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# Repercussions of global oil price shocks on banking soundness indicators in Iraq amidst parallel exchange rate fluctuations

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## Abstract

The main objective of the study is to estimate impulse response functions and test two basic hypotheses. The first is to show the response of both exchange rates and banking soundness indicators in Iraq to oil price shocks. The second is to estimate the response of banking soundness indicators to oil price shocks, for the period between 2016-2024 through monthly data. The study used the (VAR) methodology to estimate impulse response functions, and it concluded that oil price shocks have a decisive and significant impact on the exchange rate and banking soundness indicators. Also, the parallel exchange rate fluctuates greatly, which makes its shocks significantly affect the soundness indicators of the Iraqi banking sector, oil price shocks reduce non-performing loans and increase liquidity levels in Iraqi banks in the short term. However, non-performing loans tend to increase proportionally in the long term. Bank profitability is also proportionally affected in the medium term by rising oil prices. Capital adequacy levels decrease in the event of a positive oil shock. Regarding exchange rates, oil shocks to the local currency led to significant fluctuations in its value, both upward and downward.

***Keywords*:** Banking Soundness Indicators, Impulse Response Functions, Exchange Rate, Oil Prices

***JEL Classification:*** G21, E44, Q43





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## 1. Introduction

Iraq is a rentier state whose revenues consist primarily of oil revenues. More than 90% of its foreign currency comes from these revenues, which prompted Iraq to establish a currency auction window to stabilize prices and link the currency's stability to global oil prices. This auction window was established in lieu of the current fixed foreign exchange system to create a parallel market with a price different from the official exchange rate and bring a new level of instability for financial institutions, most notably banks. (Al Dulaimi et al., 2021). A functional financial system is a significant factor in attaining stable economic growth. A viable financial system facilitates economic activity which includes collecting bank savings and reallocating it towards production, providing information about returns to invest, improving governance and risk management, and contributing to exchange rate stability (Bitetto et al., 2023). The exchange rate is a key economic indicator and refers to one currency's value with respect to another. An exchange rate that is rising means that the local currency is depreciating, and the opposite is true (Ullah & Nobanee, 2025). Since the demise of the Bretton Woods system of fixed exchange rates, both real and nominal exchange rates have fluctuated substantially. Advocates of managed or fixed exchange rates have pointed to this volatility as adverse, on the basis that exchange rate uncertainty reduces company valuations. (Baum et al., 2001) Transactions involving exchange rates represent a large portion of banking sector activities, and foreign exchange markets are effectively a way of settling international transactions because they act as a financial intermediary (Lagat & Nyandema, 2016). Exchange rates influence different institutional activities. A depreciation of the local currency boosts the competitiveness of exporting companies and an increase in production due to the increase in foreign market share while importers will be paying higher costs. Domestic companies will also increase their sales and profits as imports decrease due to the increase in import costs (Fu et al., 2025). Studies outline various external factors that induce exchange rate movements, including oil price movements and speculative behavior (Lam & Ojede, 2025). In addition, there are other economic factors, such as economic growth, money supply, foreign investment, inflation, terms of trade, available international liquidity, and the financial development of the country (Bhowmik, 2020).

The banking industry faces substantial exposure to risks stemming from exchange rate variations, which include currency spreads, credit risk, interest rate fluctuations, and inflation, all of which may diminish profits (Keshtgar et al., 2020). For banks in developing economies, adverse fluctuations in exchange rates may trigger heightened withdrawal of bank deposits, compounding the economic crisis (Mamonov et al., 2024). Hence, carefully examining exchange rate conditions and accessing reliable and ongoing information to understand these would diminish losses and enhance bank profits. Additionally, it should be noted that a majority of bank profits arise from foreign exchange-related transactions, including the collection of fees and commissions. This solidifies the necessity of promoting a strong bank-management understanding of exchange rate fluctuations (Babazadeh & Farrokhnejad, 2012). The link between exchange rate and financial





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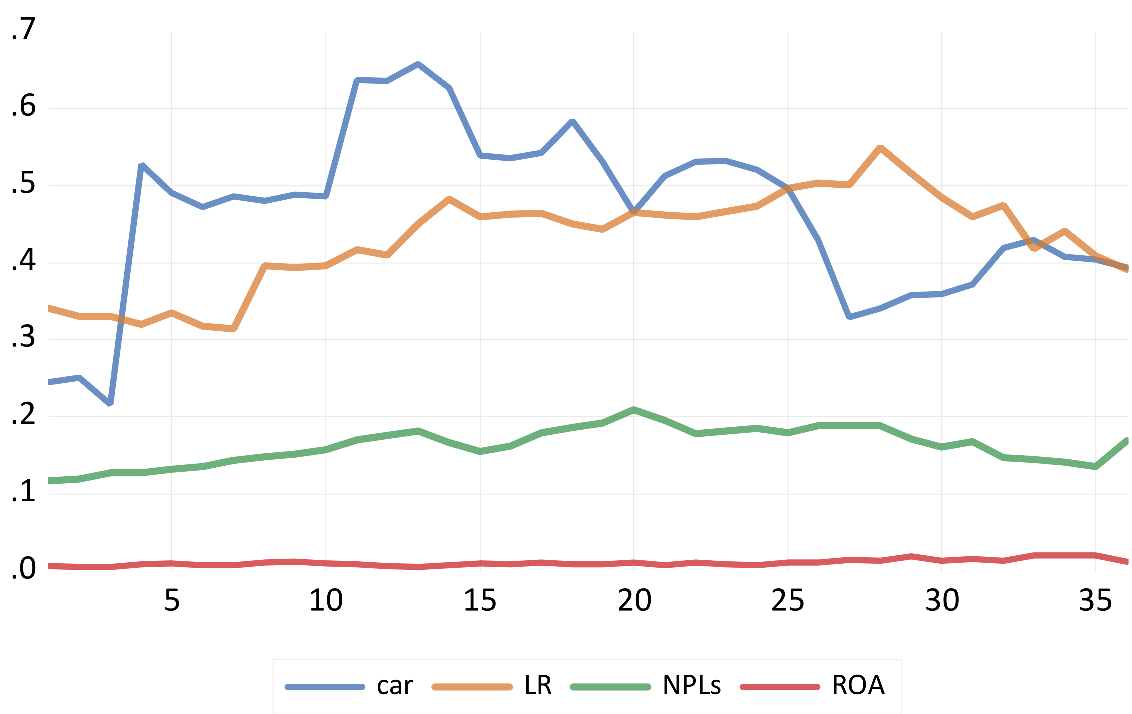
soundness is multifaceted, producing differing results. Exchange rate invariably influences all dimensions of bank soundness as it pertains to profitability, liquidity, and credit risk. Bank profit can be impacted by these banking transactions, particularly for banks whose assetually foreign currency denominated, may present losses or profits depending on the cumulating direction of behavior either favorably, or unfavorably (Ahmadyan & Valipourpasha, 2025).

The banking soundness indicators for the Iraqi banking sector are displayed in Figure (1). There is a worrying increase in non-performing loan ratios, which negatively impacts confidence in the banking sector. The average non-performing loan ratio is (0.16313), while the return on assets ratio is considerably low. Conversely, Iraqi banks have a sizeable amount that comes under liquidity and capital adequacy levels that surpass both the 8% capital adequacy level required by the Basel Accords and the Central Bank of Iraq's minimum capital adequacy ratio of (12%). They have sizeable liquidity ratios above the threshold of (30%) that is also set by the Central Bank of Iraq. Thus, the Iraqi banking sector weaknesses relate to low profits, high non-performing loans, and an increase in excess funds in banks.

**Figure 1. Banking Safety Indicators for the Iraqi Sector 2016-2024**




The government of Iraq injects large amounts of US dollars and other foreign currencies it obtains from oil sales through its currency auction window to keep exchange rates stable. Nevertheless, the exchange rate varies significantly in the parallel market, creating instability in finance. Thus, we have the aim of illustrating the influence of the issue on banking soundness indicators by





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estimating impulse response functions (IRFs). The study aims to treat prices and exchange rates as external variables that afford estimates of banking soundness indicators with IRFs. The first objective is to estimate the response of both exchange rates and banking soundness indicators in response to impulse response. The second is to estimate the response of banking soundness indicators in response to exchange rates. The study attempts to consider an oil price shocks and exchange rate variability in the Iraqi market. Given that an oil price shock is the country's only foreign currency strain in Iraq, the study also demonstrates the effect of all of these variables at once on banking soundness indicators**.** The results of this study are important for policymakers, particularly the Central Bank of Iraq and the Ministry of Finance, in developing comprehensive plans for the Iraqi economy and the banking sector. The study is based on two hypotheses:

1- There is a statistically significant impact of oil price shocks on the exchange rate.

