

GLOBAL OIL PRICE VOLATILITY AND INFLATION IN KENYA: A SVAR APPROACH

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ABSTRACT

Inflation is one of the central variables in macroeconomic management, and for a net oil-importing economy such as Kenya, movements in global crude oil prices are a recurrent source of inflationary pressure. The purpose of this study was to examine the impact of global oil price volatility on inflation in Kenya. The study was anchored on the Expectations-Augmented Phillips Curve, supported by Monetarist Theory and the Quantity Theory of Money. A descriptive, causal and correlational research design was adopted using annual secondary data for the period 1970 to 2022 obtained from the World Bank, the Federal Reserve Economic Data (FRED) and West Texas Intermediate (WTI) crude oil prices. Oil price volatility was measured using the Average True Range (ATR), while gross domestic product, government spending, money supply and the exchange rate served as control variables. Stationarity was confirmed using the Augmented Dickey-Fuller and Phillips-Perron tests, and a recursively identified Structural Vector Autoregressive (SVAR) model with one lag was estimated, from which impulse response functions (IRFs) and forecast error variance decomposition

(FEVD) were derived. The IRFs show that a one-standard-deviation shock to oil prices and to oil price volatility each causes a significant rise in inflation within the first year, after which the effect fades and becomes statistically insignificant from about the second year. The FEVD shows that oil prices explain 12.9% and oil price volatility 10.5% of the variation in inflation in the first year; over ten years, oil price volatility accounts for about 11.6% and oil prices about 6.4%, while the exchange rate becomes the dominant external driver (about 34%). The study concludes that global oil price shocks exert a significant short-run influence on inflation in Kenya that dissipates as economic agents adjust their expectations. The study recommends that the Energy and Petroleum Regulatory Authority (EPRA) and the Central Bank of Kenya institute measures that cushion the economy during oil price fluctuations, alongside diversification towards renewable energy.

Key words: Oil Price Volatility, Inflation, Structural Vector Autoregression, Impulse Response, Kenya.

BACKGROUND

Oil price volatility and inflation are closely interconnected. Oil is a crucial input for modern economies, and changes in its price can significantly affect inflation in both developed and developing economies. In the United States, the Federal Reserve Bank of Dallas estimated that a 10% increase in oil prices could raise inflation by an average of 0.2% in the short term and 0.5% in the long term, and changes in oil prices have particularly strong effects in countries that depend heavily on oil imports (IMF, 2017). Inflation, the overall increase in the prices of goods and services over time, lowers consumers' purchasing power and standard of living (Dwivedi, 2019).

Since 1970 the global oil market has experienced repeated shocks. The 1973 OPEC oil embargo quadrupled oil prices from about USD 2.90 to USD 11.65 per barrel, and the 1979 Iranian Revolution triggered a second wave of price increases, with prices peaking in 1981 (Beck, 2019). Prices collapsed to about USD 12 per barrel in 1986, remained low through most of the 1990s, and then rose steadily to above USD 140 per barrel in 2008 before falling sharply during the global financial crisis (EIA, 2020). Between mid-2014 and early 2016, prices fell from above USD 100 to below USD 30 per barrel, and the COVID-19 pandemic and the 2022 supply disruptions produced further extreme swings (Razek & Michieka, 2019; OPEC, 2019). Each of these episodes transmitted inflationary or disinflationary pressure to economies around the world.

In Sub-Saharan Africa, oil price shocks have compounded inflationary pressure arising from currency depreciation, fiscal deficits and food price shocks (IMF, 2022). Kenya is a net oil importer that depends significantly on oil for industrial activities, transportation and power generation. Kenya's inflation rate rose to 5.7% in June 2018 from 4.3% in June 2017, which was attributed to the global increase in oil prices (KNBS, 2022). According to the Energy and Petroleum Regulatory Authority, increases in domestic fuel prices have repeatedly been driven by rising global oil prices and exchange rate movements (EPRA, 2022). By October 2022, year-on-year inflation in Kenya stood at 9.6%, with transport costs up 11.6% and the costs of housing, water, electricity, gas and other fuels up 7.1% (KNBS, 2022).

Inflation in Kenya has followed a non-linear path since 1970. It rose sharply in the early 1980s following the 1982 oil shock and political instability, peaked at about 46% in 1992-1993 on the back of currency depreciation and drought, and fell to single digits after the economic reforms of the mid-1990s. It spiked again during the 2007-2008 global financial crisis and has since fluctuated mostly within single digits, with occasional spikes linked to droughts, exchange rate movements and fuel prices (CBK, n.d.; KNBS, 2022). Price volatility, defined as the extent to which a commodity's price fluctuates over time, is particularly consequential for such an economy, because it complicates planning by firms and households and affects the cost of imports, production and transport (EIA, 2020).

