RESEARCH PAPER

Oil Price Shocks, Economic Growth, and Crude Oil Production Dynamics in the United States: An Svar Approach

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ABSTRACT
This study investigates the dynamic relationship between oil price shocks, economic growth, and crude oil production in the U.S. using a Structural Vector Autoregression (SVAR) methodology. By simultaneously modeling these variables, the analysis captures both short- and long-term interactions and the causal effects among them. The findings show that West Texas Intermediate (WTI) price shocks significantly impact economic growth, both directly and indirectly through crude oil production dynamics, with adverse price increases hindering growth prospects, especially in the short-to-medium term. Moreover, fluctuations in crude oil production respond endogenously to changes in both economic activity and prices, underscoring the complex feedback mechanisms within the energy-economy nexus. The SVAR framework facilitates the differentiation of supply-side and demand-side shocks, offering nuanced insights into how external disturbances in the oil market are transmitted through the U.S. economy. Policy implications highlight the necessity for adaptive strategies that account for these interdependencies to bolster economic resilience in volatile oil markets. These results contribute to the broader energy economics literature by providing empirical evidence on the interplay between oil market dynamics and macroeconomic performance in a major oil-producing nation.
Keywords: *West Texas Intermediate, BRENT Crude Oil, Economic Growth, Crude Oil Production, Structural Vector Autoregression, Impulse Response Function*
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1. INTRODUCTION

Crude oil is a vital strategic commodity that serves as a key energy source for transportation, manufacturing, and industrial processes. It significantly impacts economic activities and global trade[1]. Fluctuations in crude oil prices have consistently drawn the attention of policymakers, economists, and market participants over recent decades owing to their potential impact on macroeconomic performance and energy market dynamics[2, 3]. Oil price unpredictability can also influence production costs, investment decisions, and economic growth. This results in complex interdependencies between the energy markets and broader economic indicators[4, 5]. As global economies are heavily dependent on energy inputs, understanding the transmission process by which oil price shocks affect economic variables has become a prominent research focus in energy economics[6, 7]. Fluctuations in oil prices significantly affect the economy through multiple transmission channels. Therefore, the production sector is an important transmission channel. Oil is a critical input in manufacturing, transportation, and logistics processes. Fluctuations in oil prices may shift the cost of production and influence industrial output, thereby affecting economic growth[8]. Another essential process is the response of the supply to the production of crude oil. Rising crude oil prices can incentivize producers to increase production and exploration activities. Conversely, falling prices discourage investment and reduce output. Such changes affect the energy supply, subsequently affecting economic outcomes[9]. Moreover, changes in oil prices may influence investment expectations and decisions concerning resource allocation in the energy sector, thereby influencing long-run economic growth[10].

The global crude oil market operates under benchmark prices that serve as a reference for international energy prices[11]. The most commonly used benchmarks are WTI and BRENT crude (BRENT). The benchmark for U.S. crude oil prices is WTI, whereas BRENT reflects international market conditions[12]. These benchmarks refer to the same commodity; however, in practice, they may diverge because of differences in local supply conditions, transport constraints, geopolitical, and global demands[13, 14]. As a result, the relationship between WTI and BRENT provides insights into the global oil market structure[15]. Analyzing these benchmarks macroeconomic variable

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interactions can enhance our understanding of the impact of shocks in the oil market on economic conditions. Numerous studies have investigated the macroeconomic effects of oil price fluctuations[3, 15-16]. Much of the extant research has focused on the correlation between oil prices and factors, such as inflation, exchange rates, and financial markets[17]. Additionally, some studies have examined the impact of oil price changes on economic growth or industrial output across various nations[18, 19]. While previous studies have examined aspects of oil price fluctuations and their macroeconomic effects, a critical gap remains in simultaneously analyzing the dynamic interdependencies and feedback mechanisms among both WTI and BRENT crude oil prices, U.S. real GDP per capita, and domestic crude oil production within a unified SVAR framework[20-22]. This study uniquely addresses this by explicitly modeling the bidirectional causality and transmission channels, particularly how global oil market dynamics (via WTI-BRENT interactions) influence U.S. economic growth and production decisions, and how U.S. economic activity, in turn, affects these oil benchmarks, providing a more granular understanding than previously achieved. Considering U.S. is one of the largest producers and consumers of crude oil in the energy market[23], the analysis of these interactions can be useful in understanding the impact of changes in the energy market on the country's economic performance. This study analyzes the interaction between key determinants of macroeconomic variables, that is, fluctuating oil prices, economic growth, and crude oil production in the U.S. It dwells on how deviations in WTI oil prices impact BRENT prices, real GDP per capita, and crude oil production. To accomplish this objective, the study employed SVAR to determine the structural relationships between the variables and to capture the dynamic responses of the system to oil price shocks. In addition to employing the SVAR framework, this study utilized impulse response functions (IRF) and forecast error variance decomposition (FEVD) to evaluate the magnitude and duration of economic variables' responses to oil price shocks. By examining the interaction between these variables, the study contributes to the existing literature by offering a more detailed understanding of the transmission mechanisms linking energy markets and macroeconomic activity.

