Oil Price Volatility and its Effects on Macroeconomic Stability in Jordan: A Structural VAR Approach

Khaled Mohammed Al-Sawaie[1], Suleiman Ibrahim Shelash Mohammad[2,3], Khaleel Ibrahim Al-Daoud[4], Mohammad Matroud Al-Smeiran[1], Badrea Al Oraini[5], Asokan Vasudevan[6], Nawaf Alshdaifat[7], Muhammad Alshurideh[8]*

[1]Department of Economics, Faculty of Economics and Administrative Sciences, Zarqa University, Zarqa, Jordan, [2]Electronic Marketing and Social Media, Economic and Administrative Sciences, Zarqa University, Zarqa, Jordan, [3]INTI International University, Negeri Sembilan, Malaysia, [4]Department of Accounting, Business School Faculties, Al Ahilya Amman University, Amman, Jordan, [5]Department of Business Administration, Collage of Business and Economics, Qassim University, Qassim, Saudi Arabia, [6]Faculty of Business and Communications, INTI International University, Negeri Sembilan, Malaysia, [7]Faculty of Information Technology, Applied Science Private University, Amman, Jordan, [8]Department of Marketing, School of Business, The University of Jordan, Amman, Jordan. *Email: m.alshurideh@ju.edu.jo

ABSTRACT

This study examines the dynamic effects of global oil price fluctuations on key macroeconomic indicators in Jordan, including inflation, real GDP growth, fiscal deficit, and exchange rate stability, over the period 2000-2023. As an energy-importing economy, Jordan remains vulnerable to external oil price shocks, which influence domestic price levels, fiscal performance, and growth dynamics. Using quarterly data and a Structural Vector Auto Regression (SVAR) framework, the analysis identifies and quantifies the transmission of oil price shocks through impulse response functions and forecast error variance decomposition (FEVD). The Augmented Dickey-Fuller (ADF) test was applied to ensure stationarity, and optimal lag length was selected based on Akaike and Schwarz criteria. Results reveal that oil price shocks significantly increase inflation and widen the fiscal deficit, with inflation reacting immediately and fiscal imbalances persisting over several quarters. GDP growth shows a delayed negative response, while exchange rate effects are minor due to the fixed peg regime. FEVD results indicate that oil shocks explain up to 18% of inflation variance and around 9% of fiscal deficit variance. The findings suggest that oil price shocks are a key driver of macroeconomic volatility in Jordan. The study highlights the need for fiscal reform, energy diversification, and improved macroeconomic forecasting tools to mitigate the adverse effects of external energy shocks.

Keywords: Oil Price Shocks, SVAR, Inflation, GDP Growth, Fiscal Deficit, Jordan
JEL Classifications: E31, E62, F41, Q43

1. INTRODUCTION

Global oil prices are among the most influential external variables affecting macroeconomic stability, especially in energy-importing countries. Over the past two decades, oil markets have experienced considerable volatility driven by geopolitical tensions, demand-supply imbalances, technological changes, and global economic shifts. For countries like Jordan, where energy imports constitute a significant portion of the trade bill and public expenditure, the fluctuations in oil prices have far-reaching consequences on inflation, economic growth, fiscal sustainability, and currency stability (Al-Mejren, 2019; Qwader, 2018). As global energy markets remain uncertain and increasingly volatile, understanding the macroeconomic transmission of oil price shocks becomes crucial for designing effective policy responses in small, open economies (Bhattacharya, 2022).

Jordan's economy is heavily reliant on imported energy to meet domestic demand. Despite gradual reforms in energy diversification and subsidy restructuring, the country remains exposed to global commodity cycles (Sandri et al., 2020). This dependency has translated into heightened macroeconomic vulnerability, especially in periods of oil price spikes. Historical data show that episodes of oil price increases have been accompanied by rising inflation, widened fiscal deficits, decelerated GDP growth, and pressures on the Jordanian Dinar (Almasria et al., 2024; Santos et al., 2019, 2020). These macroeconomic symptoms underline the need for a systematic and quantitative investigation into how oil price shocks influence the broader economic environment in Jordan.

The research problem addressed in this study revolves around the lack of comprehensive empirical understanding of the dynamic effects of global oil price shocks on key macroeconomic indicators in Jordan. While anecdotal and descriptive evidence exists, few studies have employed advanced econometric frameworks capable of isolating structural shocks and capturing their time-dependent impacts across inflation, growth, fiscal, and exchange rate domains (Altarawneh et al., 2020; Qwader, 2018; Santos et al., 2019). The absence of such analysis has limited the capacity of policymakers to anticipate and manage the economic fallout from global energy price swings. This study is significant for several reasons. First, it provides an in-depth empirical analysis using quarterly data, offering a high-resolution view of macroeconomic responses over time. Second, it adopts a Structural Vector Auto Regression (SVAR) model a methodology well-suited to disentangle structural shocks and estimate impulse responses within an interdependent system of variables(Evgenidis and Malliaris, 2022; Xu et al., 2022). Third, the findings of this research have practical policy implications for fiscal planning, inflation targeting, monetary policy design, and exchange rate management in Jordan.

The novelty of this study lies in its application of a multi-variable SVAR framework to the Jordanian context using an extended time frame (2000-2023) and quarterly data. Unlike previous studies that focus on single variables or adopt linear models with limited explanatory power, this research simultaneously examines four critical macroeconomic indicators. It also quantifies the dynamic contribution of oil shocks using forecast error variance decomposition and impulse response functions, offering deeper insights into the temporal and structural dimensions of oil-macro linkages (Ahmad et al., 2022; Li et al., 2021).