2- There is a statistically significant impact of exchange rate shocks on banking soundness indicators.

## 2. Literature Review

Studying the impact of exchange rate shocks on banking soundness indicators under oil price volatility requires dividing previous studies into those dealing with the relationship between oil prices and exchange rates, and those concerning exchange rates and banking soundness indicators. Regarding the relationship between oil prices and exchange rates, there is a long-term relationship. The study by Chen & Chen (2007), which used longitudinal data to estimate the co-integrity methodology of the G7 countries for the period 1972-2005, concluded that there is a direct, long-term impact of oil prices on real exchange rates. The study by Hashmi et al. also used this approach. (2022) A more recent methodology was used to estimate this relationship through the Quantile ARDL methodology in Pakistan. It concluded that oil prices affect exchange rates regardless of the state of the financial market, whether it is a rising or falling market. The evidence of the study by Beckmann et al. (2020) showed that the links between exchange rates and oil prices vary according to the sample countries, with some common patterns, which are strong long-term links that are useful for economic forecasting. As for the impact of exchange rate shocks on banking soundness indicators, the relationship has been studied according to different methodologies that focus on liquidity, credit risk, and capital adequacy. Regarding non-performing loans, the study by Mohamadi et al. showed. (2016), the exchange rate, whether official or parallel, has a direct impact on non-performing loans in Iran for 18 banks. The analysis showed no effect on capital adequacy using the GARCH exponential model. In relation to this, Abbassi & Bräuning (2023) used longitudinal data methodology working with German banks during Brexit which considered an external shock. They found significant losses to German banks due to mismatching the exchange rate of the pound sterling and the value of their assets and liabilities. As a result, a reduction occurred in the amount of credit they extended, and this reflected as a percentage point loss in equity. A study by Sinaga et al. (2020) confirmed this occurrence in determining that the





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exchange rate negatively impacted non-performing loans, while interest rates and inflation show no effect on credit risk. As it concerns bank liquidity, the study by Osundina et al. (2016) assessed the impact of exchange rates on the performance of Nigerian banks during the timeframe of 2005-2016, applying the ARCH LM method, which showed that the exchange rates had a negative impact on bank liquidity, which was measured as an employment rate. Finally, Mamonov et al. (2024) studied the relationship between exchange rates and the efficiency of Russian banks, using a quarterly data methodology that obtained data from Russian commercial banks on asset and liability revaluations from 2004-2020, and used a nonparametric copula method. They concluded that revaluation constitutes 26.5% of Russian banks' costs, and that revaluation is primarily due to foreign currency bank deposits and financial instability. This was corroborated by Martin & Mauer's (2003) study of a sample of 105 US banks, which showed that long-term exposure is more prevalent than short-term exposure, and that 72% of internationally operating banks and 88% of domestic banks have exchange rate risk exposure. Regarding the Iraqi context, Hadi et al. studied... (2022) The effects of the exchange rate on capital adequacy in light of the Corona pandemic. The study concluded that the Corona pandemic greatly affected capital adequacy, and the volatility of the exchange rate reinforced this effect. Yaqub (2024) indicated that the Iraqi economy is afflicted with the Dutch disease, which led to an increase in the real exchange rate, which expanded the markets for non-tradable goods. The exchange rate is one of the important variables that are attributed to the transformation of Iraq from an industrial and agricultural country to a service country.

Previous studies have not integrated banking soundness indicators into a single study, nor have they combined the impact of oil prices with exchange rates into a single model that illustrates the shocks experienced by oil-producing countries like Iraq. In light of this knowledge gap, this study aims to explain the mechanism by which oil price shocks affect exchange rates and vice versa, with the goal of providing sustainable insights and solutions for decision-makers in oil-producing countries to lay the foundations for comprehensive planning towards economic diversification.

## 3. Methodology

This research uses the banking soundness indicators that are used by the International Monetary Fund (Babihuga, 2007) and Kasselaki & Tagkalakis (2014). These indicators are: Capital Adequacy (CAR), which is measured as the ratio of core capital to risk-bearing assets; Liquidity (LQ), which is measured as the ratio of liquid assets to total assets; Credit Quality (NPLs), which is measured as the ratio of non-performing loans to total loans; and Return on Equity (ROA), which is measured as the ratio of return to total assets. All data related to banking soundness indicators and the parallel exchange rate were obtained from the official website of the Central Bank of Iraq (https://cbi.iq/page/51). Oil prices, specifically Brent crude, were obtained from the Federal Reserve website (https://fred.stlouisfed.org/series/DCOILWTIC) in the form of monthly data. These indicators are considered to be foundational for measuring financial stability, for the





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enhancement and tightening of oversight of the banking sector, and for indicator the extent of systemic risk building in banks (Kyei et al, 2023). The study also employs global oil prices (BRN) and the parallel exchange rate (EX), which are external variables. Iraq uses a fixed exchange rate system, and exchange rate movements are only conducted on the parallel exchange rate, which has a significant impact on the financial stability of Iraqi banks. To estimate the impact of for oil price and exchange rate shocks, we use the VAR methodology, which is important because it can explain the dynamic economic relationships between a set of studied variables without pre-imposed causal constraints. The VAR methodology allows for the estimation of IRF responses and the determination of the direction and magnitude of the effect (Majenge et al., 2025).

## 4. Results

Table 1 presents the descriptive statistical measures for the studied variables:

**Table 1. Descriptive Statistical Measures**

| | CAR | EX | LR | NPLS | BRN | ROA |
|---|---|---|---|---|---|---|
| **Mean** | 0.46763 | 1350.29245 | 0.43136 | 0.16313 | 68.15905 | 0.01085 |
| **Median** | 0.48498 | 1285.00000 | 0.45278 | 0.16575 | 67.73961 | 0.00967 |
| **Maximum** | 0.65820 | 1603.00000 | 0.54940 | 0.20970 | 111.98740 | 0.02040 |
| **Minimum** | 0.21600 | 1196.00000 | 0.31430 | 0.11730 | 33.37716 | 0.00550 |
| **Std. Dev.** | 0.10341 | 133.92620 | 0.06106 | 0.02293 | 17.63163 | 0.00396 |
| **Skewness** | -0.38752 | 0.28104 | -0.52414 | -0.23622 | 0.16559 | 0.97498 |
| **Kurtosis** | 2.79634 | 1.39512 | 2.31406 | 2.07473 | 2.45502 | 3.11062 |
| **Jarque-Bera** | 2.83622 | 12.77109 | 6.93161 | 4.76697 | 1.79617 | 16.84765 |
| **Probability** | 0.24217 | 0.00169 | 0.03125 | 0.09223 | 0.40735 | 0.00022 |
| **Sum Sq. Dev.** | 1.12293 | 1883303.93400 | 0.39146 | 0.05523 | 32641.81000 | 0.00165 |
| **Observations** | 106 | 106 | 106 | 106 | 106 | 106 |

Table 2 indicates that most of the variables are not stationary at the level, but they become stationary when taking the first difference, except for the capital adequacy ratio (CAR) and the profitability ratio (ROA), which are stationary time series at their levels. Therefore, one of the conditions of cointegration is that the time series stabilize at the first difference, and thus it is possible to proceed with the var methodology.





