

OIL PRICE TRANSMISSION TO INFLATION IN INDONESIA: SVAR ANALYSIS

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ABSTRACT

The transmission of global oil price shocks to inflation in Indonesia is examined using a Structural Vector Autoregression (SVAR) model estimated with monthly data covering the period from 2010 to 2024. Prior to estimation, the validity and robustness of the model are ensured through a series of preliminary tests, including stationarity, optimal lag selection, and stability testing. The analysis considers both the direct effect of oil price shocks on inflation and the indirect effect transmitted through exchange rate movements. The estimation results reveal that fluctuations in global oil prices significantly affect the exchange rate, while only a weak and statistically insignificant direct impact is observed on inflation. A stronger response is instead identified when inflation is exposed to exchange rate shocks, indicating that exchange rate pass-through represents the primary transmission mechanism in Indonesia. Consistent with these findings, the Impulse Response Function (IRF) analysis shows that the exchange rate responds positively during the initial periods following an oil price shock, whereas the adjustment of inflation occurs more gradually through exchange rate fluctuations over time. Overall, the findings suggest that the influence of global oil price shocks on inflation is transmitted predominantly through the exchange rate rather than through a direct channel, highlighting the importance of exchange rate stability in reducing inflationary pressures arising from external shocks in an open economy such as Indonesia.

Keywords: Oil Price, Exchange Rate, Inflation, SVAR, Indonesia

1. INTRODUCTION

In an economic context, crude oil is a strategic commodity that plays a vital role as a source of energy and a key raw material for the industrial, transportation, and power generation sectors (Soesanto et al., 2025). Given its significant contribution to economic activity, crude oil remains one of the most sought-after commodities worldwide, including in Indonesia. According to the Ministry of Energy and Mineral Resources (ESDM), as reported by CNBC Indonesia,

Indonesia's proven oil reserves reached 4.7 billion barrels in 2023. However, only around 2.41 billion barrels are considered economically recoverable and available for production.

According to Deputy Minister of Energy and Mineral Resources (ESDM) Yuliot Tanjung, Indonesia's oil demand was estimated at 518 million barrels in 2023, whereas domestic oil production amounted to only 221 million barrels. As a result, the country faced a shortfall of approximately 297 million barrels, which had to be met through imports from other countries. This condition indicates that Indonesia has not yet been able to fully satisfy its domestic oil demand and remains highly dependent on imported oil.

Indonesia's dependence on imported oil makes its economy vulnerable to fluctuations in global crude oil prices. These fluctuations may be driven by various factors, including geopolitical developments, policy decisions made by oil-producing countries, and changes in global demand. Movements in world oil prices can generate both supply-side and demand-side shocks. Supply shocks are typically reflected in rising production costs, higher selling prices, and reduced production capacity. Meanwhile, demand shocks may be observed through declining purchasing power, shifts in consumption patterns, and a slowdown in overall economic activity.

In addition to affecting supply and demand conditions, fluctuations in global oil prices may also influence exchange rate movements. When world oil prices increase, Indonesia's oil import bill rises because the country must pay more for the same quantity of oil. As a result, the demand for foreign currency, particularly the US dollar, also increases. This higher demand for US dollars can put downward pressure on the rupiah, leading to a depreciation of the domestic currency. A weaker rupiah may subsequently contribute to inflation, as the prices of imported goods and production costs become more expensive.

The increase in import prices and production costs may lead to inflation, as producers tend to raise selling prices to offset higher operating expenses. In addition, fluctuations in world oil prices may lead to higher operating costs, particularly through increases in energy and transportation expenditures that are required throughout the production and distribution process. Consequently, the impact of fluctuations in world oil prices is not limited to the energy sector alone but can also affect exchange rate stability and inflation dynamics in Indonesia.

A bibliometric analysis was conducted using VOSviewer software to examine the development of research on the relationship between global oil prices, exchange rates, and inflation, using the keywords "Oil Price," "Exchange Rate," and "Inflation." This analysis was employed to identify trends in scientific publications, research developments, and the level of academic interest in the topic over a specific period. The analytical results are shown in the following figure.

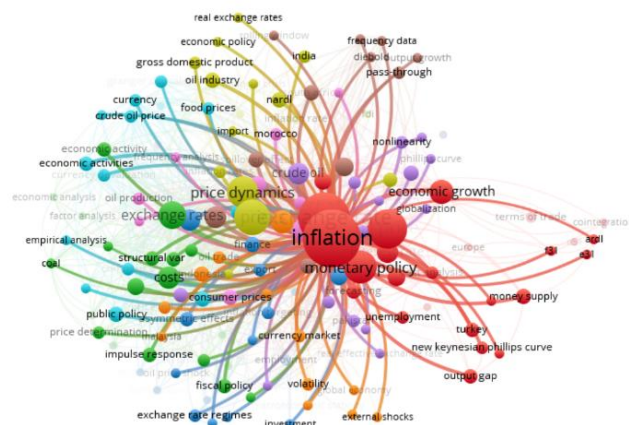
Figure 1.1. Main Information on the Keywords “Oil Price,” “Exchange Rate,” and “Inflation”



Source: Prepared by the author using bibliometric analysis.