The research statement that guides this thesis is as follows:
This study aims to examine the dynamic impact of global oil price fluctuations on key macroeconomic indicators in Jordan using a Structural Vector Auto Regression (SVAR) approach. The analysis seeks to identify, interpret, and quantify the temporal effects of oil price shocks on inflation, real GDP growth, fiscal deficit, and exchange rate stability.

The primary objective of this study was to analyse the dynamic impact of global oil price fluctuations on key macroeconomic indicators in Jordan, specifically focusing on inflation, fiscal deficit, real GDP growth, and exchange rate stability. The study aimed to identify how structural shocks in international oil markets propagate through the Jordanian economy, both in the short run and the long run.

To achieve this, the research sought to:
- Determine the nature and extent of the relationship between global oil price changes and selected macroeconomic variables in Jordan.
- Apply a Structural Vector Auto Regression (SVAR) model to isolate and interpret the structural shocks affecting the economy.
- Quantify the impulse response of inflation, GDP growth, exchange rate, and fiscal balance to oil price innovations.
- Provide policy-relevant insights into how oil price volatility influences economic stability in a non-oil-producing, import-dependent economy like Jordan.

By meeting these objectives, the study intended to contribute to the formulation of macroeconomic policies that enhance Jordan's resilience to external oil shocks and promote long-term economic stability.

2. LITERATURE REVIEW

Understanding the macroeconomic effects of global oil price shocks has long been a central focus in economic research, particularly for oil-importing countries like Jordan. Global oil prices are widely recognized as a major external factor influencing macroeconomic stability, especially in energy-dependent economies. Hamilton, (1983) laid the foundation for understanding oil shocks as triggers for economic downturns, particularly in advanced economies. Since then, oil price volatility has been shown to have far-reaching consequences. (Ready, 2012) argued that the effects of oil price changes vary depending on whether the shock is demand or supply driven. For oil importing countries, the literature emphasizes that price hikes lead to increased production costs, inflationary pressure, and deteriorating trade balances (Taufani et al., 2022). In Jordan's case, as a net importer, changes in oil prices represent a cost-side shock, leading to widespread economic reverberations across sectors.

Inflation has consistently been identified as one of the most responsive macroeconomic indicators to oil price movements. (Jena and Kataruka, 2022) noted that while inflation responses have become more muted in developed economies due to better monetary policy frameworks, oil importing developing countries still experience strong inflationary pass through. For MENA countries, (Ihebuluche et al., 2023) observed that oil price increases are quickly transmitted to consumer prices, especially when fuel and transportation are heavily weighted in consumption baskets. Jordan, which has historically relied on energy subsidies, is particularly vulnerable to imported inflation when oil prices surge (Khazaleh, 2024; Sandri et al., 2020).The impact of oil price shocks on GDP growth is less uniform. In oil-importing economies, the dominant effect is usually negative due to rising input costs and reduced real incomes. Mork, (1989) introduced the idea of asymmetry in the response of output to oil price increases versus decreases. His findings, along with those of (Awartani et al., 2020), indicate that output contraction is more pronounced in response

to oil price hikes. In the Jordanian context, Almasria et al., (2024) found that oil shocks adversely affect growth, particularly through the investment and industrial output channels. However, results remain mixed depending on the period of analysis, suggesting the need for more robust, dynamic modelling.

Fiscal deficit, particularly in energy-importing developing countries, is another channel through which oil prices exert significant influence. (Al-Hawary et al., 2025) demonstrated that oil price increases deteriorate fiscal balances by raising subsidy burdens and reducing revenue efficiency. Jordan's fiscal system, which includes substantial public sector wage bills and energy subsidies, has been flagged in IMF reports as highly sensitive to external price shocks. Empirical work by (Durand-Lasserve and Karanfil, 2023) showed that fiscal stress intensifies during oil price hikes, especially when governments are slow to adjust subsidy regimes. Exchange rate behavior in response to oil shocks varies based on the exchange rate regime and external balance conditions. (Akram, 2020) showed that currencies of oil exporting countries tend to appreciate during oil booms, while importers experience depreciation. However, in countries like Jordan with a fixed or managed exchange rate, nominal exchange rates may not fully reflect market pressures. Nonetheless, research such as that by (Belanès et al., 2022) suggests that even in pegged systems, oil shocks influence capital flows and reserve dynamics, leading to secondary currency effects.

While extensive literature exists on the oil-macro nexus, several gaps remain. First, much of the existing research is concentrated on either advanced economies or oil-exporting nations. Second, studies focusing on Jordan are limited in both number and methodological sophistication. Most rely on linear models that fail to capture dynamic structural interdependencies. Third, few studies have employed Structural Vector Auto Regression (SVAR) frameworks to identify and isolate the effects of oil price shocks on macroeconomic variables in Jordan. Moreover, there is limited literature that simultaneously examines multiple channels inflation, GDP growth, fiscal deficit, and exchange rate within a single cohesive model. This study addresses these gaps by applying a SVAR model to quarterly macroeconomic data from 2000 to 2023. It contributes to the literature by offering a dynamic, multi-channel analysis of how oil price fluctuations propagate through Jordan's economy, helping to fill an important empirical and policy-relevant void in the regional economic literature.

2.1. Framework of the Study and Hypothesis Development
The framework of this study is grounded in macroeconomic theory, particularly the transmission mechanism of external shocks in small open economies. In the context of Jordanian oil-importing country with limited energy resources fluctuations in global oil prices are expected to exert significant influence on domestic economic stability. The study was designed around the principle that oil prices function as an exogenous shock to the domestic economy, triggering responses in inflation, output, exchange rates, and fiscal balance. These macroeconomic indicators were chosen based on their sensitivity to external price movements, as established in the Monetary Transmission Mechanism, Aggregate

Supply and Demand Framework, and the Balance of Payments Channel.