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**Table 2. ADF Static Test for VAR Methodology**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **At Level** | | | | | |
| | | **BRN** | **CAR** | **EX** | **NPLS** | **LR** | **ROA** |
| **With Constant** | t-Statistic | -2.31232 | -2.94465 | -0.69619 | -2.49778 | -2.15145 | -2.50968 |
| | *Prob.* | *0.17007* | *0.04375* | *0.84232* | *0.11893* | *0.22544* | *0.11618* |
| | | n0 | ** | n0 | n0 | n0 | n0 |
| **With Constant & Trend** | t-Statistic | -2.76966 | -3.25079 | -1.90521 | -2.66921 | -0.81629 | -3.43154 |
| | *Prob.* | *0.21188* | *0.08050* | *0.64480* | *0.25155* | *0.96001* | *0.05292* |
| | | n0 | * | n0 | n0 | n0 | * |
| **Without Constant & Trend** | t-Statistic | -0.34142 | -0.33391 | 0.93141 | 0.42554 | 0.03975 | -0.47737 |
| | *Prob.* | *0.55989* | *0.56273* | *0.90549* | *0.80371* | *0.69313* | *0.50660* |
| | | n0 | n0 | n0 | n0 | n0 | n0 |
| | | **At First Difference** | | | | | |
| | | **d(BRN)** | **d(CAR)** | **d(EX)** | **d(NPLS)** | **d(LR)** | **d(ROA)** |
| **With Constant** | t-Statistic | -3.78665 | -4.73274 | -10.24946 | -3.47101 | -2.29328 | -3.06332 |
| | *Prob.* | *0.00413* | *0.00016* | *0.00000* | *0.01070* | *0.17620* | *0.03261* |
| | | *** | *** | *** | ** | n0 | ** |
| **With Constant & Trend** | t-Statistic | -3.79338 | -4.86318 | -10.22086 | -3.38282 | -3.03436 | -2.98166 |
| | *Prob.* | *0.02071* | *0.00070* | *0.00000* | *0.05930* | *0.12839* | *0.14254* |
| | | ** | *** | *** | * | n0 | n0 |
| **Without Constant & Trend** | t-Statistic | -3.80924 | -4.74647 | -10.19345 | -3.41404 | -2.28574 | -3.07846 |
| | *Prob.* | *0.00020* | *0.00000* | *0.00000* | *0.00080* | *0.02221* | *0.00238* |
| | | *** | *** | *** | *** | ** | *** |

We move to the next step of the var methodology, which is choosing the optimal slowdown period. According to Table 3, the optimal slowdown period varies according to the statistical test. According to the Schwartz criterion (SC) test, the optimal slowdown period is 1. The Hannan-Queen criterion (HQ) test has determined the slowdown period to be (2). As for the rest of the tests, represented by the probability logarithm criterion (LR), the final prediction error (FPE), and the (AIC), they have determined the slowdown period to be (7). Since most of the tests agree on the slowdown period to be (7), it will be chosen to estimate the model.

**Table 3. Selection of the optimal slowdown period**





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| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | 596.9617 | NA | 0.0000 | -12.1848 | -12.0255 | -12.1204 |
| 1 | 940.7016 | 637.8678 | 0.0000 | -18.5299 | -17.41511* | -18.0792 |
| 2 | 1011.0440 | 121.8301 | 0.0000 | -19.2380 | -17.1676 | -18.40086* |
| 3 | 1053.8003 | 68.7627 | 0.0000 | -19.3773 | -16.3514 | -18.1538 |
| 4 | 1110.2702 | 83.8316 | 0.0000 | -19.7994 | -15.8179 | -18.1895 |
| 5 | 1161.7309 | 70.0290 | 0.0000 | -20.1182 | -15.1811 | -18.1219 |
| 6 | 1185.0362 | 28.8313 | 0.0000 | -19.8564 | -13.9638 | -17.4737 |
| 7 | 1254.8103 | 77.68665* | 7.10e-17* | -20.55279* | -13.7046 | -17.7837 |
| 8 | 1286.5969 | 31.4589 | 0.0000 | -20.4659 | -12.6622 | -17.3105 |

Here it is necessary to verify some diagnostic tests to ensure that the var methodology is going in the right direction. Table 4 shows the serial autocorrelation test of the model estimated by the (LM) test. The slowdown periods (1, 2, 4, 5, 7) are healthy periods and do not suffer from the correlation problem, while there is autocorrelation in the rest of the slowdown periods, which are (3, 6). Therefore, a small part of the model suffers from the problem, while the majority of the slowdown periods are healthy. Likewise, the cumulative test shows that the slowdown periods are healthy from slowdown period 1 to h.

**Table 4 Autocorrelation Sequential Test (LM)**

| Null hypothesis: No serial correlation at lag h | | | | | | |
|---|---|---|---|---|---|---|
| **Lag** | **LRE* stat** | **Df** | **Prob.** | **Rao F-stat** | **df** | **Prob.** |
| 1.0000 | 30.5025 | 36.0000 | 0.7272 | 0.8383 | (36, 196.0) | 0.7301 |
| 2.0000 | 37.0048 | 36.0000 | 0.4224 | 1.0330 | (36, 196.0) | 0.4263 |
| 3.0000 | 55.9828 | 36.0000 | 0.0180 | 1.6366 | (36, 196.0) | 0.0186 |
| 4.0000 | 29.1683 | 36.0000 | 0.7831 | 0.7990 | (36, 196.0) | 0.7855 |
| 5.0000 | 35.0279 | 36.0000 | 0.5147 | 0.9732 | (36, 196.0) | 0.5185 |
| 6.0000 | 61.2601 | 36.0000 | 0.0054 | 1.8143 | (36, 196.0) | 0.0056 |
| 7.0000 | 26.0230 | 36.0000 | 0.8898 | 0.7075 | (36, 196.0) | 0.8913 |
| 8.0000 | 29.0048 | 36.0000 | 0.7895 | 0.7942 | (36, 196.0) | 0.7919 |

**Null hypothesis: No serial correlation at lags 1 to h**





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| Lag | LRE* stat | df | Prob. | Rao F-stat | df | Prob. |
|---|---|---|---|---|---|---|
| 1.0000 | 30.5025 | 36.0000 | 0.7272 | 0.8383 | (36, 196.0) | 0.7301 |
| 2.0000 | 76.5202 | 72.0000 | 0.3356 | 1.0693 | (72, 212.5) | 0.3518 |
| 3.0000 | 118.1108 | 108.0000 | 0.2380 | 1.1011 | (108, 190.6) | 0.2800 |
| 4.0000 | 163.0227 | 144.0000 | 0.1327 | 1.1392 | (144, 159.8) | 0.2106 |
| 5.0000 | 209.6424 | 180.0000 | 0.0644 | 1.1562 | (180, 126.3) | 0.1924 |
| 6.0000 | 318.3476 | 216.0000 | 0.0000 | 1.6826 | (216, 91.6) | 0.0025 |
| 7.0000 | 387.5469 | 252.0000 | 0.0000 | 1.6717 | (252, 56.4) | 0.0112 |
| 8.0000 | 709.5704 | 288.0000 | 0.0000 | 5.4344 | (288, 20.9) | 0.0000 |

We now move to the next diagnostic test, the heteroskedasticity test, to confirm the presence of a heteroskedasticity problem. According to Table (5), the probability ratio for the Chi-Sq test is (0.14860), which is greater than the probability ratio of 5%. Therefore, the model does not suffer from this problem. Furthermore, all the one-way heteroskedasticity tests shown in the table are valid, and their significance exceeds 5%.

**Table 5. Residual Heteroskedasticity Test for Variable Variance (VAR)**

| **Joint test:** | | |
|---|---|---|
| **Chi-sq** | **Df** | **Prob.** |
| 1825.96425 | 1764.00000 | 0.14860 |

**Individual components:**

| Dependent | R-squared | F(84,13) | Prob. | Chi-sq(84) | Prob. |
|---|---|---|---|---|---|
| res1*res1 | 0.91256 | 1.61510 | 0.16824 | 89.43060 | 0.32223 |
| res2*res2 | 0.85234 | 0.89334 | 0.64526 | 83.52940 | 0.49397 |
| res3*res3 | 0.95041 | 2.96601 | 0.01614 | 93.14010 | 0.23205 |
| res4*res4 | 0.80874 | 0.65443 | 0.87569 | 79.25697 | 0.62603 |
| res5*res5 | 0.88122 | 1.14821 | 0.41427 | 86.35997 | 0.40837 |
| res6*res6 | 0.88319 | 1.17013 | 0.39762 | 86.55252 | 0.40272 |
| res2*res1 | 0.89607 | 1.33427 | 0.29044 | 87.81443 | 0.36647 |
| res3*res1 | 0.94131 | 2.48218 | 0.03489 | 92.24838 | 0.25216 |





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| | | | | | |
|---|---|---|---|---|---|
| res3*res2 | 0.92505 | 1.91007 | 0.09601 | 90.65477 | 0.29061 |
| res4*res1 | 0.92876 | 2.01751 | 0.07873 | 91.01806 | 0.28157 |
| res4*res2 | 0.79142 | 0.58721 | 0.92494 | 77.55895 | 0.67668 |
| res4*res3 | 0.90794 | 1.52639 | 0.19984 | 88.97840 | 0.33434 |
| res5*res1 | 0.83406 | 0.77788 | 0.76206 | 81.73795 | 0.54955 |
| res5*res2 | 0.83706 | 0.79502 | 0.74492 | 82.03149 | 0.54043 |
| res5*res3 | 0.94152 | 2.49166 | 0.03434 | 92.26899 | 0.25168 |
| res5*res4 | 0.90571 | 1.48659 | 0.21594 | 88.75964 | 0.34027 |
| res6*res1 | 0.81531 | 0.68320 | 0.85138 | 79.90047 | 0.60638 |
| res6*res2 | 0.90017 | 1.39544 | 0.25789 | 88.21635 | 0.35522 |
| res6*res3 | 0.92692 | 1.96303 | 0.08702 | 90.83845 | 0.28602 |
| res6*res4 | 0.86590 | 0.99933 | 0.54178 | 84.85836 | 0.45326 |
| res6*res5 | 0.92071 | 1.79715 | 0.11870 | 90.22982 | 0.30139 |

To complete the remaining diagnostic tests, a cross-autocorrelation test must be performed. Most of the columns for the studied variables fall within the bounds (not exceeding the dashed lines). This suggests that the individual residuals do not exhibit a strong and persistent autocorrelation problem as shown in the Figure 2.