2. LITERATURE REVIEW

The theoretical foundation of this study is based on established theories explaining the interaction between oil price shocks and macroeconomic outcomes. Previous studies have highlighted the significant impact of variations in oil prices on economic activities, particularly during major global crises. One pivotal work in this area is Hamilton[24], who found that the sudden rise in oil prices was strongly linked to economic recessions in the US. His research formed the foundation for subsequent studies elucidating how energy supply disturbances could influence production costs, industrial output, and overall economic growth. Based on this foundational work, several studies have investigated the impact of oil price shocks on the broader economy. Hooker[25] conducted a study to understand whether the increase in oil prices continued to exert inflationary and macroeconomic pressures in the U.S. He noted that the association between oil prices and economic performance has evolved over the years. The findings implied that the effect of oil prices on economic activities has been alleviated by structural transformation in the economy, along with technological advancements and improvements in energy efficiency. Blanchard and Gali[26] argued that the macroeconomic impact of oil shocks in recent decades has not been as extreme as in earlier periods, such as the 1970s. Their findings attributed this shift to improved monetary policy frameworks, energy efficiency in production, and a more flexible labor market. Subsequent studies have delved into the macroeconomic impacts of oil price instabilities across various economic contexts. Lescaroux and Mignon[27] pointed out that fluctuations in oil prices impact economic performance through multiple channels, such as the cost of production, energy consumption, and investment decisions. Their results revealed the intricate interplay between energy markets and macroeconomic factors, highlighting the critical role of oil price dynamics in determining economic outcomes.

Recent empirical studies have expanded the understanding of oil price volatility and its impacts on macroeconomic variables and energy markets. Herrera et al.[20] explored the effect of oil-price shocks on U.S. economic activity, revealing that the effect of oil-price changes on economic performance is significant, altering production costs and energy demand. Similarly, Ahmed et al.[28] examined the interplay between oil prices and economic activity during global crises and discovered that the volatility of oil prices can influence investments and macroeconomic stability. Beyond macroeconomic effects, various studies have examined the relationship between key oil-price benchmarks. WTI and BRENT are the two widely acknowledged reference points when considering oil markets worldwide. Nelson[29] pointed out that the difference between WTI and BRENT prices reflects structural variations in regional supply conditions, transportation limitations, and global demand trends. Iglesias and Rivera-Alonso[14] studied the volatility patterns of BRENT and WTI prices during major economic disturbances and discovered that there is a strong interconnected relationship between these benchmarks, indicating that events that cause a shock in one benchmark may also cause a shock in the other. An essential aspect of oil-market dynamics is the interaction between oil prices and crude oil production. Oil-price volatility usually affects production decisions, with higher prices encouraging exploration and extraction, and lower prices may deter investment in production processes. According to Charfeddine and Barkat[30], fluctuations in energy prices impact resource distribution and production patterns in energy-producing economies. Mohammad et al.[31] found that crude oil price volatility plays a major role in determining energy market procurement and production strategies. Mamman et al.[32] also emphasized the fact that oil production decisions and supply conditions can be influenced by geopolitical risks and global uncertainty in the energy markets.