Despite the importance of these dynamics, existing studies in Kenya have largely examined oil price levels rather than their volatility, and have relied on single-equation or ARDL approaches that do not identify the contribution of each structural shock to inflation. This study therefore examines the impact of both global oil prices and their volatility on inflation in Kenya using a Structural Vector Autoregressive (SVAR) model, which makes it possible to trace the dynamic response of inflation to each shock and to quantify the relative importance of each shock over time.

Purpose of the Study

To examine the impact of global oil price volatility on inflation in Kenya.

Research Hypotheses

H₀₁: Oil price does not have a statistically significant effect on inflation in Kenya.

H₀₂: Oil price volatility does not have a statistically significant effect on inflation in Kenya.

Conceptual Framework

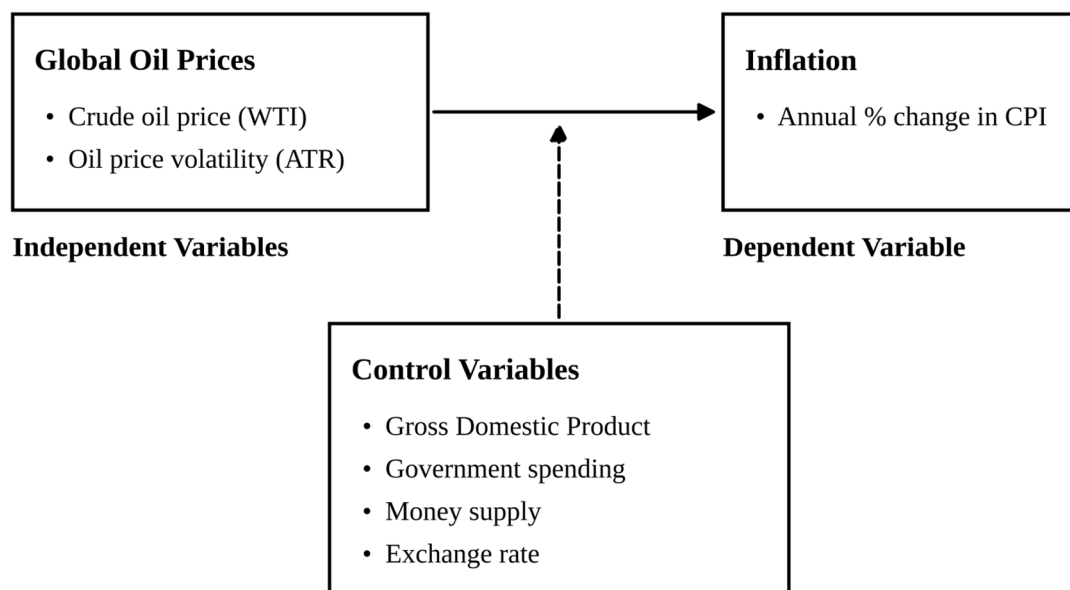


Figure 1: Conceptual Framework

Source: Moragwa (2023)

Statement of the Problem

The global oil industry has undergone abrupt and disruptive shifts that directly affect economies such as Kenya that depend heavily on oil imports. These variations have contributed to persistent inflationary pressure, compounded by the unpredictability of oil prices (World Bank, 2021). Between 2015 and 2022, the pump price of petrol in Kenya doubled from KES 87.2 to KES 179.16

per litre, while crude oil prices reached USD 80 per barrel by September 2021 compared with an average of USD 25 per barrel in 2001. Given that Kenya imports more than 40.5 million barrels of oil annually, the country remains highly exposed to volatile global oil prices (KNBS, 2022).

As a net oil-importing, non-industrialized economy, Kenya faces substantial risks from oil price volatility, which indirectly but significantly affects the prices of local commodities (Salisu, 2012; EPRA, 2022). Although many researchers have evaluated the effect of oil prices and their volatility on inflation and other macroeconomic variables, most of this research has focused on developed economies. The few studies on Kenya and other developing countries, such as Akinsola and Odhiambo (2020), Kibunyi *et al.* (2018) and Gachara (2015), examined the channels through which oil price shocks affect inflation and other macroeconomic variables using ARDL models, while Odera (2015) found no short-run link between diesel prices and inflation in Kenya but did not analyze the transmission mechanism.