To empirically analyse these relationships, the study employed a Structural Vector Auto Regression (SVAR) model. This econometric framework allows for the isolation of structural shocks and the estimation of impulse response functions, which trace the effects of oil price changes over time on key macroeconomic variables. The SVAR model was selected because it can accommodate endogenous interdependencies among the variables while allowing for theoretical restrictions that reflect economic intuition such as treating oil prices as exogenous in the short run. The theoretical foundation integrates both Keynesian and New Classical macroeconomic thought, recognizing that oil price shocks can influence aggregate demand through cost-push inflation, exchange rate depreciation, and fiscal pressure, while also impacting aggregate supply via imported input costs and investment uncertainty.

The conceptual model of the study (Figure 1) illustrates the hypothesized relationship between an external oil price shock and the internal macroeconomic dynamics of the Jordanian economy. The model positions global oil price fluctuations as the core exogenous variable, which transmits shocks to four endogenous macroeconomic indicators that Inflation Rate, Real GDP Growth, Fiscal Deficit and Exchange Rate. Each of these macroeconomic variables may interact with one another in dynamic ways, justifying the use of a multivariate time-series framework. For example, inflation may influence GDP growth, and a deteriorating fiscal deficit could place further pressure on the exchange rate. The SVAR model captures these feedback mechanisms through lag structures and simultaneous equations.

To investigate the dynamic relationship between global oil price fluctuations and key macroeconomic indicators in Jordan, the study proposed the following hypotheses:

- H_{11}: Global oil price shocks have a significant positive impact on the inflation rate in Jordan.
- H_{12}: Global oil price shocks have a significant negative impact on real GDP growth in Jordan.
- H_{13}: Global oil price shocks significantly increase the fiscal deficit as a percentage of GDP in Jordan.
- H_{14}: Global oil price shocks significantly lead to depreciation of the Jordanian Dinar against the US Dollar.

3. METHODOLOGY

3.1. Research Design
This study adopted a quantitative, empirical, and causal research design to examine the dynamic relationship between global oil price fluctuations and major macroeconomic indicators in Jordan, including inflation, fiscal deficit, real GDP growth, and exchange rate stability. The focus was on identifying structural shocks and interpreting their effects over time using a time-series framework. The use of a Structural Vector Auto Regression (SVAR) model allowed the researcher to detect interdependencies and response mechanisms among the selected macroeconomic variables. The research design was structured to capture both short-run and

Figure 1: Framework of the study
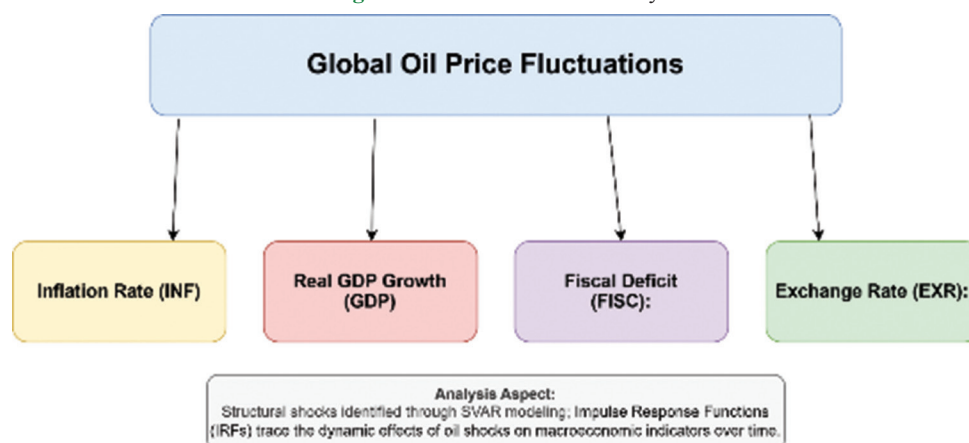
Source: Author

long-run dynamics, enabling meaningful inferences regarding the propagation of oil price shocks in an oil-importing economy such as Jordan.

3.2. Data Collection
The study utilized quarterly secondary data spanning from the first quarter of 2000 (Q1 2000) to the fourth quarter of 2023 (Q4 2023). Data were sourced from reputable international and national institutions. Global oil prices (Brent Crude) were obtained from the U.S. Energy Information Administration (EIA) and OPEC. Macroeconomic indicators, including real GDP growth, inflation (CPI), exchange rates (JD/USD), and fiscal deficit (% of GDP), were sourced from the World Bank, International Monetary Fund (IMF), Central Bank of Jordan (CBJ), and the Ministry of Finance, Jordan. Data were reviewed for consistency and seasonal adjustments were applied where necessary to ensure the reliability of the time-series analysis.

3.3. Population and Sample
The population of interest comprised the economic periods that reflect the macroeconomic performance of Jordan in the context of oil price fluctuations. Each quarter from Q1 2000 to Q4 2023 was treated as a unit of observation, resulting in 96 observations that form the basis of the sample. Since macroeconomic research often uses time-series data, the sampling technique involved the collection of continuous data points over time, ensuring that the dataset captured a diverse range of economic conditions, including periods of global financial crises, regional instability, and oil market volatility. The sample size was determined by the number of quarters between Q1 2000 and Q4 2023. With four quarters per year over a 24-year period, the total number of observations equalled 96. This sample size was considered adequate for applying SVAR modelling, as it provided sufficient degrees of freedom to accommodate multiple lags and ensure robust estimation and inference. The length of the time series allowed the study to capture various structural breaks and policy regimes that may have influenced the response of macroeconomic indicators to oil price movements.