Numerous studies have examined the impact of oil price fluctuations on the economy. Most of these studies focus on factors such as inflation, exchange rates, and financial markets. While existing studies have explored various aspects of oil price volatility impacts[25, 26] and the dynamics between WTI and BRENT crude oil prices[14, 29], a comprehensive analysis simultaneously investigating the interactions among WTI, BRENT, GDP, and crude oil production within the U.S. context remains underexplored. This study addresses this critical gap by offering a novel, integrated perspective on these interconnected dynamics and providing a more comprehensive understanding of how WTI price fluctuations impact U.S. energy markets and the broader economy. As the U.S. is both a major oil producer and consumer of crude oil[33], our study's integrated approach aims to understand these specific interactions and provide novel insights into the complex mechanisms through which WTI price volatility influences both domestic energy markets and the wider economy. Based on the above theoretical and empirical evidence, fluctuations in oil prices are expected to affect economic activity and production decisions in the energy sector. Moreover, these fluctuations are likely to influence the interactions between major oil price benchmarks. To explore these relationships, we propose the following hypothesis:

H_1: WTI crude oil prices exhibit significant dynamic interdependencies with GDP, BRENT, and crude oil production, including both direct and indirect transmission channels and feedback effects.

3. METHODOLOGY

3.1 Data Description

We considered U.S. monthly time-series data for the period 2012–2022 obtained from the Federal Reserve Economic Data (FRED) database[34]. The selected timeframe reflects major shifts in the global energy markets (e.g., shale boom, pandemic), which offers unique dynamics that should be thoroughly analyzed. The variables used in the analysis are as follows:

- WTI crude oil spot price (WTI)
- BRENT crude oil price (BRENT)
- Real Gross Domestic Product per capita (GDP)
- Crude oil production (CR)

All the variables were stabilized before estimation by converting them into logarithmic form (ln). This step was essential to reduce heteroscedasticity and enhance the reliability of the analysis. Hence, after the logarithmic transformation, the variables were converted as lnWTI, lnBRENT, lnGDP, and lnCR.

3.2 Model Specification with SVAR Framework

In order to understand the dynamic interplay between the variables, this study adopts the SVAR framework, widely used in macroeconomic and energy economics studies. Our contribution is distinctive as we have included WTI, BRENT, crude oil production, and GDP, allowing for a more detailed examination of their interconnectedness than has not been addressed in previous studies. Hence, the SVAR equation for the considered variables is specified as:

$$y_t = (\ln WTI_t, \ln BRENT_t, \ln GDP_t, \ln CR_t) \quad (1)$$

where A is a "matrix capturing simultaneous coefficient", y_t is a "vector of endogenous variables", and ε_t represents "the vector of structural shocks". Here, all the variables are considered as endogenous. This allows dynamic feedback effects between the variables.

$$C(1) = \begin{pmatrix} \text{Variables} \\ \ln WTI_t \\ \ln BRENT_t \\ \ln GDP_t \\ \ln CR_t \end{pmatrix} \begin{pmatrix} \varepsilon^{\ln WTIt} & \varepsilon^{\ln BRENTt} & \varepsilon^{\ln GDPt} & \varepsilon^{\ln CRt} \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} \text{Variables} \\ \ln WTIt \\ \ln BRENTt \\ \ln GDPt \\ \ln CRt \end{pmatrix}$$

$$\begin{pmatrix} \varepsilon^{\ln WTI_t} & \varepsilon^{\ln BRENTt} & \varepsilon^{\ln GDPt} & \varepsilon^{\ln CRt} \\ b_{11} & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 \\ 0 & 0 & b_{33} & 0 \\ 0 & 0 & 0 & b_{44} \end{pmatrix} = \begin{pmatrix} \varepsilon^{\ln WTI_t} & \varepsilon^{\ln BRENTt} & \varepsilon^{\ln GDPt} & \varepsilon^{\ln CRt} \\ 1 & 0 & 0 & 0 \\ NA & 1 & 0 & 0 \\ NA & NA & 1 & 0 \\ NA & NA & NA & 1 \end{pmatrix}$$

Structural shocks were identified using a Cholesky triangular decomposition, which imposes recursive long-run restrictions. The ordering of variables in the SVAR was [lnWTI, lnBRENT, lnGDP, lnCR]. This specific ordering is theoretically justified by assuming that global oil price shocks (lnWTI, lnBRENT) affect domestic economic activity (lnGDP) and production (lnCR) contemporaneously, but that domestic GDP and production do not instantaneously affect global oil prices within the same month. Specifically, lnWTI is assumed to be the most exogenous variable, followed by lnBRENT, reflecting their global benchmark status, then lnGDP, and finally lnCR, as crude oil production is likely to respond to price signals and economic activity with some lag or at least be the most endogenous contemporaneously[35].