To date, few studies have assessed the effect of oil price volatility, as distinct from the oil price level, on inflation in Kenya, and none to the researchers' knowledge has done so using an SVAR model that isolates the contribution of each structural shock. This study sought to fill this gap by investigating the impact of oil price shocks and oil price volatility shocks on inflation in Kenya, the timing and direction of the inflation response, and the relative importance of each shock in explaining inflation dynamics.

THEORETICAL FRAMEWORK

Expectations-Augmented Phillips Curve

The Phillips Curve, first introduced by Phillips (1958), describes an inverse relationship between inflation and unemployment: as unemployment falls, inflation tends to rise, and vice versa (Ball & Mazumder, 2021). Graphically, this relationship is a downward-sloping curve with inflation on the vertical axis and unemployment on the horizontal axis (Gali & Gertler, 1999). The original Phillips curve did not account for inflation expectations, and supply-side shocks such as oil price shocks can shift the curve unexpectedly. The Expectations-Augmented Phillips Curve (EAPC) addresses this by incorporating expectations: if economic agents anticipate higher inflation, they demand higher wages to protect their purchasing power, which in turn raises inflation; if they anticipate lower inflation, they accept lower wages, which reduces inflation (Ball & Mazumder, 2021).

The EAPC can be represented as $\pi = \pi^e - \alpha(U - U^*)$, where π is the inflation rate, π^e is expected inflation, α measures the sensitivity of inflation to unemployment, U is the actual unemployment rate and U^* is the natural rate of unemployment. Oil prices enter this framework both through firms' costs and through expectations. When oil prices rise, production costs increase and are passed on to consumers as higher prices; when they fall, costs and prices decline (Mankiw & Reis,

2002). If agents expect oil prices to continue rising, workers may demand higher wages, reinforcing inflation (Galati *et al.*, 2018). Ajmi *et al.* (2015) note that Phillips curve models frequently include energy prices as a key input, and Lidiema (2020) found that rising crude oil prices have a positive and significant effect on inflation in Kenya.

A limitation of the Phillips curve is that the trade-off between inflation and unemployment has proved unstable over time, particularly when supply shocks and changing expectations shift the curve. However, it is precisely this role of expectations that makes the EAPC relevant to this study: it predicts that an oil price shock should raise inflation in the short run, and that the effect should fade as agents adjust their expectations to the new conditions.

Supporting Theories

The study is further supported by Monetarist Theory and the Quantity Theory of Money. Monetarism holds that inflation is fundamentally a monetary phenomenon, so that changes in the money supply are primarily responsible for fluctuations in the price level (Cochrane, 2021; Friedman, 1989). From this perspective, an oil price increase raises production costs in manufacturing and industrial sectors, and these costs are passed on to consumers, while the monetary response determines whether the shock becomes persistent inflation. The Quantity Theory of Money, formalized by Fisher (1911) as $MV = PT$, where M is the money supply, V is the velocity of money, P is the price level and T is the volume of transactions, implies that an increase in the money supply results in a proportionate increase in the price level when velocity and transactions are stable (Friedman, 1989). These theories justify the inclusion of money supply, government spending and the exchange rate as control variables in the model.

Empirical Literature Review

Kose and Unal (2021) analyzed the effects of oil price and oil price volatility on inflation in Turkey using an SVAR model and monthly data from 1988 to 2019. The variance decomposition showed that in the initial months both oil prices and oil price volatility had relatively minor effects on inflation, but that their effects became significant as time progressed, and the impulse response functions indicated that the responses of inflation to oil prices and the exchange rate were notably significant. The study underscored the importance of stable monetary and fiscal policies.

Hijazine and Al-Assaf (2022) examined the impact of oil prices on headline and core inflation in Jordan. They found that oil prices have a significant positive impact on headline inflation in the short run, but that the long-run impact is minimal. Granger causality tests showed that oil prices directly affect headline inflation but not core inflation, and the authors advised decision-makers to focus on core inflation when setting monetary policy.

Shaari *et al.* (2012) investigated the effect of oil price shocks on inflation in Malaysia using monthly data from 2005 to 2011 and VAR-VECM and Granger causality methods. The study

found that oil prices Granger-cause inflation but not the exchange rate, while inflation Granger-causes oil prices, and the exchange rate has no causal influence on either inflation or oil prices.

Salisu *et al.* (2017) analyzed the oil price-inflation nexus for selected net oil-exporting and net oil-importing countries using quarterly panel data from 2000 to 2014. They found a significant positive long-run relationship between oil prices and inflation in both groups, with a larger long-run effect in net oil-importing countries, while short-run evidence was mixed. Oil price asymmetries were more important for oil-exporting countries.