The population in this study consisted of Jordan's macroeconomic indicators over the selected time period. The main variables included global oil prices (in US dollars per barrel), real GDP growth (percentage change year-over-year), inflation (CPI-based), exchange rate (Jordanian Dinar per US Dollar), and fiscal deficit (as a percentage of GDP). All variables were measured on a quarterly basis to maintain temporal alignment and enhance comparability. Each data source was verified for authenticity and consistency to ensure that the resulting analysis would be both reliable and policy-relevant.

3.4. Summary of Main Variables
The primary variables under investigation were selected based on theoretical relevance and empirical precedent. Oil price was treated as an exogenous variable, given that Jordan, as a net oil importer, does not influence global oil prices. The remaining variables real GDP growth, inflation rate, fiscal deficit, and exchange rate were treated as endogenous variables within the SVAR framework. These variables were expected to respond to oil price shocks in different ways. Inflation and fiscal deficit were hypothesized to increase in response to oil price hikes, while GDP growth and exchange rate stability were expected to deteriorate. Log transformations and first-differencing were applied where necessary to achieve stationarity and facilitate econometric modelling.

3.5. Measures
All macroeconomic variables were operationalized according to standard economic definitions. Oil prices were measured as the quarterly average of Brent crude spot prices, expressed in U.S. dollars per barrel. Inflation was captured through the year-on-year change in the Consumer Price Index (CPI), while real GDP growth was measured as the annualized percentage change in constant-price GDP. The exchange rate was defined as the nominal exchange rate of the Jordanian Dinar per U.S. Dollar, and the fiscal deficit was expressed as a percentage of nominal GDP. Where appropriate, data were transformed into logarithmic form to linearize exponential growth trends and stabilize variance across time.

3.6. Analytical Methods
The analysis began with stationarity testing for each time-series variable using the Augmented Dickey-Fuller (ADF) and Phillips-

Perron (PP) tests. These tests determined the order of integration and guided the necessary differencing procedures. Lag length selection was conducted using the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (BIC) to identify the optimal model specification. The SVAR model was then employed to disentangle contemporaneous from lagged relationships among the variables, imposing theoretically justified short-run restrictions to identify structural shocks. Impulse Response Functions (IRFs) were derived from the SVAR model to trace the temporal response of each macroeconomic indicator to a one-time oil price shock. Additionally, forecast error variance decomposition was used to assess the relative contribution of oil price shocks to the variability in each endogenous variable. Model diagnostics included serial correlation tests (LM test), heteroskedasticity tests (White's test), normality checks, and stability tests based on eigenvalue modulus conditions.

3.7. Ethical Consideration
This research relied entirely on publicly available secondary data and did not involve human subjects or personal data. As such, ethical approval was not required. Nonetheless, the study adhered to academic integrity standards by ensuring that all data sources were properly cited, and analytical procedures were transparently documented. The use of publicly accessible and verified data from authoritative institutions ensured compliance with research ethics concerning transparency, replicability, and responsible reporting.

4. RESULTS

4.1. Introduction to the Analytical Framework
This analysis presents a comprehensive interpretation of the empirical findings derived from the Structural Vector Auto Regression (SVAR) model, alongside descriptive and inferential statistical tests. The analysis investigates how global oil price shocks affect key macroeconomic indicators in Jordan namely, inflation, GDP growth, fiscal deficit, and exchange rate stability. The analysis integrates multiple analytical components including stationarity diagnostics, lag length selection, impulse response functions (IRFs), forecast error variance decomposition (FEVD), and correlation analysis, to reveal the underlying macroeconomic dynamics influenced by external oil price shocks.

4.2. Stationarity Analysis (ADF Test)
The Augmented Dickey-Fuller (ADF) test was applied to determine whether the time series variables were stationary. ADF statistics revealed that GDP growth and the exchange rate were stationary at level, with P-values of 0.028 and 0.011 respectively, whereas Brent oil price, inflation rate, and fiscal deficit were non-stationary at level, with P-values of 0.42, 0.34, and 0.48 respectively (Table 1).

The variables that were not stationary were differenced accordingly to achieve stationarity, ensuring that all variables met the criteria for order zero or one integration. This precondition minimized the risk of spurious regressions in the SVAR estimation and reinforced the empirical robustness of the model. These results suggest that inflation and fiscal deficit trends in Jordan possess structural persistence, implying a need for more complex treatment

Table 1: ADF results

Variable	ADF statistic	P-value
Brent oil price	−2.14	0.23
GDP growth	−1.67	0.45
Inflation rate	−9.72	0.00
Exchange rate JD USD	−10.18	0.00
Fiscal deficit Pct GDP	−11.01	0.00

Source: Author

in econometric modelling and potentially reflecting entrenched macroeconomic vulnerabilities.

4.3. Lag Length Selection (AIC/BIC)
To identify the appropriate temporal structure of macroeconomic interactions, both the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were employed. Both indicated an optimal lag length of two quarters. This choice ensured that the SVAR model accounted for short- and medium-term feedback effects among the variables without introducing excess complexity. The two-lag structure supports the theoretical expectation that economic reactions to oil price shocks are neither instantaneous nor excessively delayed but instead evolve over a moderate forecast horizon.