3.3 Econometric Procedure

In the initial stage, time-series variables were analyzed to check for their stationarity characteristics through the Augmented Dickey-Fuller (ADF) unit root test to determine the stationary form of the variables[36]. In the second stage, standard information measures, the Akaike information criterion (AIC), the Hannan-Quinn (HQ), the Schwarz Criterion (SC), and the Final Prediction Error (FPE) criterion criterion were used to determine the correct lag length to capture the dynamic structure and ensure reliable model estimation[37]. In the third stage, the SVAR model was calculated using the Cholesky decomposition identification technique. This approach allows the extraction of structural shocks and helps assess the simultaneous interactions between endogenous variables. In the final stage, IRF method was used to trace the time path of each variable following a one-time shock in another variable, whereas FEVD method was used to investigate the proportion of variance in the forecast error of each variable attributable to shocks in other variables within the model. These methods provide deeper insights into the dynamics of transmission between oil prices, GDP, and crude oil production in the long run.

4. RESULTS AND DISCUSSION

4.1 Unit Root Analysis

An ADF test was conducted on logarithmic series of lnWTI, lnBRENT, lnGDP and lnCR to examine their stationarity properties and to avoid false regression results (Table 1).

Table 1: Results of ADF Test

Variable	ADF	Prob.
D(lnWTI (-1))	-8.451	0
D(lnBRENT (-1))	-8.4817	0
D(lnGDP (-1))	-11.118	0
D(lnCR (-1),2)	-6.5043	0

Source: Author

The results indicated that lnWTI, lnBRENT, and lnGDP are integrated of order one (I(1)), while lnCR is integrated of order two (I(2)). Consequently, the SVAR model was estimated using the first differences of lnWTI, lnBRENT, and lnGDP, and the second difference of lnCR. These findings are consistent with the macroeconomic data, where some of the series typically exhibit stationarity at 1st difference while others after further differencing. The p-values (<0.05) further confirm the statistical significance of the analysis highlighting the use of SVAR framework for further analysis.

4.2 SVAR Output

Table 2: Optimal Lag Length Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	576.5657	NA	1.66e-12	-10.09851	-9.953691	-10.03974
1	1400.508	1545.803	1.46e-18	-24.04439	-23.03067	-23.63303
2	1492.442	162.7148	5.44e-19	-25.03437	-23.15175*	-24.27042*
3	1548.149	92.68031	3.89e-19	-25.38316	-22.63164	-24.26662
4	1586.378	59.54352	3.83e-19	-25.42262	-21.8022	-23.95349
5	1630.570	64.13646	3.46e-19	-25.56761	-21.07828	-23.74589
6	1660.367	40.08140	4.11e-19	-25.45783	-20.0996	-23.28351
7	1717.535	70.82704*	3.10e-19*	-25.83247	-19.60534	-23.30557
8	1757.373	45.12602	3.29e-19	-25.90040*	-18.80436	-23.0209

To determine the optimal lag length of the VAR model, standard information criteria such as AIC, HQ, SC, and FPE criterion were used (Table 2). The results from the analysis exhibit that AIC recommends a lag length of 8, and FPE and LR recommend a lag length of 7, whereas SC and HQ recommend a lag length of 2. Despite AIC and FPE suggesting longer lag lengths of 7 and 8 respectively, a lag length of 2 was ultimately selected for the SVAR estimation, following the recommendations of the SC and HQ criteria. This decision prioritizes model parsimony and avoids potential overfitting given the monthly data frequency, while still capturing essential short-term dynamics. A lag order of 2 ensures a balance between model efficiency and capturing the dynamic interactions between the variables.