**Figure 2. Test for discrete autocorrelation functions**





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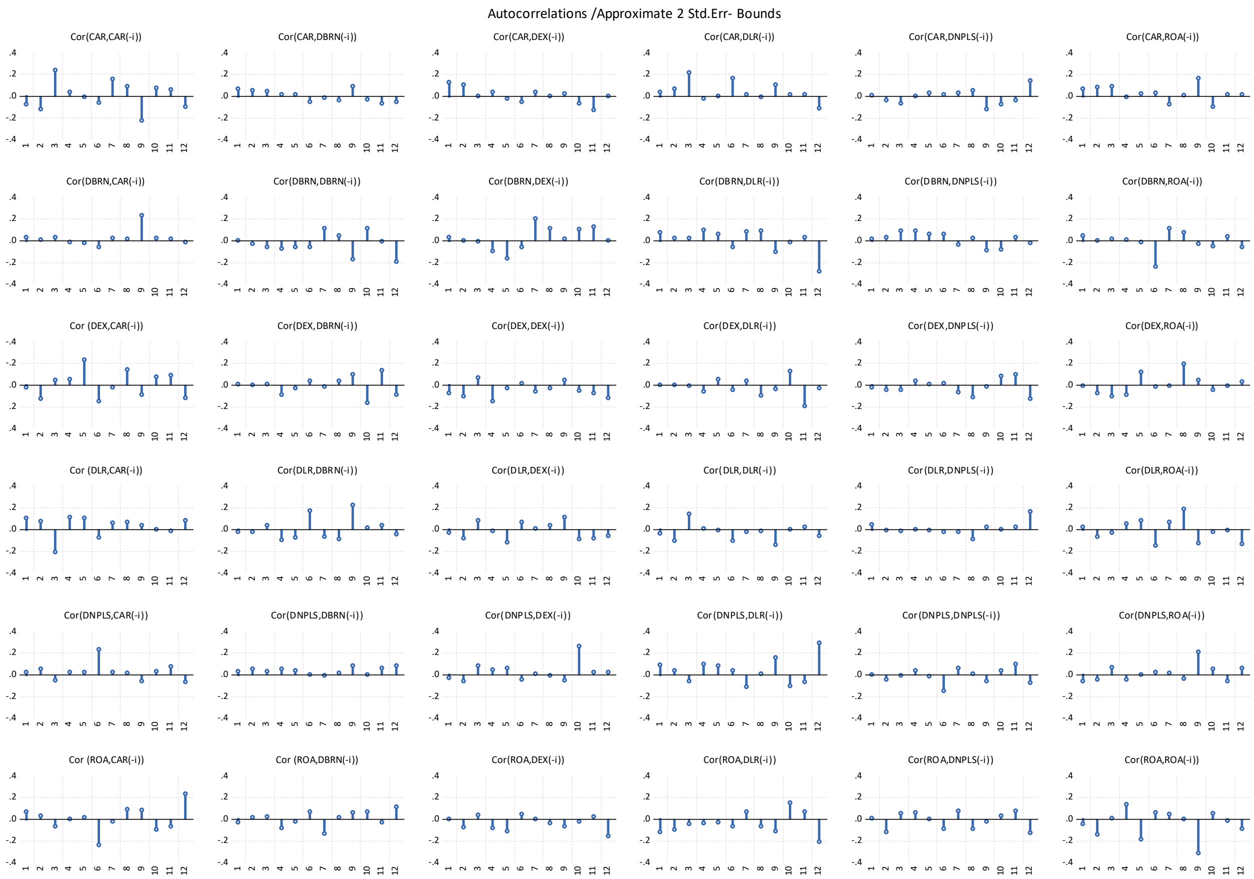


We now estimate the impulse response functions according to two models: the first is the impact of oil price shocks on exchange rates and banking soundness indicators, and the second is the impact of exchange rate shocks on banking soundness indicators.

Figure 3 shows the analysis of the Impulse Response Functions (IRFs) of the VAR model, as it analyzes the response of both the exchange rate and the banking soundness indicators of the Iraqi banking sector to a shock of one standard deviation (One S.D.). For ten periods, the Capital Adequacy Ratio (CAR) shows an inverse relationship with rising oil prices (BRN), but the response is weak. It increases after the third period until it reaches a decrease of (-0.01) in the sixth period, after which it recovers by the end of the period. The local currency exchange rate (EX) responds directly at the beginning of the period (the first period), then decreases inversely until it reaches (-0.5) in the fourth period. The value of the local currency then tends towards continuous fluctuation in the long term. This is strong evidence that oil prices are a primary driver of the value of the local currency. As for bank liquidity, rising exchange rates lead to an increase in liquidity levels at banks in periods 1 and 2 by (0.001), followed by relative stability in the medium term. Then, it tends towards an increase in the long term, similar to the increase at the beginning of the period. Regarding non-performing loans, in the first and second periods there is an inverse relationship between oil prices and non-performing loans, but they quickly rise with rising oil





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prices in the long term, although the increase is slight. The profitability of the banking sector does not respond at the beginning of the period. The period, however, responds in period 3 and reaches its peak in period 6 by an amount of (0.0005), after which it decreases in the long term, so that the rise in oil is inversely proportional.

**Figure 3. Impulse response functions of the impact of oil price shocks on the exchange rate and banking soundness indicators**