Based on the bibliometric results for the keywords “Oil Price,” “Exchange Rate,” and “Inflation,” research on this topic showed substantial growth during the 2021–2026 period. A total of 111 documents were identified across 70 publication sources, involving 279 authors. In addition, the average citations per document of 9.523 indicates that this topic has attracted considerable academic attention and remains highly relevant in the field of macroeconomic studies.

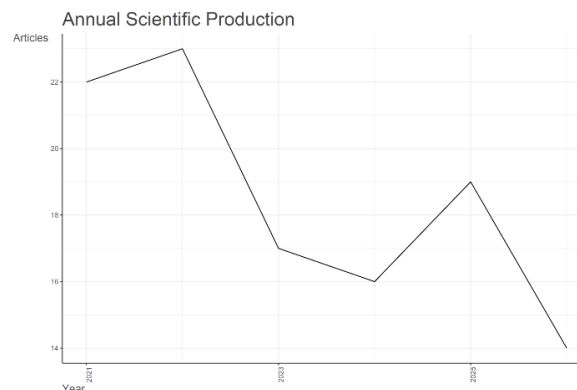
Figure 1.2. Results of the VOSviewer Analysis for the Dominant Keyword “Inflation”



Source: Prepared by the author using VOSviewer.

The network visualization generated by VOSviewer for the keywords “Oil Price,” “Exchange Rate,” and “Inflation” reveals strong linkages with various macroeconomic issues. The keyword inflation emerges as the most dominant topic and exhibits a close relationship with both crude oil price and exchange rate. In addition, the presence of the keyword SVAR indicates that this method has been widely employed to analyze relationships among economic variables, particularly the impact of oil prices on inflation. The visualization also suggests that changes in oil prices affect not only the energy sector but also broader economic stability through their transmission effects on exchange rates and inflation.

Figure 1.3. Annual Scientific Production



Source: Prepared by the author using bibliometric analysis.

Based on the figure above, the number of scientific publications related to oil price, exchange rate, and inflation fluctuated during the 2021–2026 period. The highest publication output was recorded in 2022, with approximately 23 articles, while around 14 articles had been published in 2026. However, the data for 2026 are not yet complete, as the year is still ongoing. The interaction between oil prices, exchange rates, and inflation remains widely examined in the macroeconomic literature.

As tensions in major oil-producing countries have the potential to disrupt global energy markets and raise international oil prices, understanding how oil price shocks influence inflation has become increasingly relevant in the Indonesian context. The examination of economic relationships in this study is conducted through a quantitative framework, where variables are represented and analyzed in numerical form. Using the Structural Vector Autoregression (SVAR) approach, this study evaluates the interaction of oil prices, exchange rates, and inflation while investigating whether exchange rate movements serve as a channel through which oil price shocks are transmitted to inflation in Indonesia.

In Indonesia, several economic policies are closely related to the issues examined in this study. Efforts to manage inflation in Indonesia are carried out through monetary policy interventions by Bank Indonesia (BI), primarily by regulating interest rates and promoting stability in the exchange rate. In response to increases in international oil prices, energy subsidy schemes and fuel price adjustment mechanisms have been introduced to protect households and support overall economic stability.

Based on the conditions described above, this study seeks to address the question of how global oil prices are transmitted to inflation in Indonesia through the exchange rate channel. In addition, the study aims to examine the responses of inflation and the exchange rate to world oil price shocks using the Structural Vector Autoregression (SVAR) approach.

Understanding how oil prices, exchange rates, and inflation interact within the Indonesian economy constitutes the primary focus of this study. The evidence generated is expected to

assist the government and Bank Indonesia in developing appropriate policy responses to inflationary pressures while preserving macroeconomic stability.

2. LITERATURE REVIEW

Oil Price (WTI)

The value of crude oil traded globally is shaped by market forces, with supply and demand serving as the primary determinants of price movements. These prices are generally quoted in U.S. dollars (USD) per barrel. Benchmark crude oils play an important role in determining prices in the global petroleum market. Among the commonly used benchmarks are Brent, Dubai crude, and West Texas Intermediate (WTI). The widespread use of WTI as a pricing reference is associated with its characteristics as a high-quality light sweet crude oil containing relatively low levels of sulfur (Qorina & Sekaringsih, 2025). As a result, WTI is commonly used as a reference standard in international oil markets.

As a strategic commodity in international trade, global oil prices are closely related to several economic theories that explain price formation and their role in the economy. Cost-push inflation arises when higher production expenses are passed on to consumers through increases in the prices of goods and services (Mankiw, 2019). One of the key factors contributing to higher production costs is the price of energy, particularly global oil prices. This theory suggests that fluctuations in world oil prices can influence both exchange rates and inflation within an economy.