Akinsola and Odhiambo (2022) examined the effect of oil prices on economic growth in seven low-income, oil-importing Sub-Saharan African countries using annual data from 1990 to 2018. Oil prices had no short-run effect on growth but a negative long-run effect, and inflation, interest rates and exchange rates were found to be significant transmission channels, leading the authors to recommend inflation-targeting regimes.

Ogede *et al.* (2020) studied quarterly data from African OPEC member countries from 1995 to 2017. The panel results showed a negative association between inflation and global oil price volatility, with inflation falling by 0.02% for every one percentage point rise in volatility. Country-specific results showed a positive and significant effect in Algeria, Angola, Gabon and Nigeria and a negative effect in Libya.

Niyimbanira (2019) investigated the relationship between oil prices and inflation in South Africa using the Augmented Dickey-Fuller test and the Johansen-Juselius cointegration method, and found a long-run relationship between oil prices and inflation, with unidirectional Granger causality running from oil prices to inflation. In Kenya, Odera (2015) examined the relationship between international diesel prices and inflation using cointegration and Granger causality tests, and found no short-run causal relationship, although the study did not examine the transmission mechanisms through which oil price variations affect inflation.

RESEARCH METHODOLOGY

The study adopted a quantitative approach using a combination of descriptive, causal and correlational research designs. Kenya was the target population, and the study used annual secondary time series data for the period 1970 to 2022. Data on inflation, gross domestic product, government spending, money supply and the exchange rate were obtained from the World Bank's World Development Indicators, while crude oil prices were obtained from the West Texas Intermediate (WTI) series in the Federal Reserve Economic Data (FRED) database. The year 1970 was chosen as the starting point because the decade marked the first major oil price shocks. All variables were transformed into annual percentage changes before analysis. Table 1 summarizes the operationalization of the variables.

Table 1: Operationalization of Variables

Type	Abbreviation	Variable	Measurement	Source
Independent	OILP	Oil price	Annual % change in WTI crude oil price	WTI / FRED
Independent	OILV	Oil price volatility	Average True Range (ATR)	Authors' computation
Dependent	INF	Inflation	Annual % change in CPI	World Bank
Control	GDP	Gross domestic product	Real GDP	World Bank
Control	GOV	Government spending	General government final consumption expenditure	World Bank
Control	Ms	Money supply	Broad money	World Bank
Control	EXCR	Exchange rate	KES per US dollar	World Bank

Source: Moragwa (2023)

Oil price volatility was measured using the Average True Range (ATR) developed by Wilder (1978). For each year, the true range was computed as the greatest of (i) the year's highest price less its lowest price, (ii) the highest price less the previous year's closing price, and (iii) the lowest price less the previous year's closing price, and the ATR was obtained by averaging the true range over the period. This measure captures the magnitude of price swings rather than the price level.

The analysis employed a Structural Vector Autoregressive (SVAR) model, an approach introduced by Sims (1980) that is widely used to study the transmission of economic shocks. The structural model is specified as $A_0 Y_t = B_0 + \sum B_1 Y_{t-s} + B_2 X_t + \varepsilon_t$, where Y_t is the vector of endogenous variables, A_0 is the matrix of contemporaneous coefficients, B_0 is a vector of intercepts, B_1 is the matrix of coefficients on lagged endogenous variables, B_2 is the matrix of coefficients on exogenous variables X_t , and ε_t is the vector of structural shocks. The reduced-form errors u_t are related to the structural shocks through $u_t = A_0^{-1} \varepsilon_t$.

The vector of endogenous variables was ordered as $Y_t = \{OILP_t, OILV_t, INF_t, GDP_t, GOV_t, Ms_t, EXCR_t\}$. The structural shocks were identified using a recursive (Cholesky) scheme, which imposes $N(N-1)/2 = 21$ zero restrictions on the lower-triangular contemporaneous matrix for the seven variables. Placing the oil price first assumes that the global price of crude oil is exogenous to the Kenyan economy, since no single small economy can significantly influence world oil prices. Impulse response functions (IRFs) with ± 2 analytic asymptotic standard error bands were used to trace the response of inflation to oil price and oil price volatility shocks over ten years, and forecast error variance decomposition (FEVD) was used to assess the relative contribution of each shock to inflation. Post-estimation diagnostic tests for serial correlation, heteroscedasticity, normality and stability were conducted. Estimation was carried out in EViews 12.