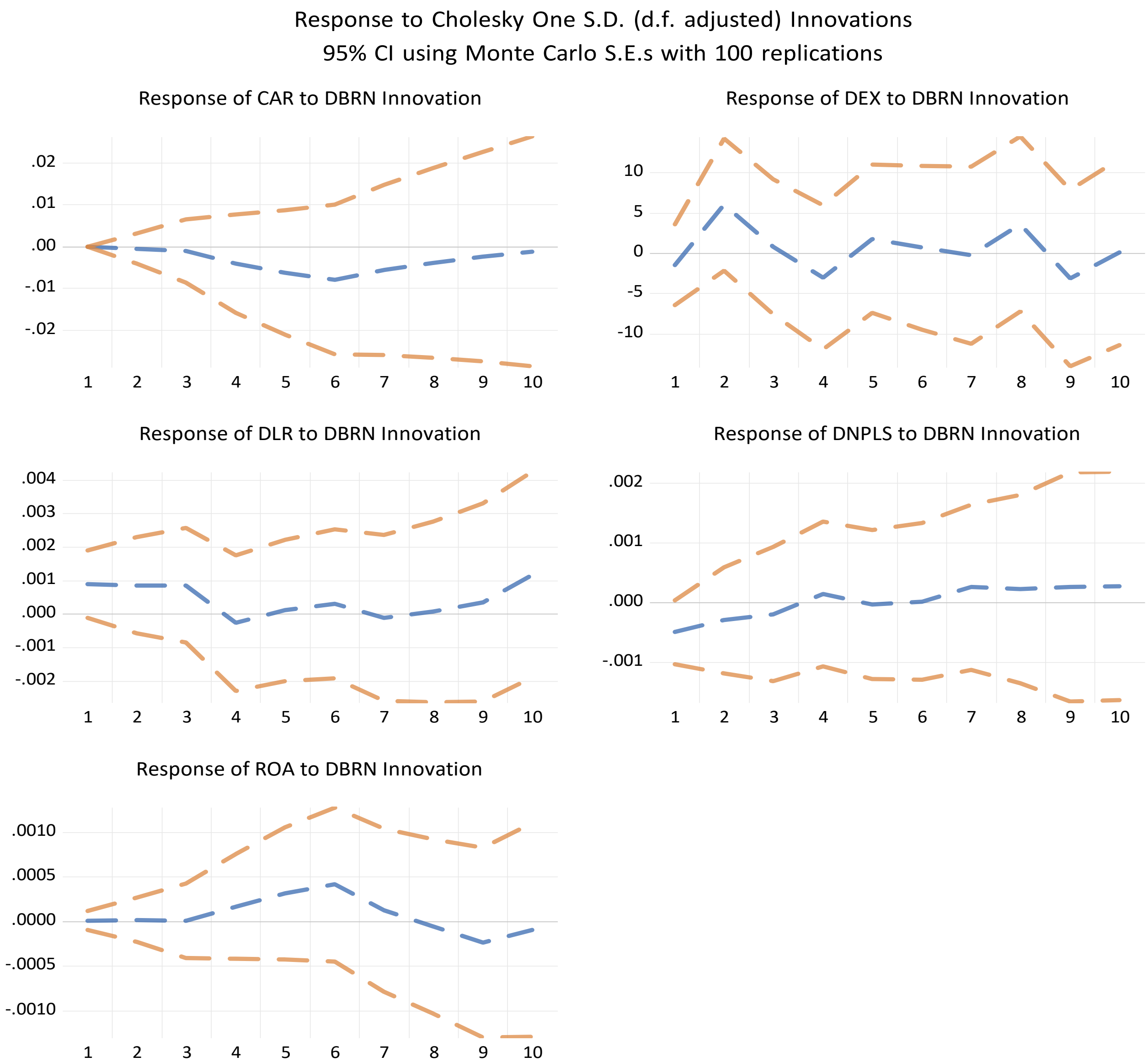


**Figure 4. Impulse Response Functions To Exchange Rates On Financial Soundness Indicators**





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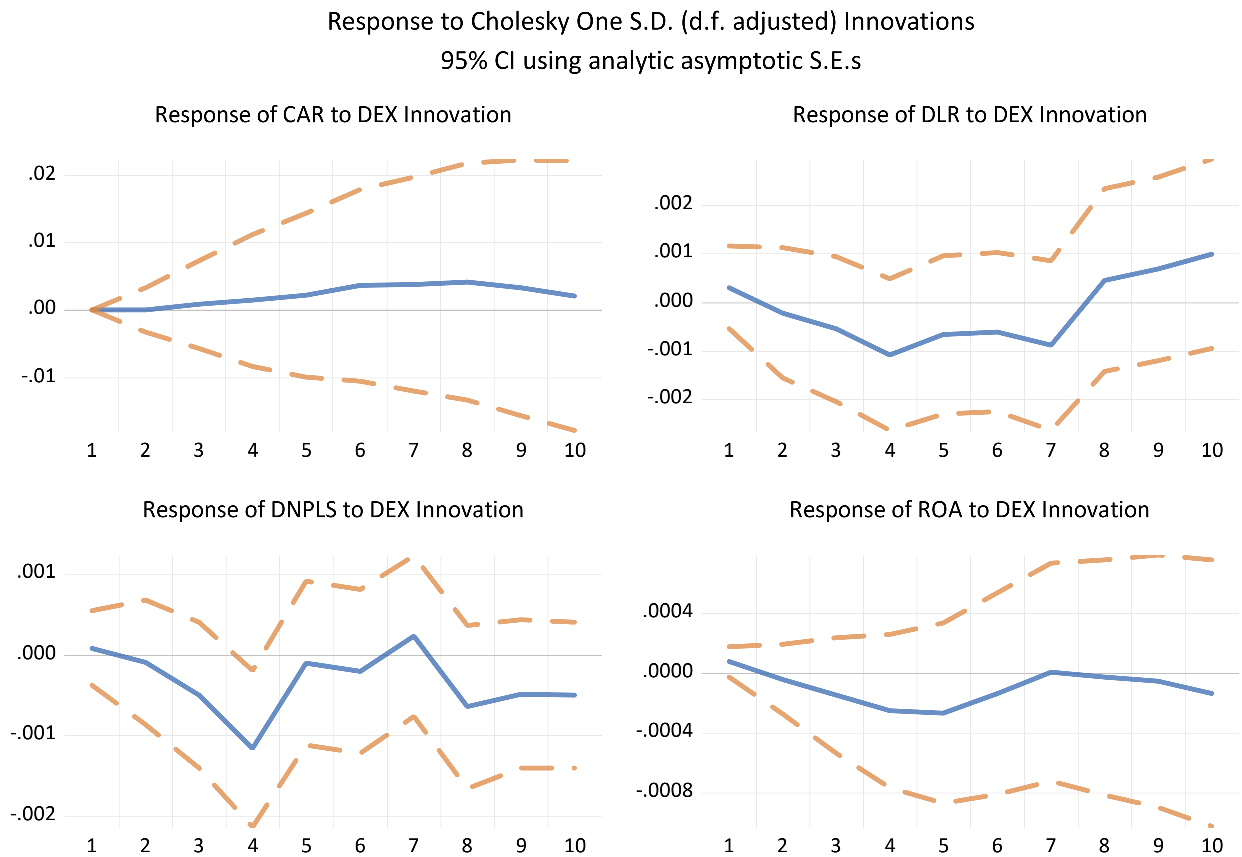


In fact, the exchange rate is one of the most influential variables in economic and banking dynamics. Since oil prices affect exchange rates and banking soundness indicators, it is useful to analyze the response of banking soundness indicators to oil price shocks. Figure 4 shows that a decrease in the value of the currency leads to an increase in the capital adequacy ratio (CAR) of banks, thus reducing capital risk. In period 4, we find that the exchange rate shock has a positive impact on capital adequacy, and this increase continues until period 10. However, a decrease in the value of the currency has a significant negative impact on bank liquidity levels. Exchange rate instability can destabilize the banking sector, and the decline reaches its peak in period 4, reaching (-0.002). It then recovers after period 8 and rises again once the shock subsides. Non-performing loans respond inversely to rising exchange rates (i.e., a decrease in the value of the currency), decreasing as the currency depreciates (i.e., rising exchange rates). Therefore, an increase in exchange rates leads to... A shock occurs in periods 1 and 2, increasing significantly in period 4 to reach -0.001, then it returns to stability and quickly declines in the long term. As for the profitability of banks, it responds negatively in period 1, at the beginning of the period, as the decline in exchange rates leads to a reduction in bank profits, reaching a peak in period 5 and reaching (about -0.0004), then it moves towards stability in period 7. Perhaps the main reason for this is that many of the assets of Iraqi banks are denominated in foreign currency.





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## 5. Conclusion, Recommendations, and Limitations of the Study

In light of the study's primary objective, which is to determine the responsiveness of banking soundness indicators to both oil prices and exchange rates in Iraq, the study concludes that oil price shocks negatively impact capital adequacy and create exchange rate instability. Oil price shocks reduce non-performing loans and increase liquidity levels in Iraqi banks in the short term. However, non-performing loans tend to increase proportionally in the long term. Bank profitability is also proportionally affected in the medium term by rising oil prices. Capital adequacy levels decrease in the event of a positive oil shock. Regarding exchange rates, oil shocks to the local currency lead to significant fluctuations in its value, both upward and downward.. Because banks deal in foreign currency, currency depreciation negatively impacts their profits. The study recommends diversifying revenue sources away from oil revenues by developing private sector economic activities and easing pressure on the currency exchange market. It also recommends working to reduce the gap between official and unofficial exchange rates. This gap must be narrowed to achieve financial stability. Programs targeting the private sector should be implemented, including incentives for exporting companies that obtain foreign currency to increase the country's foreign exchange reserves. The government could purchase these currencies at a rate higher than the parallel market rate to encourage these companies to export and alleviate pressure on the currency auction window.

Despite the relative importance of the study's findings, it suffers from some limitations, namely its short timeframe, which may not align with the results of a longer-term study. Furthermore, it failed to differentiate between public and private banks, particularly since private banks are more closely tied to government activities, significantly impacting their financial performance compared to public banks. Additionally, there is a pressing need to include certain regulatory variables such as government spending, GDP, public debt, and interest rates to adjust the relationship. Finally, the study's findings cannot be generalized to most oil-producing countries due to the economic and political instability in Iraq.

## References:





DOI: https://doi.org/10.56879/ijbm.v5i1.05

Abbassi, P., & Bräuning, F. (2023). Exchange Rate Risk, Banks' Currency Mismatches, And Credit Supply. *Journal Of International Economics*, *141*, 103725. Https://Doi.Org/10.1016/J.Jinteco.2023.103725

Ahmadyan, A., & Valipourpasha, M. (2025). Linear And Non-Linear Effect Of Exchange Rate On Iranian Banks's Financial Soundness. *Iranian Journal Of Economic Studies*, *13*(2), 543-573 DOI: 10.22099/Ijes.2025.53065.2034

Al Dulaimi, H. A. M., Aljebory, A. M., Ali, H. A., & Obaid Al Imari, M. H. (2021). Econometric Analysis Of Oil Revenue Effect On Foreign Reserves Of The Iraqi Economy 2003-2018. *Academy Of Entrepreneurship Journal*, *27*(3), 1-12.