Rising global oil prices can also affect the economic conditions of oil-importing countries, including Indonesia. When oil prices increase, the cost of oil imports becomes higher, leading to greater demand for foreign currency, particularly the U.S. dollar. This situation may put downward pressure on the rupiah, resulting in currency depreciation. A weaker rupiah can subsequently increase import costs and contribute to higher domestic inflation.

Exchange Rate

Krugman and Obstfeld (2012) describe the exchange rate as the relative value at which one currency is exchanged for another. In Indonesia, exchange rates are commonly categorized into nominal and real exchange rates. International competitiveness is often assessed through the real exchange rate, as it reflects relative price levels between countries. By comparison, the nominal exchange rate is determined by the value of one currency against another in the foreign exchange market (Ginting, 2013).

Exchange rates play a vital role in the transmission of external shocks to the domestic economy. External shocks, including global uncertainty, increases in the U.S. Federal Reserve's interest rates, geopolitical conflicts, and trade wars, may cause fluctuations in the rupiah exchange rate. A depreciation of the rupiah raises the cost of imported raw materials and capital goods, increasing production costs for firms that rely on imported inputs. These additional costs

are often passed on to consumers through higher selling prices, thereby contributing to inflationary pressures (Simbolon et al., 2025).

The Exchange Rate Pass-Through theory explains the mechanism through which exchange rate fluctuations influence domestic prices. Krugman and Obstfeld (2012) argue that movements in exchange rates are transmitted not only to import prices but also to the prices of goods and services in the domestic market. In the context of global oil price shocks, changes in international oil market conditions may alter the balance between the demand and supply of foreign exchange. As Indonesia requires more U.S. dollars to finance oil imports, demand for foreign currency increases, placing depreciation pressure on the rupiah.

The depreciation of the rupiah resulting from rising global oil prices makes imported goods more expensive. This situation increases production costs for businesses, particularly those that still depend on imported raw materials, energy, and capital goods. Increases in production costs are typically passed on to consumers through higher prices for goods and services, allowing profit margins to be maintained. Consequently, domestic prices also increase, which ultimately contributes to inflation in Indonesia (Soesanto et al., 2024).

Inflation

Inflation is generally understood as a persistent increase in the overall price level within an economy (Mankiw, 2019). A similar definition is provided by Bank Indonesia, which describes inflation as a continuous and widespread rise in the prices of goods and services over a given period. Such a condition reflects changes in the prices of various commodities and services available in the market. To assess inflation, the Consumer Price Index (CPI) is widely used, with inflation rates being calculated based on changes in the index over time. As noted by Kamila and Abidin (2022), the CPI is often regarded as an important indicator of economic stability because it captures variations in the prices of goods and services consumed by households and the broader public.

Both demand-pull and cost-push factors contribute to inflationary pressures in Indonesia. Cost-push inflation, in particular, is often linked to exchange rate movements. As changes in the exchange rate occur, adjustments in the prices of goods and services may follow, especially for imported products and commodities that depend on foreign inputs. Inflation may also be influenced by international trade. Dependence on imported food and energy products makes a country more vulnerable to price increases in global markets. As a result, changes in international prices can be transmitted to domestic prices through trade channels and contribute to inflationary pressures (Prameswati et al., 2025).

Empirical Studies

Numerous studies have examined the transmission of oil prices and exchange rates to inflation using the Structural Vector Autoregression (SVAR) approach. Baek (2021) found that fluctuations in global oil prices affected Indonesia's economic growth and exchange rate but did not have a significant impact on inflation. Meanwhile, Anh et al. (2021) reported that shocks

in oil prices, exchange rates, and the output gap contributed to variations in domestic prices across ASEAN countries. Evidence of exchange rate pass-through to the price level was also found in the study.

However, these studies have several limitations. Baek (2021) focused primarily on the effects of oil prices on broad macroeconomic indicators, such as economic growth and exchange rates, while providing limited discussion on the specific transmission mechanism through which oil prices affect inflation in Indonesia. In contrast, Anh et al. (2021) examined exchange rate pass-through at the ASEAN level, making it difficult to capture the specific dynamics of oil price shock transmission to inflation in Indonesia.

Another limitation is related to the period of observation. The data used in these studies only covered up to 2019 and 2016, respectively. The analysis therefore did not reflect several contemporary economic developments, such as the economic effects of the COVID-19 pandemic, growing geopolitical instability, and substantial fluctuations in international energy markets.

A more recent study by Sukma and Andrianus (2025) investigated the effects of external shocks, namely world oil prices and the federal funds rate, on Indonesia's macroeconomic variables using the Structural Vector Autoregression (SVAR) method for the period 2008–2022. Their findings showed that world oil price shocks influenced both inflation and the real effective exchange rate in Indonesia. This study is closely related to the present research because both employ the SVAR approach and focus on the impact of global oil prices on Indonesia's macroeconomic conditions.

3. METHODS

Research Design and Approach

This study adopts a quantitative approach using the Structural Vector Autoregression (SVAR) method. The SVAR framework is employed because the analysis focuses on the interactions among global oil prices, exchange rates, and inflation within a system in which these variables influence one another. In addition to examining the relationships among variables, SVAR enables the analysis of how a variable responds to shocks originating from other variables in the system.