Table 4: Long-run Pattern Matrix

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.129591	0.008400	15.42721	0.0000
C(2)	0.000540	0.003039	0.177726	0.8589
C(3)	0.004232	0.000825	5.129290	0.0000
C(4)	0.125913	0.008557	14.71412	0.0000
C(5)	0.032460	0.002104	15.42725	0.0000
C(6)	0.003379	0.000720	4.695278	0.0000
C(7)	-0.00169	0.002515	-0.67009	0.5028
C(8)	0.006771	0.000439	15.42725	0.0000
C(9)	0.000664	0.002473	0.268384	0.7884
C(10)	0.026975	0.001749	15.42725	0.0000

Table 4 presents selected coefficients from the estimated structural form of the SVAR model. Specifically, C(1) and C(4) represent the contemporaneous self-response of lnWTI and lnBRENT, respectively, to their own structural shocks, indicating strong internal persistence in global oil pricing dynamics. The significant positive values (C(1)=0.1296, C(4)=0.1259, both p=0.0000) confirm that both benchmark crude oil prices exhibit substantial immediate responses. Coefficients C(3)=0.0042 and C(6)=0.0034, which are positive and statistically significant (p=0.0000), indicate the contemporaneous effect of a one-standard-deviation structural shock in lnWTI and lnBRENT, respectively, on lnGDP. This suggests an immediate positive impact from oil market shocks on economic activity. This observation underscores the demand-side mechanism of oil price fluctuations, where the long-run trends in the movement of oil prices influence energy prices, investment and aggregate output. In the case of lnCR, C(8) = 0.0068 is positive and significant (p = 0.0000) and means that structural shocks which are consistent with the Cholesky order to include all the previous variables, have a positive impact on lnCR in the long term. Thus, the results of the SVAR model indicate the significance of structural relations between oil price benchmarks and macroeconomic variables. The high own-shock persistence of both lnWTI and lnBRENT speaks to the entrenched nature of global oil markets, and strong positive transmission of oil price shocks to lnGDP and lnCR demonstrates more macroeconomic implications of the dynamics of oil market shocks[29].

4.3 IRF Analysis

The study used IRF to examine the dynamic impact of lnWTI on lnBRENT, lnGDP and lnCR over a ten-period timeframe. The reaction of lnBRENT to lnWTI shocks indicates that initially there is a negative impact until the third period, after that we can see a gradual recovery period.

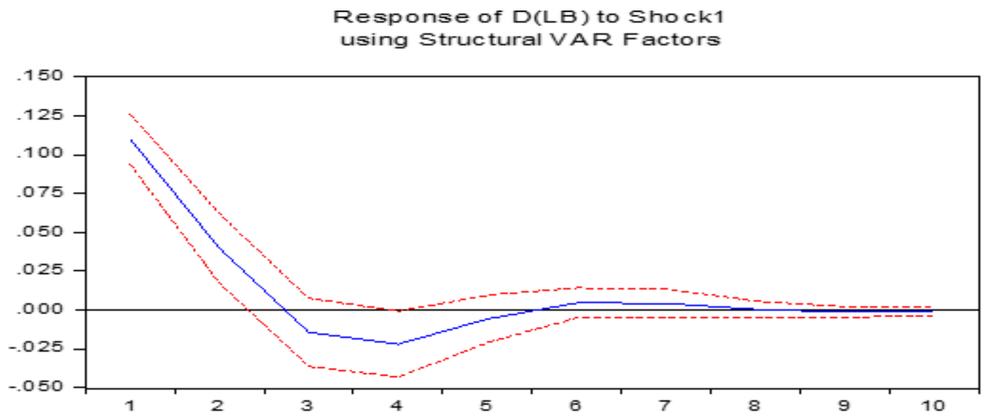

Figure 1: Response of lnBRENT to a unit shock from lnWTI

The response turns positive around the fifth to sixth period before stabilizing towards equilibrium in the long term. This trend implies that there will be short-term adjustments in the market followed by convergence in the long run, reflecting the integrated characteristics of the global oil markets (Figure 1).