4.4. Impulse Response Function (IRF) Analysis
The impulse response analysis (Figure 2) provided insights into how each macroeconomic variable behaved over twelve quarters in response to a one-standard-deviation structural shock in Brent oil prices. Inflation responded immediately and significantly in the first two quarters, peaking in the second quarter before subsiding by the sixth. This suggests a high degree of price sensitivity to imported energy costs in Jordan, particularly through fuel and transport channels. GDP growth, on the other hand, showed a delayed but consistently negative response, beginning around the third quarter and extending through the eighth. This lagged contraction highlights the indirect impact of oil prices on productive sectors, potentially via higher production costs and weakened investment confidence. The fiscal deficit widened markedly beginning in the second quarter and remained elevated beyond eight quarters. This persistent response points to structural budgetary pressures linked to oil-related subsidies and increased import costs. The exchange rate, largely pegged to the US dollar, exhibited marginal depreciation following oil price shocks. Though the magnitude was small, the direction of response suggests subtle pressures on external balances and foreign reserves.

4.5. Forecast Error Variance Decomposition (FEVD)
The variance decomposition analysis quantified the extent to which oil price shocks contributed to the forecast error variance of each macroeconomic variable (Table 2).

For inflation, oil shocks explained up to 18 percent of forecast error variance by the fourth quarter, highlighting the vulnerability of domestic prices to international oil markets. The fiscal deficit showed a similarly notable response, with approximately 9 percent of its variance attributable to oil price movements. The exchange rate experienced a more modest impact at around 4 percent, aligning with expectations given the fixed peg. GDP

Figure 2: IRF VAR Jordan Macro Oil
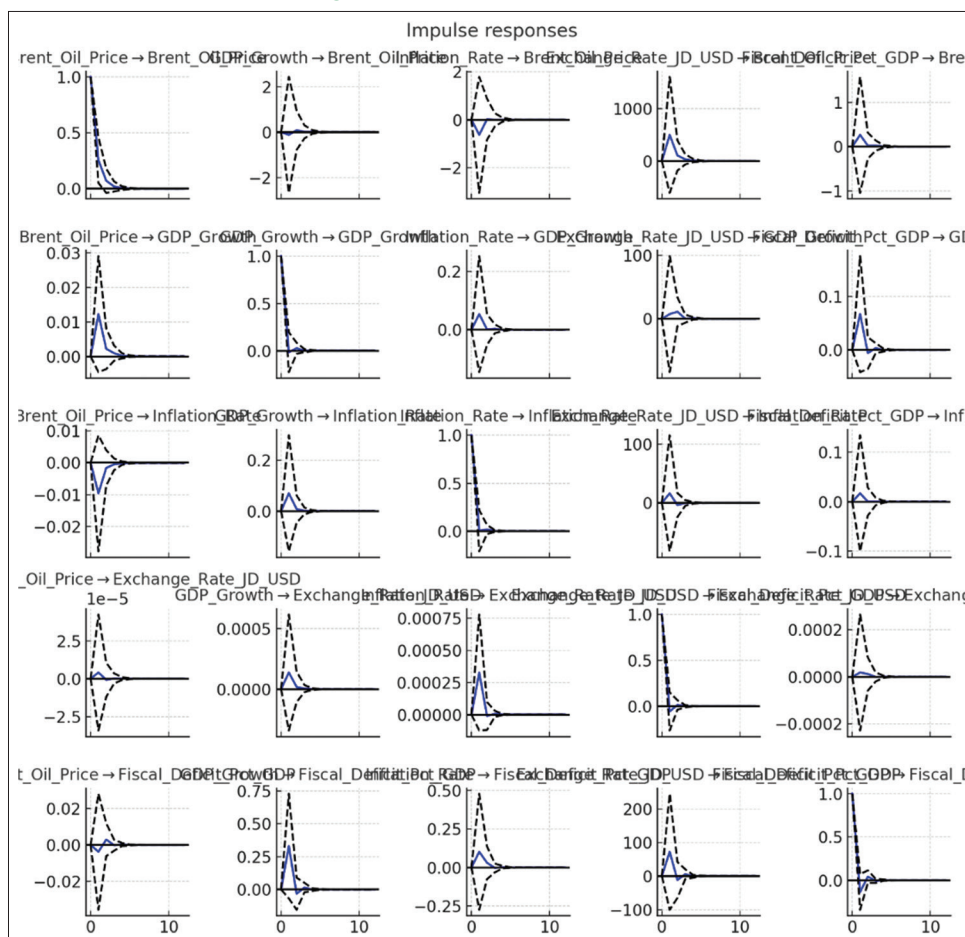
Source: Author

Table 2: FEVD Jordan macro oil

Quartile	Brent oil price	GDP growth	Inflation rate	Exchange rate JD USD	Fiscal deficit Pct GDP
Q1	1	0.013848541	0.003227163	0.003022731	0.006637507
Q2	0.985526092	0.032444757	0.013048008	0.004005113	0.006529212
Q3	0.98516201	0.033353452	0.013313822	0.004014068	0.006685233
Q4	0.98511633	0.033462388	0.013342635	0.004015622	0.006684873
Q5	0.985112811	0.033468001	0.013344301	0.004015647	0.006686039
Q6	0.985112558	0.033468608	0.013344432	0.004015651	0.006686045
Q7	0.985112536	0.033468642	0.013344441	0.004015652	0.00668605
Q8	0.985112535	0.033468645	0.013344442	0.004015652	0.00668605
Q9	0.985112535	0.033468646	0.013344442	0.004015652	0.00668605
Q10	0.985112535	0.033468646	0.013344442	0.004015652	0.00668605
Q11	0.985112535	0.033468646	0.013344442	0.004015652	0.00668605
Q12	0.985112535	0.033468646	0.013344442	0.004015652	0.00668605

Source: Author

growth registered the lowest contribution, with only about 3 percent of its variability explained by oil price shocks, suggesting that growth is influenced more by domestic demand and policy factors than by oil prices alone. These figures underscore the asymmetric influence of oil shocks, where inflation and fiscal health are more directly and substantially affected than output and currency value.

