a result of global financial contagion.

5.1.3. Hybrid model efficiency

The use of Scenario Analysis proved to be more effective than traditional regression in handling volatile Iraqi data.

6. Recommendations

6.1. Liquidity buffer requirements

The Central Bank of Iraq should impose stricter "Liquidity Buffers" on banks with high exposure to government deposits to mitigate the impact of sudden withdrawals.

6.2. Diversification of funding

Policy measures should encourage the transition from volatile public deposits to long-term private sector savings.

6.3. Institutionalizing the EWS

The proposed scenario-based EWS should be adopted as a regular supervisory tool to monitor macro-financial linkages.

References

[1] Adham Mohammed Al-Barmawi, Banking Crises and Contagion: The Domino Effect and the Silicon Valley Bank Crisis, Contemporary Economic Horizons, 2023, p. 2.
[2] Ali Mohammed Al-Maamouri et al., The Role of the Financial Safety Net in Developing Confidence in the Banking System: An Applied Study on a Sample of Commercial Banks, Journal of the University of Kufa, Vol. 67, Part 2, Dec 2022, p. 18.
[3] Arezki, R., et al. (2020). Oil Price Volatility and Financial Stability in Resource-Rich Economies. Journal of International Money and Finance, 101, 102-115.
[4] Demirgüç-Kunt, A., & Detragiache, E. (1998). The Determinants of Banking Crises in Developing and Developed Countries. IMF Staff Papers. https://doi.org/10.2307/3867330.
[5] Joy, M., et al. (2021). Banking systemic vulnerability: A early warning system for emerging markets. Journal of Financial Stability, 56, 100-112.
[6] Kaminsky, G. L., & Reinhart, C. M. (1996). The Twin Crises: The Causes of Banking and Balance-of-Payments Problems. American Economic Review. https://doi.org/10.17016/ifdp.1996.544.