According to Enders (2015), SVAR is an extension of the Vector Autoregression (VAR) model that allows researchers to identify structural relationships among variables through restrictions derived from economic theory. Unlike the VAR model, which primarily captures dynamic relationships among variables, SVAR makes it possible to identify structural shocks and provide a clearer explanation of the transmission mechanisms linking the variables under investigation.

This study aims to examine the effects of global oil price shocks on the exchange rate and inflation in Indonesia, as well as to analyze the transmission mechanism through changes in the exchange rate.

Data and Data Sources

Secondary data were obtained from the Federal Reserve Economic Data (FRED) database. A total of 181 monthly observations covering the period from 2010 to 2024 were used in the analysis. Monthly data are employed because they provide a more detailed representation of the movements in global oil prices, the rupiah exchange rate, and inflation than annual data.

The population of this study comprises all time series data related to global oil prices, the rupiah exchange rate against the U.S. dollar, and inflation in Indonesia. The sample consists of monthly observations for these three variables over the 2010–2024 period. This period was selected due to the availability of complete data and its suitability for examining the relationship between oil prices, exchange rates, and inflation in Indonesia. Data were collected through a documentation method by downloading the relevant series from the FRED database according to the variables and observation period specified in the study.

Research Variables

This study employs three main variables: oil price, exchange rate, and inflation, with inflation proxied by the Consumer Price Index (CPI). All variables are treated as endogenous variables because they may influence one another throughout the observation period.

Table 3.1. Operational Definition of Variables

Variable	Proxy	Unit	Source
Oil Price	West Texas Intermediate (WTI)	US\$/barrel	FRED
Exchange Rate	Rupiah terhadap Dolar AS	Rupiah/USD	FRED
Inflation	Consumer Price Index (CPI)	Indeks	FRED

Source: Prepared by the author, 2026.

Bibliometric Analysis

In addition to the econometric approach, this study also employs bibliometric analysis to examine the development of research on oil prices, exchange rates, and inflation. The bibliometric data were obtained from the Scopus database using the keywords *oil price*, *exchange rate*, and *inflation* for the period 2021–2026.

The collected data were analyzed using the Bibliometrix package in RStudio, while the visualizations were generated using VOSviewer. These tools were used to identify relationships among keywords, examine publication trends, and explore the development of research themes within the field.

Conceptual Framework and Research Model

This study is based on Indonesia's continued dependence on imported oil to meet domestic energy demand. When global oil prices increase, the cost of oil imports also rises, leading to

greater demand for U.S. dollars. The increase in demand for foreign currency may place pressure on the rupiah exchange rate.

A decline in the value of the rupiah increases the cost of imported goods, placing upward pressure on production costs for firms that depend on imported raw materials and capital equipment. As these higher costs are transferred to consumers through increased prices of goods and services, inflationary pressures may emerge.

In addition to its indirect effect through the exchange rate, changes in oil prices may also influence inflation directly by increasing energy and transportation costs. This study examines two transmission channels through which oil price shocks affect inflation: the direct effect of oil prices on inflation and the indirect effect operating through movements in the rupiah exchange rate. These relationships provide the basis for establishing the restrictions used in the SVAR model.

SVAR Model Specification

The relationships among the variables in the SVAR model are specified based on economic theory. Global oil prices are assumed to affect both the exchange rate and inflation, while the exchange rate is assumed to influence inflation. These assumptions serve as the basis for imposing the restrictions required to identify the SVAR model.

$$\begin{bmatrix} 1 & 0 & 0 \\ a_{21} & 1 & 0 \\ a_{31} & a_{32} & 1 \end{bmatrix} \begin{bmatrix} OilPrice_t \\ ExchangeRate_t \\ Inflation_t \end{bmatrix} = \varepsilon_t$$

Global oil prices are treated as the most exogenous variable in the model because their movements are largely determined by conditions in international markets. In the short run, changes in the exchange rate and inflation in Indonesia are assumed not to affect global oil prices. In contrast, fluctuations in oil prices are expected to influence both the exchange rate and inflation.

This assumption reflects Indonesia's continued dependence on imported oil to meet domestic energy demand. When global oil prices increase, the demand for U.S. dollars to finance oil imports also rises, placing pressure on the rupiah exchange rate. A depreciation of the rupiah may subsequently increase the prices of imported goods and production inputs, thereby contributing to inflationary pressures.

In the restriction matrix, coefficient a_{21} represents the effect of global oil prices on the exchange rate, a_{31} captures the effect of global oil prices on inflation, and a_{32} represents the effect of the exchange rate on inflation.