Babazadeh, M., & Farrokhnejad, F. (2012). Effects Of Short-Run And Long-Run Changes In Foreign Exchange Rates On Banks' Profit. *International Journal Of Business And Management*, *7*(17), 70. Https://Doi.Org/10.5539/Ijbm.V7n17p70

Babihuga, R. (2007). Macroeconomic And Financial Soundness Indicators: An Empirical Investigation. Https://Ssrn.Com/Abstract=995618

Baum, Christopher F., Mustafa Caglayan, And John T. Barkoulas. "Exchange Rate Uncertainty And Firm Profitability." *Journal Of Macroeconomics* 23.4 (2001): 565-576. Https://Doi.Org/10.1016/S0164-0704(01)00178-1

Beckmann, J., Czudaj, R. L., & Arora, V. (2020). The Relationship Between Oil Prices And Exchange Rates: Revisiting Theory And Evidence. *Energy Economics*, *88*, 104772. Https://Doi.Org/10.1016/J.Eneco.2020.104772

Bhowmik, D. (2020). Determinants Of Nominal Effective Exchange Rate (NEER) And Real Effective Exchange Rate (REER) Of Chinese Renminbi (RMB). *London Journal Of Research In Humanities And Social Sciences*, *20*(15), 47-64.

Bitetto, A., Cerchiello, P., & Mertzanis, C. (2023). Measuring Financial Soundness Around The World: A Machine Learning Approach. *International Review Of Financial Analysis*, *85*, 102451. Https://Doi.Org/10.1016/J.Irfa.2022.102451

Chen, S. S., & Chen, H. C. (2007). Oil Prices And Real Exchange Rates. *Energy Economics*, *29*(3), 390-404. Https://Doi.Org/10.1016/J.Eneco.2006.08.003

Fu, L., Ho, C. Y., Zhang, X., & Wei, X. (2025). Real Exchange Rate, Financial Constraints, And Product Innovation: Evidence From China. *Journal Of International Money And Finance*, 103437. Https://Doi.Org/10.1016/J.Jimonfin.2025.103437

Hadi, M., Makttoof, N., & Ahmed, M. S. (2022). The Impact Of Exchange Rate Fluctuations On Capital Adequacy In Light Of The Corona Pandemic: An Analytical Study On A Sample





DOI: https://doi.org/10.56879/ijbm.v5i1.05

Of Iraqi Commercial Banks For The Period (2011-2021). *World Economics And Finance Bulletin*, *16*, 44-51..

Hashmi, S. M., Chang, B. H., Huang, L., & Uche, E. (2022). Revisiting The Relationship Between Oil Prices, Exchange Rate, And Stock Prices: An Application Of Quantile ARDL Model. *Resources Policy*, *75*, 102543. Https://Doi.Org/10.1016/J.Resourpol.2021.102543

Kasselaki, M. T., & Tagkalakis, A. O. (2014). Financial Soundness Indicators And Financial Crisis Episodes. *Annals Of Finance*, *10*(4), 623-669. Https://Ssrn.Com/Abstract=995618

Keshtgar, N., Pahlavani, M., & Mirjalili, S. H. (2020). The Impact Of Exchange Rate Volatility On Banking Performance (Case Of Iran). *International Journal Of Business And Development Studies*, *12*(1), 39-56. Https://Doi.Org/10.22111/Ijbds.2020.5436

Kyei, C. B., Cantah, W. G., & Owusu, P. J. (2023). Effect Of Commodity Prices On Financial Soundness; Insight From Adaptive Market Hypothesis In The Ghanaian Setting. *Resources Policy*, *86*, 104076. Https://Doi.Org/10.1016/J.Resourpol.2023.104076

Lagat, C. C., & Nyandema, D. M. (2016). The Influence Of Foreign Exchange Rate Fluctuations On The Financial Performance Of Commercial Banks Listed At The Nairobi Securities Exchange. *British Journal Of Marketing Studies*, *4*(3), 1-11.

Lam, E., & Ojede, A. (2025). Exchange Rate Movements And Oil Price Expectation Shocks In Selected African Countries: Evidence From A Recursive Methodology. *Energy Economics*, 108653. Https://Doi.Org/10.1016/J.Eneco.2025.108653

Majenge, L., Mpungose, S., & Msomi, S. (2025). Comparative Analysis Of VAR And SVAR Models In Assessing Oil Price Shocks And Exchange Rate Transmission To Consumer Prices In South Africa. *Econometrics*, *13*(1), 8. Https://Doi.Org/10.3390/Econometrics13010008

Mamonov, M., Parmeter, C. F., & Prokhorov, A. B. (2024). Bank Cost Efficiency And Credit Market Structure Under A Volatile Exchange Rate. *Journal Of Banking & Finance*, *168*, 107285. Https://Doi.Org/10.1016/J.Jbankfin.2024.107285

Mamonov, M., Parmeter, C. F., & Prokhorov, A. B. (2024). Bank Cost Efficiency And Credit Market Structure Under A Volatile Exchange Rate. *Journal Of Banking & Finance*, *168*, 107285. Https://Doi.Org/10.1016/J.Jbankfin.2024.107285

Martin, A. D., & Mauer, L. J. (2003). Exchange Rate Exposures Of US Banks: A Cash Flow-Based Methodology. *Journal Of Banking & Finance*, *27*(5), 851-865. Https://Doi.Org/10.1016/S0378-4266(02)00253-4





DOI: https://doi.org/10.56879/ijbm.v5i1.05

Mohamadi, T., Shakeri, A., Eskandari, F., & Karimi, D. (2016). The Effect Of Exchange Rate Volatility On Non-Performing Loans In The Banking System Of Iran. Http://Eprj.Ir/Article-1-1347-En.Html

Osundina, C. K., Osundina, J. A., Jayeoba, O. O., & Olayinka, I. M. (2016). Exchange Rate Volatility And Banks Performance: Evidence From Nigeria. *IIARD International Journal Of Economics And Business Management*, *2*(4), 1-11.

Sinaga, J. S., Muda, I., & Silalahi, A. S. (2020). The Effect Of BI Rate, Exchange Rate, Inflation And Third Party Fund (DPK) On Credit Distribution And Its Impact On Non Performing Loan (NPL) On XYZ Commercial Segment Bank. *Universal Journal Of Accounting And Finance*, *8*(3), 55-64. DOI: 10.13189/Ujaf.2020.080301

Ullah, S., & Nobanee, H. (2025). Decoding Exchange Rate In Emerging Economy: Financial And Energy Dynamics. *Heliyon*, *11*(2). Https://Doi.Org/10.1016/J.Heliyon.2025.E41995

Yaqub, K. Q. (2024). Fluctuations Of The Real Exchange Rate And The Structure Of The Iraqi Economy. *International Journal Of Research And Innovation In Social Science*, *8*(10), 622-640. Https://Dx.Doi.Org/10.47772/IJRISS.2024.8100052





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**Vector Autoregression (VAR) Model Appendix**