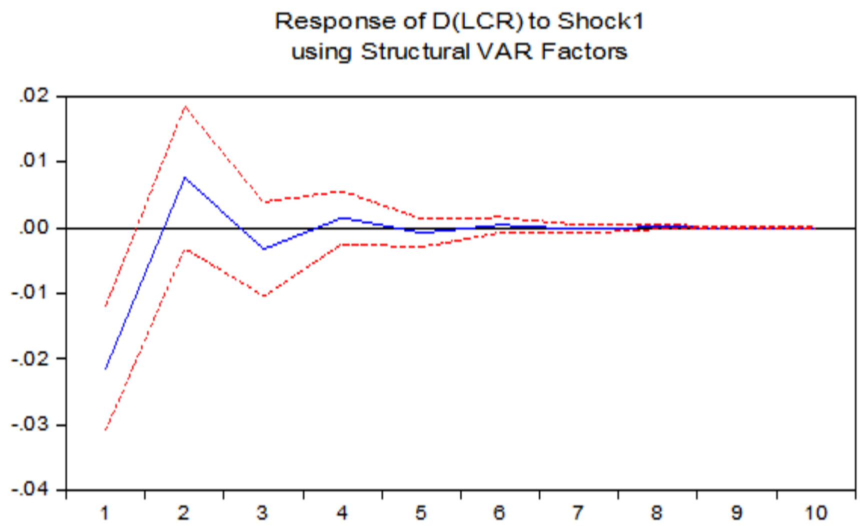

Figure 2: Response of lnCR to a unit shock from lnWTI

In the case of lnCR, the response to lnWTI shocks is negative in the first period followed by a sharp positive adjustment in the second period. This effect is however temporary, as production declines again exhibiting fluctuating behaviour before returning to equilibrium. This shows that production decisions respond quickly to price signals but are prone to short-term fluctuations and adjustment constraints (Figure 2).

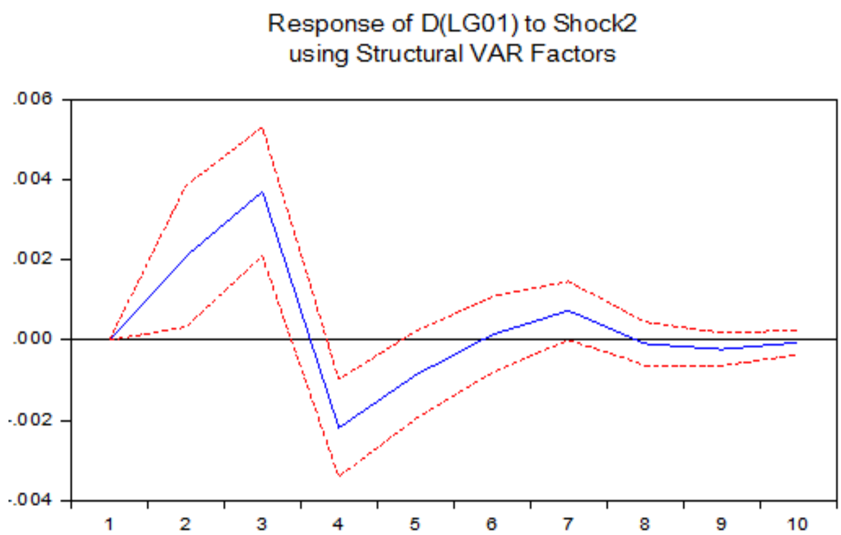

Figure 3: Response of lnGDP to a unit shock from lnWTI

The response of lnGDP to oil price shocks exhibits a mixed and unstable pattern. The initial positive response of lnGDP to an oil price shock could reflect increased revenues for domestic oil producers and related sectors in the very short term, potentially boosting economic activity. However, this effect is sharply reversed by the fourth period, transitioning to a negative impact. This reversal likely indicates the dominance of adverse supply-side effects, where higher oil prices translate into increased production costs for energy-intensive industries, reduced household disposable income, and dampened investment across the broader economy, consistent with the cost-push channel. In subsequent periods, lnGDP gradually comes to a point where it becomes stable, converging towards equilibrium in the long run (Figure 3). The IRF results exhibits that WTI crude oil prices have a significant effect on GDP, BRENT crude oil prices, and crude oil production, hence H1 is supported. All the variables converge towards equilibrium which indicates that the system is stable in the long run, with temporary deviations derived by oil price shocks.

4.4 FEVD

This study used FEVD analysis to understand the proportion of structural shocks explaining the variability of each variable over time. It exhibits the evolving significance of different variables both in the short and long terms. The results are graphically presented in Figure 4.