Data Analysis Techniques

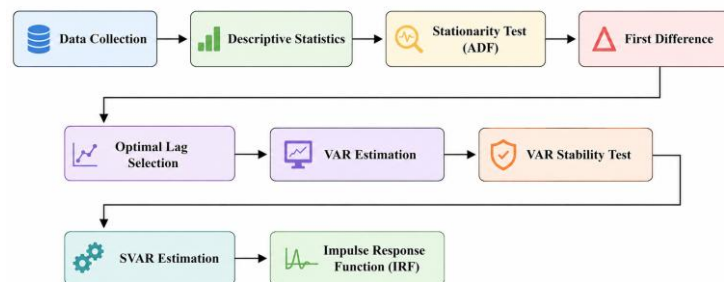
Data processing was conducted using Stata software. The analysis began with descriptive statistics to examine the characteristics of each research variable. This was followed by a stationarity test using the Augmented Dickey–Fuller (ADF) method. Variables that were not

stationary at the level form were transformed into their first differences until the stationarity requirement was satisfied.

The Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan–Quinn Information Criterion (HQIC) were subsequently employed to identify the optimal lag length. Based on the selected lag, a VAR model was estimated and subsequently used as the foundation for the SVAR specification.

Before estimating the SVAR model, the VAR model was tested to ensure that it satisfied the stability condition. Once stability was confirmed, the SVAR model was estimated based on the predetermined restrictions. The estimation results were subsequently analyzed using the Impulse Response Function (IRF) to examine how each variable responds to shocks occurring within the system over time.

Figure 3.1. Research Analysis Procedure



Source: Prepared by the author, 2026.

4. RESULTS AND DISCUSSION

Descriptive Statistics

The characteristics of each research variable are summarized using descriptive statistical measures. A summary of the descriptive statistics for Oil Price, Exchange Rate, and the Consumer Price Index (CPI) over the 2010–2024 observation period is presented in Table 4.1.

Table 4.1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
OilPrice	180	72.02	21.33	16.55	114.84
ExchangeRate	180	12853.62	2322.19	8521.26	16325.05
CPI	180	104.88	17.13	73.74	131.43

Source: Author's calculations using Stata, 2026.

The Oil Price variable recorded an average value of USD 72.02 per barrel during the 2010–2024 period, with a maximum value of USD 114.84 per barrel and a minimum value of USD 16.55 per barrel. The standard deviation of 21.33 indicates that oil prices experienced noticeable fluctuations throughout the observation period.

The Exchange Rate variable, measured as the rupiah against the U.S. dollar, had an average value of IDR 12,853.62 per USD. The highest recorded value was IDR 16,325.05 per USD, while the lowest was IDR 8,521.26 per USD, with a standard deviation of 2,322.19. These figures suggest that the rupiah underwent considerable exchange rate movements during the study period.

The Consumer Price Index (CPI) had an average value of 104.88, ranging from a minimum of 73.74 to a maximum of 131.43. The standard deviation of 17.13 reflects variations in the CPI over the 2010–2024 period. The CPI data also show a generally upward trend, indicating the presence of inflationary pressures in Indonesia over time.

Stationarity Test

The stationarity test was conducted to ensure that the Oil Price, Exchange Rate, and CPI series do not contain unit roots that could lead to spurious regression results. The test was performed using the Augmented Dickey-Fuller (ADF) method. If a variable was found to be non-stationary at the level form, differencing was applied until stationarity was achieved. Only stationary data were used in the subsequent SVAR analysis.

Table 4.2. ADF Test Results at Level

Variable	ADF Statistic	P-value
OilPrice	-1.837	0.3620
Exchange Rate	-0.907	0.7857
CPI	-1.587	0.4901

Source: Author's calculations using Stata, 2026.

All variables were found to have p-values exceeding 0.05 in the ADF test. This outcome suggests that the null hypothesis (H_0) remains valid, indicating the existence of unit roots and the non-stationary nature of the data series. Consequently, a first-difference transformation is required to achieve stationarity before proceeding with the SVAR analysis.

Table 4.3. ADF Test Results at First Difference

Variable	ADF Statistic	p-value
OilPrice	-10.217	0.0000
ExchangeRate	-10.779	0.0000
CPI	-9.763	0.0000

Source: Author's calculations using Stata, 2026.

P-values of 0.0000 were obtained for all variables at the first-difference level, as reported in Table 4.3. Since these values are lower than the 5% significance level, the null hypothesis (H_0) was rejected. The absence of unit roots in the Oil Price, Exchange Rate, and CPI series indicates that stationarity was achieved after first differencing. With this requirement fulfilled, the next stage of the analysis involves determining the optimal lag length.

Optimal Lag Selection

The specification of the VAR model requires the identification of an appropriate lag order before the SVAR estimation stage can be performed. For this purpose, the Akaike Information Criterion (AIC) is used to determine the optimal number of lags.

Table 4.4. Optimal Lag Selection

Lag	LR	FPE	AIC	HQIC	SBIC
0	-	357239	21.2998	21.3216	21.3536*
1	40.279	314995	21.1739	21.2612	21.2893
2	46.451*	268249*	21.0132*	21.166*	21.39

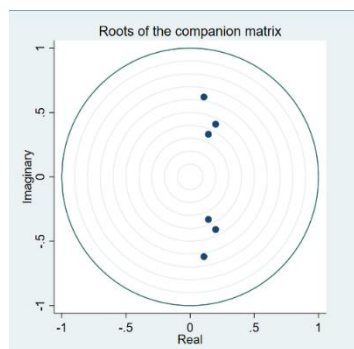
Source: Author's calculations using Stata, 2026.