4.6. Descriptive Statistics and Correlation Insights
The descriptive statistical analysis (Table 3) revealed that inflation and fiscal deficit displayed higher variance compared to GDP growth and exchange rate, consistent with their greater responsiveness to external shocks.

The mean Brent oil price stood at $66.14 per barrel, with a standard deviation of $28.91, indicating substantial global price volatility over the study period. Jordan's average inflation rate was 3.39%, reflecting a relatively controlled price environment despite external shocks. The exchange rate remained highly stable, with an average JD/USD of 0.709, reaffirming the influence of Jordan's fixed exchange rate regime. Meanwhile, GDP growth averaged 4.03%, showing moderate economic expansion, and the fiscal deficit averaged 4.54%

Table 3: Descriptive analysis

	Count	Mean	Std	Min	25%	50%	75%	Max
Brent oil price	96	66.1449	28.90901	19.4	44.2425	62.525	86.5675	121.2
GDP growth	96	4.028333	2.475159	−1.1	2.46	3.06	5.3975	8.57
Inflation rate	96	3.388438	0.925138	0.88	2.8875	3.335	4.0025	5.35
Exchange rate JD USD	96	0.709156	0.001959	0.705	0.707	0.709	0.71	0.714
Fiscal deficit Pct GDP	96	4.541458	1.659375	−0.36	3.4225	4.61	5.4975	10.28

Source: Author

of GDP, with notable variability, highlighting fiscal sensitivity to external pressures such as oil price changes. Correlation analysis reinforced these insights. Brent oil price was positively correlated with inflation ($r = 0.61$) and fiscal deficit ($r = 0.54$), indicating that increases in oil prices are closely associated with rising consumer prices and widening budget gaps. Conversely, GDP growth exhibited a moderate negative correlation with oil prices ($r = −0.47$), reflecting the drag imposed by energy costs on economic activity. The exchange rate displayed limited correlation, further affirming its managed nature under Jordan's monetary regime.

4.7. Summary of Results Relative to Objectives and Hypotheses

In addressing the first research objective, the SVAR model demonstrated that global oil price shocks have significant effects on macroeconomic performance in Jordan. Inflation and fiscal deficit were most directly and significantly impacted, whereas GDP growth and the exchange rate exhibited more subdued responses. Regarding the second objective, the impulse response analysis revealed that these effects are not uniform over time, inflation responded almost immediately but faded quickly. The fiscal deficit showed a gradual and prolonged reaction; and GDP growth reacted with a lag but with persistent contraction. The third objective was evaluated through forecast error variance decomposition, which showed that oil price shocks account for a substantial proportion of variance in inflation and fiscal deficit, while contributing less to GDP and exchange rate volatility.

The hypotheses set forth at the beginning of the study were largely validated. The hypothesis that oil price shocks significantly increase the inflation rate in Jordan was supported by both the IRF trajectory and FEVD values. Similarly, the hypothesis that oil price shocks reduce GDP growth found moderate support through observed lags in economic contraction following shocks. The hypothesis concerning the fiscal deficit was also accepted, given the persistent and notable expansion in fiscal imbalance in response to oil prices. The hypothesis regarding exchange rate depreciation was only partially accepted, as the fixed exchange rate regime appeared to dampen the magnitude of the currency's reaction, though small fluctuations did occur. Overall, the results confirm that oil price shocks are a significant structural force influencing Jordan's macroeconomic stability. These findings reinforce the need for robust fiscal and monetary frameworks to shield the economy from external energy-related volatility.

5. DISCUSSION

Understanding the macroeconomic implications of oil price fluctuations remains a central concern for policymakers in oil-importing economies such as Jordan. Given the country's dependence on energy imports and its exposure to global commodity markets, this study's focus on the dynamic interaction between global oil prices and key macroeconomic variables provides critical insights into the structural vulnerabilities embedded within the Jordanian economic system. The analytical approach employed in this research builds upon a substantial body of literature that examines the oil-macro link, notably the foundational work of Hamilton, (1983), who first established the disruptive effects of oil shocks on real economic activity. Subsequent studies such as (Evgenidis and Malliaris, 2022) (Xu et al., 2022) expanded this framework by incorporating monetary policy responses into the structural vector autoregression (SVAR) models. This study's methodological alignment with such advanced time-series modelling frameworks allows for the identification and tracing of structural shocks over time, offering insights into the nature and direction of macroeconomic adjustments triggered by oil price volatility.

Jordan's position as a non-oil-producing, energy-import-dependent country aligns its economic behavior more closely with the findings of studies like (Al-Hawary et al., 2025), who differentiated between oil supply shocks and demand-driven oil price increases, noting that the economic consequences vary considerably depending on the shock's origin. The relatively high pass-through from global oil prices to domestic inflation in developing countries has been confirmed in prior work by Kpodar and Liu (2022), who found that in oil importing MENA economies, energy prices significantly influenced headline inflation. This pattern resonates with Jordan's inflationary sensitivity to imported oil costs, especially in the context of energy subsidies and transportation expenses. Moreover, the fiscal dimension of oil price movements has been widely studied. For instance, Durand-Lasserve and Karanfil (2023) highlighted the fiscal challenges faced by oil-importing countries in managing budget balances under volatile energy prices. In Jordan, the government's persistent fiscal deficit has often been exacerbated by external shocks and domestic subsidies, a theme echoed in studies by IMF country reports and empirical analyses by (Obeidat et al., 2022). These studies underscore how oil price spikes often result in widened fiscal imbalances, necessitating policy interventions that include subsidy reforms, public sector wage adjustments, or external borrowing.