Vector Autoregression Estimates
Date: 11/03/25 Time: 00:55
Sample (adjusted): 9 106
Included observations: 98 after adjustments
Standard errors in ( ) & t-statistics in [ ]

| | CAR | DBRN | DEX | DLR | DNPLS | ROA |
|---|---|---|---|---|---|---|
| CAR(-1) | 1.76910 | -10.06030 | -130.85354 | -0.03253 | 0.01323 | -0.00858 |
| | 0.10456 | 16.73434 | 204.86242 | 0.03694 | 0.01997 | 0.00433 |
| | [ 16.9191] | [-0.60118] | [-0.63874] | [-0.88062] | [ 0.66222] | [-1.97986] |
| CAR(-2) | -0.78249 | 8.52547 | 291.16717 | 0.02930 | -0.01165 | 0.01123 |
| | 0.19462 | 31.14749 | 381.30882 | 0.06875 | 0.03718 | 0.00807 |
| | [-4.02058] | [ 0.27371] | [ 0.76360] | [ 0.42621] | [-0.31350] | [ 1.39194] |
| CAR(-3) | -0.52169 | -0.51661 | -424.71643 | -0.02389 | 0.00103 | -0.00215 |
| | 0.20013 | 32.02866 | 392.09611 | 0.07069 | 0.03823 | 0.00829 |
| | [-2.60678] | [-0.01613] | [-1.08319] | [-0.33799] | [ 0.02696] | [-0.25969] |
| CAR(-4) | 0.85636 | -6.52348 | 213.10617 | 0.03702 | 0.01241 | -0.00819 |
| | 0.18341 | 29.35297 | 359.34016 | 0.06479 | 0.03503 | 0.00760 |
| | [ 4.66912] | [-0.22224] | [ 0.59305] | [ 0.57149] | [ 0.35434] | [-1.07815] |
| CAR(-5) | -0.34545 | 6.75249 | 87.65427 | -0.01289 | -0.01476 | 0.00775 |
| | 0.19402 | 31.05074 | 380.12436 | 0.06853 | 0.03706 | 0.00804 |
| | [-1.78052] | [ 0.21747] | [ 0.23059] | [-0.18811] | [-0.39830] | [ 0.96347] |
| CAR(-6) | -0.14620 | -14.72762 | -450.81004 | -0.02285 | 0.00383 | -0.00660 |
| | 0.18675 | 29.88825 | 365.89318 | 0.06597 | 0.03567 | 0.00774 |
| | [-0.78282] | [-0.49276] | [-1.23208] | [-0.34635] | [ 0.10724] | [-0.85217] |
| CAR(-7) | 0.12600 | 12.60437 | 397.18530 | 0.02270 | 0.00213 | 0.00504 |
| | 0.09323 | 14.92124 | 182.66637 | 0.03293 | 0.01781 | 0.00386 |
| | [ 1.35142] | [ 0.84473] | [ 2.17438] | [ 0.68923] | [ 0.11984] | [ 1.30367] |
| DBRN(-1) | -0.00032 | 0.82329 | 2.67426 | 0.00005 | 0.00008 | -0.00001 |
| | 0.00087 | 0.13906 | 1.70243 | 0.00031 | 0.00017 | 0.00004 |
| | [-0.36293] | [ 5.92025] | [ 1.57085] | [ 0.17820] | [ 0.48653] | [-0.15901] |
| DBRN(-2) | 0.00013 | 0.04349 | -1.55396 | 0.00008 | -0.00001 | 0.00002 |
| | 0.00114 | 0.18232 | 2.23200 | 0.00040 | 0.00022 | 0.00005 |
| | [ 0.11822] | [ 0.23853] | [-0.69622] | [ 0.18793] | [-0.02995] | [ 0.43905] |
| DBRN(-3) | -0.00104 | -0.35305 | -2.26838 | -0.00002 | 0.00013 | 0.00006 |
| | 0.00113 | 0.18124 | 2.21876 | 0.00040 | 0.00022 | 0.00005 |
| | [-0.92092] | [-1.94793] | [-1.02237] | [-0.04739] | [ 0.57985] | [ 1.34240] |
| DBRN(-4) | 0.00088 | 0.30822 | 4.40062 | 0.00023 | -0.00007 | -0.00009 |
| | 0.00114 | 0.18270 | 2.23656 | 0.00040 | 0.00022 | 0.00005 |
| | [ 0.76851] | [ 1.68709] | [ 1.96758] | [ 0.56448] | [-0.30859] | [-1.80026] |
| DBRN(-5) | 0.00008 | 0.04108 | 0.49841 | -0.00006 | -0.00015 | 0.00003 |
| | 0.00116 | 0.18522 | 2.26742 | 0.00041 | 0.00022 | 0.00005 |
| | [ 0.07246] | [ 0.22179] | [ 0.21981] | [-0.13680] | [-0.68412] | [ 0.58533] |
| DBRN(-6) | 0.00091 | -0.20518 | -3.67313 | -0.00064 | 0.00024 | -0.00008 |
| | 0.00113 | 0.18074 | 2.21264 | 0.00040 | 0.00022 | 0.00005 |





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| | | | | | | |
|---|---|---|---|---|---|---|
| | [ 0.80600] | [-1.13522] | [-1.66006] | [-1.60059] | [ 1.09702] | [-1.69101] |
| DBRN(-7) | -0.00104 | 0.04446 | 1.77875 | 0.00092 | -0.00002 | 0.00008 |
| | 0.00086 | 0.13747 | 1.68290 | 0.00030 | 0.00016 | 0.00004 |
| | [-1.20712] | [ 0.32345] | [ 1.05696] | [ 3.02768] | [-0.14063] | [ 2.17487] |
| DEX(-1) | 0.00000 | -0.01756 | -0.17742 | -0.00002 | -0.00001 | -0.00001 |
| | 0.00007 | 0.01119 | 0.13695 | 0.00002 | 0.00001 | 0.00000 |
| | [ 0.06658] | [-1.56935] | [-1.29552] | [-0.62986] | [-0.46483] | [-2.42040] |
| DEX(-2) | 0.00002 | -0.00944 | 0.18291 | -0.00002 | -0.00002 | 0.00000 |
| | 0.00007 | 0.01157 | 0.14165 | 0.00003 | 0.00001 | 0.00000 |
| | [ 0.33491] | [-0.81581] | [ 1.29130] | [-0.87462] | [-1.41223] | [-0.66810] |
| DEX(-3) | -0.00001 | -0.00271 | -0.02526 | -0.00003 | -0.00002 | 0.00000 |
| | 0.00007 | 0.01128 | 0.13815 | 0.00002 | 0.00001 | 0.00000 |
| | [-0.12419] | [-0.23989] | [-0.18283] | [-1.12661] | [-1.81056] | [ 0.75382] |
| DEX(-4) | -0.00003 | 0.00671 | -0.22820 | 0.00002 | 0.00004 | 0.00000 |
| | 0.00007 | 0.01167 | 0.14284 | 0.00003 | 0.00001 | 0.00000 |
| | [-0.40042] | [ 0.57487] | [-1.59762] | [ 0.64997] | [ 2.74172] | [-0.72226] |
| DEX(-5) | 0.00006 | -0.00021 | -0.01418 | 0.00000 | 0.00000 | 0.00000 |
| | 0.00007 | 0.01089 | 0.13336 | 0.00002 | 0.00001 | 0.00000 |
| | [ 0.82831] | [-0.01898] | [-0.10633] | [ 0.08533] | [-0.27984] | [ 1.32238] |
| DEX(-6) | 0.00001 | 0.01515 | 0.29666 | -0.00001 | -0.00001 | 0.00000 |
| | 0.00007 | 0.01120 | 0.13708 | 0.00002 | 0.00001 | 0.00000 |
| | [ 0.14151] | [ 1.35320] | [ 2.16411] | [-0.44646] | [-0.47935] | [ 0.56467] |
| DEX(-7) | 0.00003 | 0.01464 | -0.07312 | 0.00000 | -0.00003 | -0.00001 |
| | 0.00007 | 0.01143 | 0.13989 | 0.00003 | 0.00001 | 0.00000 |
| | [ 0.48516] | [ 1.28098] | [-0.52268] | [-0.09592] | [-2.28256] | [-2.35749] |
| DLR(-1) | 0.14328 | -8.88003 | -860.27124 | 0.80041 | -0.00726 | -0.01597 |
| | 0.30523 | 48.84918 | 598.01360 | 0.10782 | 0.05830 | 0.01265 |
| | [ 0.46941] | [-0.18178] | [-1.43855] | [ 7.42377] | [-0.12451] | [-1.26259] |
| DLR(-2) | 0.01056 | -12.68470 | 261.45477 | -0.02787 | -0.02942 | -0.00016 |
| | 0.36646 | 58.64867 | 717.97935 | 0.12945 | 0.07000 | 0.01519 |
| | [ 0.02882] | [-0.21628] | [ 0.36415] | [-0.21531] | [-0.42032] | [-0.01051] |
| DLR(-3) | -0.28961 | -7.47585 | 589.85179 | -0.84475 | -0.10891 | 0.03186 |
| | 0.35313 | 56.51592 | 691.87009 | 0.12474 | 0.06745 | 0.01463 |
| | [-0.82012] | [-0.13228] | [ 0.85255] | [-6.77213] | [-1.61452] | [ 2.17740] |
| DLR(-4) | 0.52841 | 8.30842 | -1111.53785 | 0.69086 | 0.09561 | -0.03605 |
| | 0.39169 | 62.68627 | 767.40770 | 0.13836 | 0.07482 | 0.01623 |
| | [ 1.34907] | [ 0.13254] | [-1.44843] | [ 4.99331] | [ 1.27793] | [-2.22106] |
| DLR(-5) | 0.00015 | -1.71218 | 560.14311 | 0.00261 | 0.00295 | -0.00154 |
| | 0.35139 | 56.23698 | 688.45527 | 0.12412 | 0.06712 | 0.01456 |
| | [ 0.00042] | [-0.03045] | [ 0.81362] | [ 0.02106] | [ 0.04399] | [-0.10541] |
| DLR(-6) | -0.67459 | -19.86621 | -35.69432 | -0.58818 | -0.07511 | 0.01083 |
| | 0.35021 | 56.04857 | 686.14879 | 0.12371 | 0.06690 | 0.01451 |
| | [-1.92622] | [-0.35445] | [-0.05202] | [-4.75461] | [-1.12285] | [ 0.74597] |
| DLR(-7) | 0.74493 | 4.11501 | -919.58285 | 0.45252 | 0.06146 | -0.01898 |
| | 0.28906 | 46.26124 | 566.33184 | 0.10211 | 0.05521 | 0.01198 |
| | [ 2.57708] | [ 0.08895] | [-1.62375] | [ 4.43194] | [ 1.11303] | [-1.58450] |