The optimal lag length is selected based on the asterisk (*) in the Akaike Information Criterion (AIC) column, which indicates the best model according to the selection criterion. As shown in Table 4.4, the asterisk (*) appears at lag 2, indicating that this lag has the lowest AIC value. Therefore, lag 2 is chosen as the optimal lag length for the subsequent analysis.

VAR Stability Test

An evaluation of model stability is required before the results of the IRF analysis can be interpreted. The validity of the estimated VAR model depends on its ability to satisfy the stability criterion, which requires all inverse roots of the characteristic polynomial to fall inside the unit circle.

Figure 4.1. Unit Circle Test for VAR Stability



Source: Author's calculations using Stata, 2026.

As presented in Figure 4.1, the inverse roots are found to lie entirely within the unit circle. On this basis, the VAR model is regarded as stable and can subsequently be employed for SVAR analysis.

SVAR Model Specification

The A and B restriction matrices are employed in the estimation of the SVAR model to facilitate the identification of structural relationships among the variables included in the analysis. The restriction matrices employed in this study are specified as follows:

$$A = \begin{bmatrix} 1 & 0 & 0 \\ a_{21} & 1 & 0 \\ a_{31} & a_{32} & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} b_{11} & 0 & 0 \\ 0 & b_{22} & 0 \\ 0 & 0 & b_{33} \end{bmatrix}$$

Based on the specified matrix restrictions, the SVAR model was successfully estimated. The estimation results of the SVAR model are presented in the following table.

Table 4.5. SVAR Estimation Results

Parameter	Coefficient	p-value
A(2,1)	9.158224	0.003
A(3,1)	0.008211	0.112
A(3,2)	-0.000060	0.631
B(1,1)	5.532561	0.000
B(2,2)	224.278300	0.000
B(3,3)	0.370683	0.000

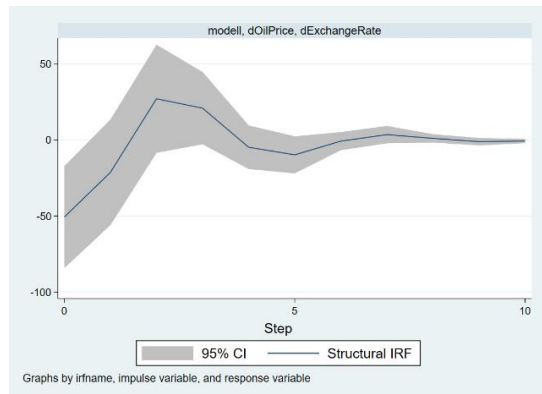
Source: Author's calculations using Stata, 2026.

Table 4.5 indicates that parameter A(2,1) is statistically significant at the 5% level, as reflected by a p-value of 0.003. In contrast, parameters A(3,1) and A(3,2) fail to meet the significance criterion because their p-values are greater than 0.05. For matrix B, significance is achieved by all estimated parameters, each of which records a p-value below the 5% threshold. Subsequently, an Impulse Response Function (IRF) analysis is performed to assess how the variables respond to structural disturbances identified within the SVAR model

Impulse Response Function (IRF)

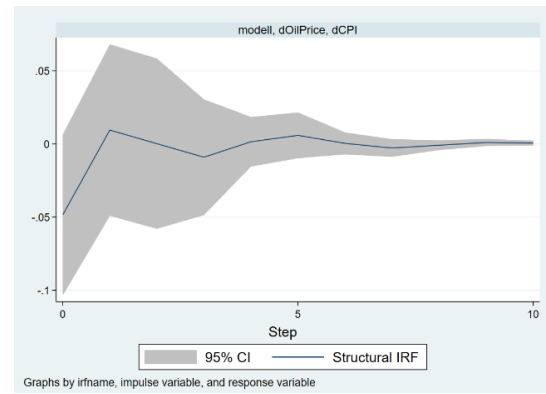
The dynamic responses of the exchange rate and the Consumer Price Index (CPI) to structural shocks in global oil prices are examined using the Impulse Response Function (IRF) approach. The effects of the shock are traced over several subsequent periods to evaluate their evolution over time.

Figure 4.2. Response of Exchange Rate to an Oil Price Shock



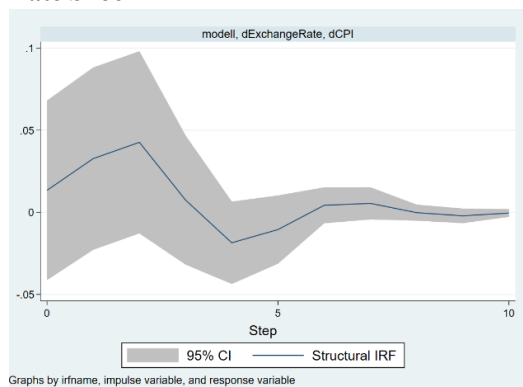
Source: Author's calculations using Stata, 2026.