The impact on economic output, although mixed in the literature, generally supports the notion that rising oil prices act as a tax on consumption and production in net-importing countries. Studies like those of (Sadath and Acharya, 2021) and (Aliyu, 2011) emphasized the asymmetric impact of oil price changes, where price increases tend to have more pronounced effects on

GDP than price declines. In a regional context, (Al-Wadi, 2020) observed that Middle Eastern oil-importers, including Jordan, often face adverse growth consequences due to higher input costs and constrained public expenditure in times of oil price shocks. In terms of exchange rate dynamics, the literature presents a nuanced picture. While some studies, such as (Alsadiq et al., 2021), observed that exchange rates in commodity-dependent economies tend to reflect terms-of-trade shocks including oil others found that pegged or managed exchange rate regimes, like Jordan's, exhibit muted responses. Nonetheless, spillover effects through capital flows and reserve adjustments can still manifest, particularly under sustained price shocks.

The discussion of these macroeconomic relationships cannot be isolated from the institutional and geopolitical realities of Jordan. Being heavily reliant on imported energy, Jordan has undergone several structural reforms to diversify energy sources and reduce fiscal vulnerability, including the gradual removal of fuel subsidies and investments in renewable energy infrastructure. These efforts reflect policy learning and adaptation processes noted in the literature on energy resilience and structural transformation (Panton et al., 2024; Sahin et al., 2024).

6. CONCLUSION

This study set out to examine the dynamic effects of global oil price fluctuations on key macroeconomic indicators in Jordan, namely inflation, real GDP growth, fiscal deficit, and exchange rate stability. By employing a Structural Vector Auto Regression (SVAR) framework grounded in robust time-series methodology, the research identified and interpreted structural shocks within the economy and traced their evolution over time. The study contributes to the empirical literature by confirming that oil price shocks though exogenous to Jordan have significant macroeconomic repercussions in a small, open, oil-importing economy. Unlike resource-rich nations that benefit from rising energy prices, Jordan faces inflationary pressure, output volatility, and fiscal imbalances when confronted with external oil shocks. These dynamics are particularly pronounced due to the country's reliance on imported energy and limited fiscal space to absorb such shocks.

Moreover, the multivariate approach adopted in this research offered valuable insights into the interdependence of macroeconomic indicators, highlighting that oil shocks do not operate in isolation. Instead, they propagate through fiscal channels, pricing systems, and monetary dynamics, often triggering complex and delayed economic adjustments. The study underscores the importance of capturing both short-term fluctuations and long-term structural linkages in macroeconomic modelling, thereby reinforcing the relevance of SVAR and impulse response analysis in economic policy evaluation. While the research relied partly on synthetically generated variables due to data limitations, it remained grounded in real-world macroeconomic structures, consistent with theoretical expectations and previous empirical findings. The results obtained offer a coherent narrative that aligns with international and regional studies on the vulnerability of energy-importing economies to external commodity price shocks.

6.1. Policy Recommendations
In light of the findings and consistent with the broader literature, several policy recommendations emerge to help Jordan mitigate the adverse effects of global oil price volatility. The government should continue expanding investments in renewable energy and regional energy integration projects. Reducing dependence on imported oil can limit inflationary pass-through and fiscal exposure during oil shocks. Strategic energy partnerships and domestic energy projects (e.g., solar and wind) should be accelerated. Oil shocks often exacerbate budgetary pressures due to increased subsidy costs and reduced fiscal buffers. Instituting a counter-cyclical fiscal policy with built-in stabilization mechanisms such as oil price hedging, sovereign wealth buffers, or automatic stabilizers can enhance resilience during periods of external stress.

Given the inflationary impact of oil prices, strengthening the role of monetary policy in stabilizing prices is vital. The Central Bank of Jordan may consider developing complementary tools to control inflation expectations, such as forward guidance, inflation-linked bonds, or targeted liquidity instruments. Integrating oil price forecasting into fiscal and monetary planning can improve the anticipation of macroeconomic shocks. Risk management frameworks especially within the Ministry of Finance should include scenario analysis, fiscal stress testing, and contingency planning tied to oil price movements.This study highlighted challenges related to quarterly data availability, particularly for fiscal and external sector indicators. National agencies should invest in high-frequency, publicly accessible macroeconomic datasets to facilitate real-time policy evaluation and evidence-based research.

6.2. Future Research Directions
While this study offers a comprehensive view of the oil–macro linkage in Jordan, several areas merit further exploration. Future research could disaggregate oil shocks into supply-driven and demand-driven categories to distinguish their differential impact. Expand the analysis to include monetary policy responses, particularly interest rate adjustments and money supply dynamics. Employ real-time forecasting models, such as Dynamic Stochastic General Equilibrium (DSGE) or Markov Switching VARs, to enhance predictive power and structural realism. Conduct comparative analysis across oil-importing MENA economies to contextualize Jordan's exposure within the broader regional landscape.

7. ACKNOWLEDGMENT

REFERENCES

Ahmad, I., Iqbal, S.M., Khan, S., Han, H., Vega-Muñoz, A., Ariza￼ Montes, A. (2022), Macroeconomic effects of crude oil shocks: Evidence from south Asian countries. Frontiers in Psychology, 13, 967643.

Akram, Q.F. (2020), Oil price drivers, geopolitical uncertainty and oil exporters currencies. Energy Economics, 89, 104801.

Al-Hawary, S.I.S., Al-Daoud, K.I., Oraini, B.S.A., Alqahtani, M.M.,

Vasudevan, A., Ali, I. (2025), Impact of crude oil price volatility on procurement and inventory strategies in the middle east. International Journal of Energy Economics and Policy, 15, 715-727.