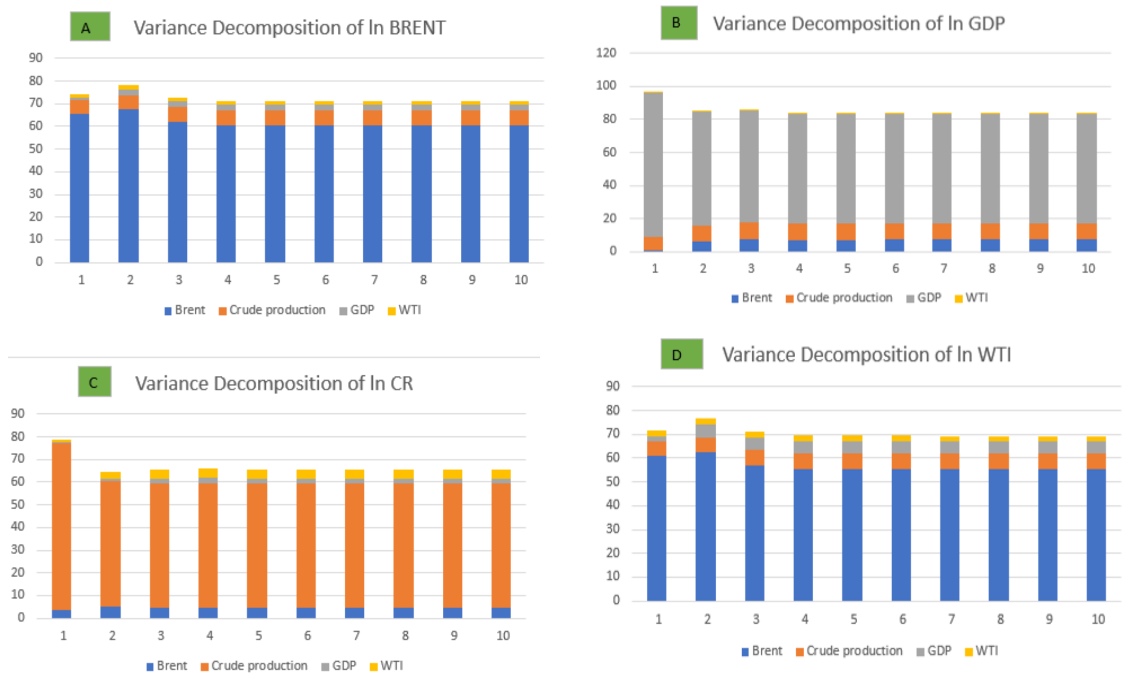

Figure 4: FEVD of lnBRENT, lnCR, lnGDP, and lnWTI

The variance decomposition of lnBRENT shows that its own shocks dominate the variance in the short run "approximately 60–70% across all 10 periods", indicating strong internal persistence in global oil pricing. However, over time, the contribution of other factors, such as lnCR and lnWTI, gradually increases. This indicates that lnBRENT is influenced by broader market dynamics in the long run. The variance decomposition of lnGDP shows that its own shocks dominate the variance throughout the time horizon "approaching approximately 95%, before declining to approximately 80% from period 3 onward and stabilizing at this level throughout the remaining horizon". However, lnBRENT and lnCR modestly contribute to GDP variabilities, indicating that economic activity depends on energy market conditions to a limited extent. The diminishing volatility over time indicates that the economy is gradually adapting to oil-price shocks and moving towards a stable equilibrium. The FEVD results for lnCR reveal that its own shocks remain the main source of variation across all periods. However, the impact of oil prices, especially lnWTI, becomes slightly more pronounced over time. This shows that although internal and structural factors are very important in production decisions, market price signals also contribute to production dynamics in the long term. The FEVD of lnWTI indicates that a significant portion of its variance is explained by lnBRENT. This shows that there is a strong interdependence between the two benchmarks. In contrast, the contributions of lnGDP and lnCR were relatively modest. This supports the opinion that WTI price movements are more closely associated with global oil market conditions than domestic economic factors. Therefore, the outcomes of the FEVD analysis indicate that although all the variables were initially driven by their own shocks, the influence of the association between WTI and BRENT becomes more prominent over time. This highlights the interconnectedness of global oil markets and their broader macroeconomic effects.