Figure 4.3. Response of CPI to an Oil Price Shock



Source: Author's calculations using Stata, 2026.

Figure 4.4. Response of CPI to an Exchange Rate Shock



Source: Author's calculations using Stata, 2026.

As illustrated in Figure 4.2, a positive response of the exchange rate is observed following a shock in oil prices. The response becomes stronger during the initial periods, reaches its highest level around the second period, and subsequently diminishes before converging toward zero. Meanwhile, Figure 4.3 indicates that only a limited response is generated by the Consumer Price Index (CPI) in reaction to an oil price shock, with the effect dissipating relatively quickly. The response of the CPI to oil price disturbances is also found to be weaker than its response to shocks originating from the exchange rate. Consistent with this finding, Figure 4.4 shows that a more pronounced reaction of the CPI is produced by an exchange rate shock. The response intensifies in the early periods, attains its maximum value around the second period, and then gradually decreases until it approaches zero.

The Transmission of Oil Prices to the Exchange Rate

The exchange rate exhibits a clear response to global oil price shocks during the early periods following the shock. A statistically significant relationship between global oil price movements and fluctuations in the rupiah exchange rate is indicated by parameter $A(2,1)$, which

records a p-value of 0.003. Further evidence is provided by the IRF analysis, where the exchange rate response is observed to strengthen during the initial periods, attain its maximum level around the second period, and subsequently decline toward its equilibrium path. This pattern can be explained by Indonesia's dependence on imported oil. As global oil prices rise, oil import costs increase, leading to greater demand for U.S. dollars to finance these imports. The resulting increase in demand for foreign currency places pressure on the rupiah and contributes to its depreciation against the U.S. dollar.

These findings are consistent with those of Hesniati et al. (2022), who showed that Indonesia's reliance on imported oil makes the rupiah vulnerable to fluctuations in world oil prices. Similarly, Wahyudi et al. (2023) found that oil price movements significantly influence exchange rate dynamics in the short run. Together, these studies support the evidence that the rupiah responds to external shocks originating from the oil market.

Nevertheless, the IRF results indicate that this response gradually weakens and eventually converges toward zero. This suggests that the effect of oil price shocks on the rupiah is temporary rather than permanent. A possible explanation for this finding can be found in the exchange rate stabilization policies pursued by Bank Indonesia. When the rupiah is subjected to external shocks, foreign exchange market interventions may be implemented to contain excessive volatility and reduce the duration of the shock's impact.

The Weak Impact of Oil Prices on Inflation (CPI)

The CPI shows only a limited response to global oil price shocks. The $A(3,1)$ parameter is not statistically significant (p -value = 0.112), and the IRF results presented in Figure 4.3 indicate that the CPI response is small and quickly returns to equilibrium. This suggests that changes in global oil prices do not directly exert a strong influence on inflation in Indonesia.

The results further suggest that the transmission of oil price shocks to domestic inflation operates differently from the standard cost-push inflation mechanism. Although higher energy prices are generally expected to raise production costs and put upward pressure on prices, this effect appears to have been relatively weak in Indonesia during the 2010–2024 period.

One explanation is the government's policy of regulating domestic fuel prices through subsidies and price controls. Fuel products such as Pertalite and diesel do not always adjust in line with movements in world oil prices. As a result, increases in international oil prices are not immediately passed on to consumers and businesses, limiting the direct impact of oil price shocks on the CPI.

Consistent evidence has been provided by earlier studies. A non-significant relationship between global oil prices and inflation in Indonesia was reported by Qorina and Sekaringsih (2025). Likewise, Baek (2021) found that while oil price shocks affected exchange rates, no significant effect on inflation was detected. The findings of the present study align with these results, as only a modest response of inflation to oil price shocks is observed.

The Transmission of Exchange Rates to Inflation

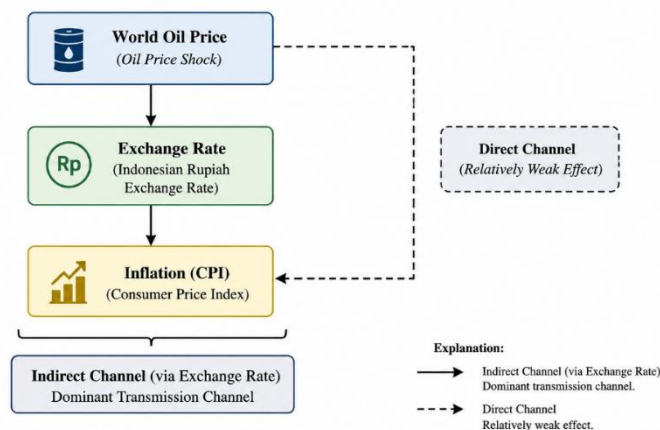
While no significant direct relationship between oil prices and the CPI is identified, the IRF results presented in Figure 4.4 reveal that inflation reacts more strongly to exchange rate disturbances. The response increases in the early periods, attains its peak around the second period, and gradually converges toward zero thereafter. This pattern suggests that exchange rate movements are transmitted to domestic prices, supporting the existence of an exchange rate pass-through mechanism in the Indonesian economy.