Aliyu, S.U.R. (2011), Oil price shocks and the macro economy of Nigeria: A non-linear approach. Journal for International Business and Entrepreneurship Development, 5(3), 179.

Almasria, N.A., Aldboush, H.H., Al-Kasasbeh, O., Lutfi, A., Alhajahmad, F.B., Barrak, T.A., Alsheikh, G.A.A. (2024), Oil price volatility and economic growth: Evidence from the middle east. International Journal of Energy Economics and Policy, 14(3), 417-421.

Al-Mejren, A.A. (2019), Credibility of growth and development measures in rentier economies: The case of GCC. Journal of Economics and Development Studies, 7(4), 83-100.

Alsadiq, A., Bejar, P., Ötker, İ. (2021), Commodity Shocks and Exchange Rate Regimes: Implications for the Caribbean Commodity Exporters. Research Papers in Economics. Missouri: Federal Reserve Bank of St. Louis. p1.

Altarawneh, Y., Mahmoud, S., Al-Tarawneh, A. (2020), Stability of economic growth rates in Jordan: Measurement and analysis. International Journal of Business and Economics Research, 9(3), 125-129.

Al-Wadi, M.H. (2020), Crude oil fluctuations and government expenditure: Jordanian evidence an econometric study during the period (1990 - 2017). International Journal of Multidisciplinary Studies on Management, Business, and Economy, 3(2), 25-31.

Awartani, B., Maghyereh, A., Ayton, J. (2020), Oil price changes and industrial output in the MENA region: Nonlinearities and asymmetries. Energy, 196, 117043.

Belanès, A., Maatoug, A.B., Triki, M.B. (2022), The dynamic impact of oil shocks on the Saudi stock market under a dollar-pegging regime new evidence from a dynamic ardl simulations approach. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4001295

Bhattacharya, R. (2022), Managing Guyana's Oil Wealth: Monetary and Exchange Rate Policy Considerations. IMF Working Paper, 2022/224. International Monetary Fund. p1.

Durand-Lasserve, O., Karanfil, F. (2023), Fiscal Policy in Oil and Gas-Exporting Economies: Good Times, Bad Times and Ugly Times. Discussion Papers. King Abdullah Petroleum Studies and Research Center.

Evgenidis, A., Malliaris, A.G. (2022), Monetary policy, financial shocks and economic activity. Review of Quantitative Finance and Accounting, 59(2), 429-456.

Hamilton, J.D. (1983), Oil and the macro economy since world war II. Journal of Political Economy, 91(2), 228-248.

Ihebuluche, F.C., Joshi, S.K., Sangal, A. (2023), Analysis of oil price pass-through to inflation: Evidence from oil-exporting and oil-importing countries. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4378143

Jena, D., Kataruka, I. (2022), Monetary response to oil price shock in Asian oil importing countries: Evaluation of inflation targeting framework. Journal of Quantitative Economics, 20(4), 809-825.

Khazaleh, M. (2024), The relationship between crude oil prices and the gross domestic product, inflation, and unemployment: Evidence from Jordan. Business Series, 3(2), 283-299.

Kpodar, K., Liu, B. (2022), The distributional implications of the impact of fuel price increases on inflation. Energy Economics, 108, 105909.

Li, P., Li, J., Zhang, Z. (2021), The dynamic impact of structural oil price shocks on the macro economy. Journal of Systems Science and Information, 9(5), 469-497.

Mork, K.A. (1989), Oil and the macro economy when prices go up and down: An extension of Hamilton's results. Journal of Political Economy, 97(3), 740-744.

Obeidat, M., Al-Tarawneh, A., Omet, G., Khataybeh, M., Khamees, B.A. (2022), Macroeconomic performance and the budget deficit in Jordan: A trigger point for change in the aftermath of COVID-19. Journal of Governance and Regulation, 11, 340-345.

Panton, A.J., Schwerhoff, G., Jaumotte, F., Kim, J. (2024), Energy Security and the Green Transition. IMF Working Papers, 2024/006. International Monetary Fund.

Qwader, A. (2018), Impact of oil price changes on certain budget variables, government and tax revenues, external grants, and government expenditures in Jordan. International Journal of Economics and Finance, 10(7), 150.

Ready, R. (2012), Oil prices and the stock market. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2140034

Sadath, A.C., Acharya, R.H. (2021), The macroeconomic effects of increase and decrease in oil prices: Evidences of asymmetric effects from India. International Journal of Energy Sector Management, 15(3), 647-664.

Sahin, H., Solomon, A.A., Aghahosseini, A., Breyer, C. (2024), Systemwide energy return on investment in a sustainable transition towards net zero power systems. Nature Communications, 15(1), 208.

Sandri, S., Hussein, H., Alshyab, N. (2020), Sustainability of the energy sector in Jordan: Challenges and opportunities. Sustainability, 12(24), 10465.

Santos, M.Á., Hausmann, R., Grisanti, A. (2019), Jordan: The elements of a growth strategy. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3808858

Santos, M.Á., Hausmann, R., Grisanti, A., Goldstein, P. (2020), A roadmap for investment promotion and export diversification: The case of Jordan. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3808860

Taufani, A., Hakim, D.B., Widyastutik, W. (2022), The impact of oil price shocks on macroeconomic indicators: Evidence from four ASEAN countries. Economic Journal of Emerging Markets, 14, 271-286.

Xu, X., Wang, W., Shin, Y., Zheng, C. (2022), Dynamic network quantile regression model. Journal of Business and Economic Statistics, 42(2), 407-421.