4.5 Discussion of Results

Our findings provide strong empirical evidence of the dynamic interconnections between oil prices, economic activity, and crude oil production. The findings from SVAR, IRF, and FEVD support our hypothesis that WTI crude oil prices have a significant effect on GDP, BRENT crude oil prices, and crude oil production. The study found that there is a strong transmission mechanism between BRENT and WTI prices. The FEVD outcomes show that BRENT prices explain a significant percentage of the fluctuations in WTI. This implies that there is a high degree of integration between global oil markets. Our findings of strong interdependence between WTI and BRENT prices, where BRENT explains a significant portion of WTI variance, corroborate previous research by Liu et al.[38] and Xiao and Huang[39] on the integrated nature of global oil markets. However, our study further delineates the dynamic evolution of this influence within the U.S. context, showing how initial shocks stabilize over time, providing a more detailed temporal understanding of this benchmark relationship. The study also found that there is an indirect transmission channel from oil prices to economic growth crude oil production. Although oil prices have a direct impact on GDP, a large portion of their effects are relayed through production dynamics. Both WTI and BRENT prices affect crude oil production, which leads to fluctuations in GDP. This observation is consistent with prior findings highlighting that production acts as a vital intermediator linking oil market variations to broader economic performance[40, 41]. Furthermore, the findings indicate that there is a feedback mechanism between oil prices and economic activity. GDP impacts WTI prices, which in turn affect the levels of crude oil production. This implies that economic expansion can drive oil demand and price changes, which then signal shifts in production decisions. The presence of such a bidirectional relationship underscores the intricacy of interactions between the macroeconomic and energy industries42[, 43]. The study also found that crude oil production plays a strong role in explaining deviations in GDP compared to oil price benchmarks. The FEVD findings reveal that production consistently contributes to GDP variance over time. This indicates that supply-side dynamics play a significant role in determining economic outcomes. This underscores the significance of price and quantity effects when examining the macroeconomic impact of oil markets[44]. Thus, oil price shocks are not independent processes but are transmitted through several interconnected channels involving benchmark price relations, production adaptations, and economic feedback structures. These results are aligned with the existing literature emphasizing that oil markets play a crucial role in determining macroeconomic performance[20, 28].

5. CONCLUSION

This study investigated the dynamic interactions between WTI crude oil prices, BRENT crude oil prices, GDP, and crude oil production in the U.S. using an SVAR framework over the period 2012 to 2022. The empirical outcomes confirm that oil-price shocks have a significant impact on economic activities and production dynamics, both in the short and long run. The findings exhibit a high level of interdependence between both benchmarks, indicating that movements in global oil markets are highly integrated. Oil-price shocks influence GDP both directly and indirectly via crude oil production, highlighting the importance of supply-side adjustments in transmitting energy market shocks to the rest of the economy. The IRF and FEVD analysis indicates that while the impact of oil price shocks are strong in the short-run, they stabilize over time in the long-run. The findings underscore the significance of monitoring the volatility of oil prices and their transmission channels. Policymakers should identify that oil-price volatility not only impacts market prices but also impacts production decisions and economic outcomes. Therefore, to avert the negative impacts of oil-price shocks, stabilization mechanisms (e.g., strategic petroleum reserves, diversification of energy sources, and investments in renewable energy) could be utilized. Domestic production capabilities should be strengthened, and overdependence on unstable oil markets should be reduced to contribute to long-term economic stability. This study has a few drawbacks that can be used to facilitate future research. We used a linear SVAR model, which may not fully capture nonlinear and asymmetric behavior in oil-price dynamics. Although we considered key macroeconomic factors, other important macroeconomic variables might enrich the analysis with key insights. We considered monthly data for our analysis; future studies can explore high-frequency or mixed-frequency methods for deeper insights into the data.

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AUTHOR CONTRIBUTION

Research scholar Kumar Supreeth, conducted the study under the guidance of Dr Purna Prasad Arcot, who provided academic supervision, methodological guidance, and critical review throughout the research process.

CONFLICT OF INTEREST

The authors declare no conflicts of interest in the conduct of this research

ETHICS APPROVAL

Not Applicable

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