When the rupiah is weakened by an oil price shock, the cost of imported goods tends to rise. Higher production expenses are consequently incurred by producers that rely on imported raw materials. In response, adjustments to the prices of goods and services may be implemented to maintain profitability. These price adjustments are eventually captured by the Consumer Price Index (CPI), thereby contributing to inflationary pressures.

Exchange rate movements appear to play a key role in transmitting external shocks to domestic prices. According to the exchange rate pass-through theory, changes in the exchange rate can influence import prices and subsequently affect domestic inflation. The findings of this study are consistent with those reported by Maharani et al. (2022), in which a linkage between exchange rate movements and the CPI was observed in Indonesia. In addition, Simbolon et al. (2025) suggested that the weakening of the rupiah increases the cost of imported commodities and production inputs, which may subsequently be transmitted into higher inflation.

The Transmission Channel of Oil Prices to Inflation

Figure 4.5. Transmission Channels of World Oil Prices to Inflation in Indonesia



Source: Author's illustration based on SVAR and IRF results, 2026

Figure 4.5 indicates that exchange rate fluctuations serve as the main channel through which oil price shocks are transmitted to inflation in Indonesia. Rising oil prices put pressure on the rupiah, and the resulting depreciation increases the cost of imported goods and production inputs, which subsequently contributes to inflation.

In contrast, a limited direct effect of oil price fluctuations on the CPI is detected. The IRF findings show that only a small response is exhibited by the CPI after an oil price shock, with

the impact becoming progressively weaker in subsequent periods. This suggests that fluctuations in world oil prices are not directly translated into higher inflation in Indonesia. One explanation is the government's policy of regulating domestic energy prices, which prevents fuel prices from fully adjusting to changes in international oil markets.

A principal finding of this research is the identification of the exchange rate as the main channel through which global oil price shocks are transmitted to inflation. The effects of oil price shocks are first reflected in movements of the rupiah exchange rate and are subsequently transmitted to the CPI. Although the influence of global oil price shocks on both inflation and exchange rates in Indonesia has also been documented by Sukma and Andrianus (2025), the results obtained in this study provide a more comprehensive understanding of the transmission mechanism linking these variables.

5. CONCLUSION AND LIMITATION

Conclusion

Based on the SVAR analysis using monthly data from 2010 to 2024, oil price shocks have a significant effect on the rupiah exchange rate. The SVAR and IRF results show that the exchange rate responds positively in the periods immediately following a shock, reaches its peak around the second period, and then gradually returns toward equilibrium. Rising oil prices increase the demand for U.S. dollars to finance imports, placing pressure on the rupiah.

A relatively weak direct relationship between oil price movements and the Consumer Price Index (CPI) is identified. The estimated relationship between oil prices and the CPI is not statistically significant, while the IRF results indicate only a small and short-lived response of the CPI to oil price shocks. A direct transmission of global oil price fluctuations to inflation in Indonesia is not observed. A possible explanation can be found in the regulation of domestic energy prices by the government, which reduces the extent to which changes in international oil markets are transmitted to domestic fuel prices.

The results also show that the CPI responds more strongly to exchange rate shocks than to oil price shocks. Higher costs of imported goods and production inputs are generated when the rupiah depreciates, creating upward pressure on domestic prices. As a result, exchange rate movements are transmitted to inflation through higher import costs and production expenses. Taken together, the findings suggest that the influence of global oil prices on inflation in Indonesia is transmitted predominantly through exchange rate fluctuations rather than through a direct impact on consumer prices.

These results emphasize how crucial exchange rate fluctuations are in shaping the transmission of external shocks to domestic inflation. The findings imply that Indonesia's inflation dynamics are primarily influenced by global oil price shocks through the exchange rate.

Limitation

This study has several limitations. The period of observation covers 2010–2024, which includes major economic events such as the COVID-19 pandemic and the global energy market disruption following the Russia–Ukraine conflict. These events may have altered the behavior of macroeconomic variables and created fluctuations that differ from normal economic conditions. However, the analysis does not explicitly account for possible structural changes across different periods.

Government intervention in the energy sector may also affect the transmission of oil price shocks. During the observation period, domestic fuel prices in Indonesia were influenced by subsidy schemes, compensation programs, and price control policies. These policies may weaken the direct impact of global oil price movements on domestic inflation. Although this aspect is discussed in the interpretation of the results, it is not included as a specific variable in the empirical model.

The analysis is limited to three variables, namely global oil prices, the exchange rate, and inflation. In practice, inflation is influenced by a wider range of factors, including monetary policy, administered prices, food prices, and other macroeconomic conditions. The exclusion of these variables means that the model may not fully capture all channels through which inflation responds to external shocks.

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