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| | | | | | | |
|---|---|---|---|---|---|---|
| DNPLS(-1) | -0.16154 | -2.11983 | -2367.18392 | -0.04013 | 0.92407 | -0.02862 |
| | 0.72903 | 116.67566 | 1428.34798 | 0.25752 | 0.13926 | 0.03021 |
| | [-0.22158] | [-0.01817] | [-1.65729] | [-0.15582] | [ 6.63570] | [-0.94734] |
| DNPLS(-2) | 0.23052 | -91.58729 | -1038.63621 | 0.02823 | 0.00456 | 0.01162 |
| | 1.01795 | 162.91341 | 1994.39225 | 0.35957 | 0.19444 | 0.04219 |
| | [ 0.22646] | [-0.56218] | [-0.52078] | [ 0.07850] | [ 0.02347] | [ 0.27551] |
| DNPLS(-3) | 0.61376 | -141.28575 | 3015.97126 | 0.57703 | -0.36463 | -0.04706 |
| | 1.00006 | 160.05045 | 1959.34389 | 0.35326 | 0.19103 | 0.04144 |
| | [ 0.61372] | [-0.88276] | [ 1.53928] | [ 1.63347] | [-1.90879] | [-1.13560] |
| DNPLS(-4) | -0.51663 | 214.30521 | 1811.13397 | -0.59455 | 0.12350 | 0.03814 |
| | 1.15399 | 184.68672 | 2260.94198 | 0.40763 | 0.22043 | 0.04782 |
| | [-0.44769] | [ 1.16037] | [ 0.80105] | [-1.45854] | [ 0.56029] | [ 0.79757] |
| DNPLS(-5) | -0.19520 | 58.27125 | 214.81112 | 0.13525 | 0.20904 | 0.01980 |
| | 1.12671 | 180.32052 | 2207.49081 | 0.39799 | 0.21522 | 0.04669 |
| | [-0.17325] | [ 0.32315] | [ 0.09731] | [ 0.33984] | [ 0.97128] | [ 0.42411] |
| DNPLS(-6) | 1.11741 | 4.96560 | -4002.78228 | 0.70282 | -0.14815 | -0.02398 |
| | 1.04397 | 167.07804 | 2045.37583 | 0.36877 | 0.19941 | 0.04326 |
| | [ 1.07035] | [ 0.02972] | [-1.95699] | [ 1.90587] | [-0.74293] | [-0.55431] |
| DNPLS(-7) | -0.83681 | 45.33241 | 3225.57917 | -0.44464 | -0.01654 | -0.00598 |
| | 0.85260 | 136.45141 | 1670.44345 | 0.30117 | 0.16286 | 0.03533 |
| | [-0.98148] | [ 0.33222] | [ 1.93097] | [-1.47637] | [-0.10159] | [-0.16915] |
| ROA(-1) | -1.47904 | -400.66698 | -11182.05088 | -0.97087 | -0.22125 | 1.83876 |
| | 3.28830 | 526.26461 | 6442.55186 | 1.16154 | 0.62812 | 0.13627 |
| | [-0.44979] | [-0.76134] | [-1.73566] | [-0.83585] | [-0.35224] | [ 13.4933] |
| ROA(-2) | 0.29680 | 219.78869 | 13665.12628 | 0.98950 | 0.97083 | -0.93265 |
| | 6.97765 | 1116.71337 | 13670.84849 | 2.46475 | 1.33284 | 0.28916 |
| | [ 0.04254] | [ 0.19682] | [ 0.99958] | [ 0.40146] | [ 0.72839] | [-3.22532] |
| ROA(-3) | 0.30402 | 191.62621 | -878.22145 | 2.59198 | -1.15611 | -0.73881 |
| | 7.36379 | 1178.51122 | 14427.38022 | 2.60115 | 1.40660 | 0.30517 |
| | [ 0.04129] | [ 0.16260] | [-0.06087] | [ 0.99647] | [-0.82192] | [-2.42102] |
| ROA(-4) | -0.18738 | -411.84949 | -10335.76616 | -6.54279 | 0.13008 | 1.43348 |
| | 5.82895 | 932.87327 | 11420.27083 | 2.05899 | 1.11342 | 0.24156 |
| | [-0.03215] | [-0.44148] | [-0.90504] | [-3.17767] | [ 0.11683] | [ 5.93425] |
| ROA(-5) | -0.42707 | 287.59126 | 9453.58869 | 4.09625 | 1.59526 | -0.72913 |
| | 7.27000 | 1163.50086 | 14243.62285 | 2.56802 | 1.38868 | 0.30128 |
| | [-0.05874] | [ 0.24718] | [ 0.66371] | [ 1.59510] | [ 1.14875] | [-2.42012] |
| ROA(-6) | 0.22277 | -266.11960 | -3457.87788 | -1.90993 | -1.91439 | -0.10018 |
| | 7.06827 | 1131.21655 | 13848.39697 | 2.49676 | 1.35015 | 0.29292 |
| | [ 0.03152] | [-0.23525] | [-0.24970] | [-0.76496] | [-1.41791] | [-0.34202] |
| ROA(-7) | 1.29653 | 276.48095 | 1834.38214 | 1.43288 | 0.68696 | 0.14857 |
| | 3.36798 | 539.01670 | 6598.66348 | 1.18969 | 0.64334 | 0.13957 |
| | [ 0.38496] | [ 0.51294] | [ 0.27799] | [ 1.20441] | [ 1.06781] | [ 1.06446] |
| C | 0.02138 | 3.25150 | 24.12010 | 0.00560 | -0.00377 | 0.00171 |
| | 0.01904 | 3.04732 | 37.30538 | 0.00673 | 0.00364 | 0.00079 |
| | [ 1.12301] | [ 1.06701] | [ 0.64656] | [ 0.83238] | [-1.03556] | [ 2.16318] |
| R-squared | 0.98751 | 0.70256 | 0.52659 | 0.85541 | 0.77050 | 0.98964 |





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|---|---|---|---|---|---|---|
| Adj. R-squared | 0.97797 | 0.47542 | 0.16508 | 0.74500 | 0.59524 | 0.98172 |
| Sum sq. resids | 0.00880 | 225.41054 | 33781.71823 | 0.00110 | 0.00032 | 0.00002 |
| S.E. equation | 0.01265 | 2.02444 | 24.78332 | 0.00447 | 0.00242 | 0.00052 |
| F-statistic | 103.51139 | 3.09310 | 1.45664 | 7.74755 | 4.39644 | 125.06097 |
| Log likelihood | 317.52160 | -179.87081 | -425.34865 | 419.50239 | 479.75084 | 629.50169 |
| Akaike AIC | -5.60248 | 4.54838 | 9.55814 | -7.68372 | -8.91328 | -11.96942 |
| Schwarz SC | -4.46826 | 5.68260 | 10.69236 | -6.54950 | -7.77906 | -10.83520 |
| Mean dependent | 0.48543 | 0.26142 | 2.50000 | 0.00066 | 0.00043 | 0.01123 |
| S.D. dependent | 0.08522 | 2.79512 | 27.12295 | 0.00885 | 0.00380 | 0.00388 |
| Determinant resid covariance (dof adj.) | | 0.00000 | | | | |
| Determinant resid covariance | | 0.00000 | | | | |
| Log likelihood | | 1268.43721 | | | | |
| Akaike information criterion | | -20.62117 | | | | |
| Schwarz criterion | | -13.81584 | | | | |
| Number of coefficients | | 258.00000 | | | | |





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