Descriptive Statistics

Table 2: Descriptive Statistics

Statistic	EXCR	GDP	GOV	INF	OILV	OILP	Ms
Mean	52.829	2.326	4.741	11.161	11.040	37.093	8.951
Std. Dev.	3.782	3.551	3.341	7.931	34.058	28.188	1.401
Skewness	0.093	1.341	0.973	1.979	1.879	0.927	1.671
Kurtosis	1.568	4.665	3.056	8.553	10.060	2.726	4.522
Jarque-Bera	4.691	31.547	8.529	104.678	138.622	7.903	30.354
Probability	0.095	0.000	0.014	0.000	0.000	0.019	0.000

Source: Authors' computation in EViews 12

Table 2 presents the descriptive statistics of the variables over the period 1970 to 2022. Inflation recorded a mean of 11.16 with a standard deviation of 7.93, reflecting the episodes of high inflation in the 1980s and early 1990s. Oil prices (mean = 37.09, SD = 28.19) and oil price volatility (mean = 11.04, SD = 34.06) displayed the largest dispersion of all the variables, with the standard deviation of oil price volatility exceeding its mean, confirming that global oil prices were the most unstable variable in the system. Money supply showed the least dispersion (SD = 1.40), indicating that the money in circulation in one period was relatively close to that of the previous period.

Inflation (skewness = 1.98, kurtosis = 8.55) and oil price volatility (skewness = 1.88, kurtosis = 10.06) were positively skewed and leptokurtic, indicating occasional extreme upward movements. Based on the Jarque-Bera probabilities, only the exchange rate ($p = 0.095$) followed a normal distribution at the 5% level, while all the other variables departed from normality, which is common for macroeconomic series subject to periodic shocks.

Trend analysis showed that crude oil prices followed an upward trend on average since 1970, punctuated by sharp increases during the oil crises of the 1970s, the run-up to the 2007-2008 global financial crisis and the post-pandemic recovery, and by sharp falls in 1986, 2014-2016 and 2020. Inflation in Kenya did not follow a linear trend: it peaked in 1993, rose markedly in 2007-2008, and has remained relatively stable within single digits since 2012. A comparison of annual percentage changes showed that oil prices and the exchange rate were the most volatile variables in the system.

Unit Root Tests

Table 3: ADF and PP Unit Root Test Results

Variable	ADF 5% Critical Value	ADF t- Statistic	ADF Prob.	PP 5% Critical Value	PP t- Statistic	PP Prob.
EXCR	-2.9188	-5.3242	0.0000	-2.9188	-5.3242	0.0000
GDP	-2.9188	-5.9823	0.0000	-2.9188	-5.9823	0.0000
GOV	-2.9200	-5.2964	0.0000	-2.9188	-5.2953	0.0000
INF	-2.9200	-4.0599	0.0024	-2.9188	-4.0066	0.0029
OILV	-2.9200	-5.9103	0.0000	-2.9188	-7.8798	0.0000
OILP	-2.9200	-7.3189	0.0000	-2.9188	-7.3189	0.0000
Ms	-2.9188	-5.2491	0.0001	-2.9188	-5.2491	0.0001

Note: All variables were transformed into annual percentage changes before testing.

Source: Authors' computation in EViews 12

Table 3 presents the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test results. For every variable, the t-statistic is more negative than the 5% critical value and the probability values are below 0.05, so the null hypothesis of a unit root is rejected under both tests. All the variables are therefore stationary at levels after transformation into percentage changes, which makes them suitable for estimation in an SVAR framework without differencing.

Optimal Lag Length Selection

Table 4: Optimal Lag Length of the SVAR

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	-1193.606	N/A	4.524	49.004	49.275*	49.107
1	-1108.157	142.995*	1.043*	47.517*	49.679	48.337*
2	-1067.997	55.733	1.698	47.877	51.931	49.415
3	-1014.874	58.544	2.005	47.709	53.655	49.965
4	-964.383	41.217	4.037	47.648	55.486	50.622

** indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level); FPE: final prediction error; AIC: Akaike information criterion; SIC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.*

Source: Authors' computation in EViews 12

Table 4 shows that the LR, FPE, AIC and HQ criteria all select one lag, while the SIC selects zero lags. Following the AIC and the majority of the criteria, the SVAR was estimated with an optimal lag length of one, which balances goodness of fit against model complexity and avoids over-fitting given the annual sample. The SVAR was estimated by maximum likelihood and is just-identified.

Impulse Response Functions

Figure 2 presents the responses of the variables in the system to a one-standard-deviation structural shock to global crude oil prices, traced over ten years with ± 2 standard error bands.

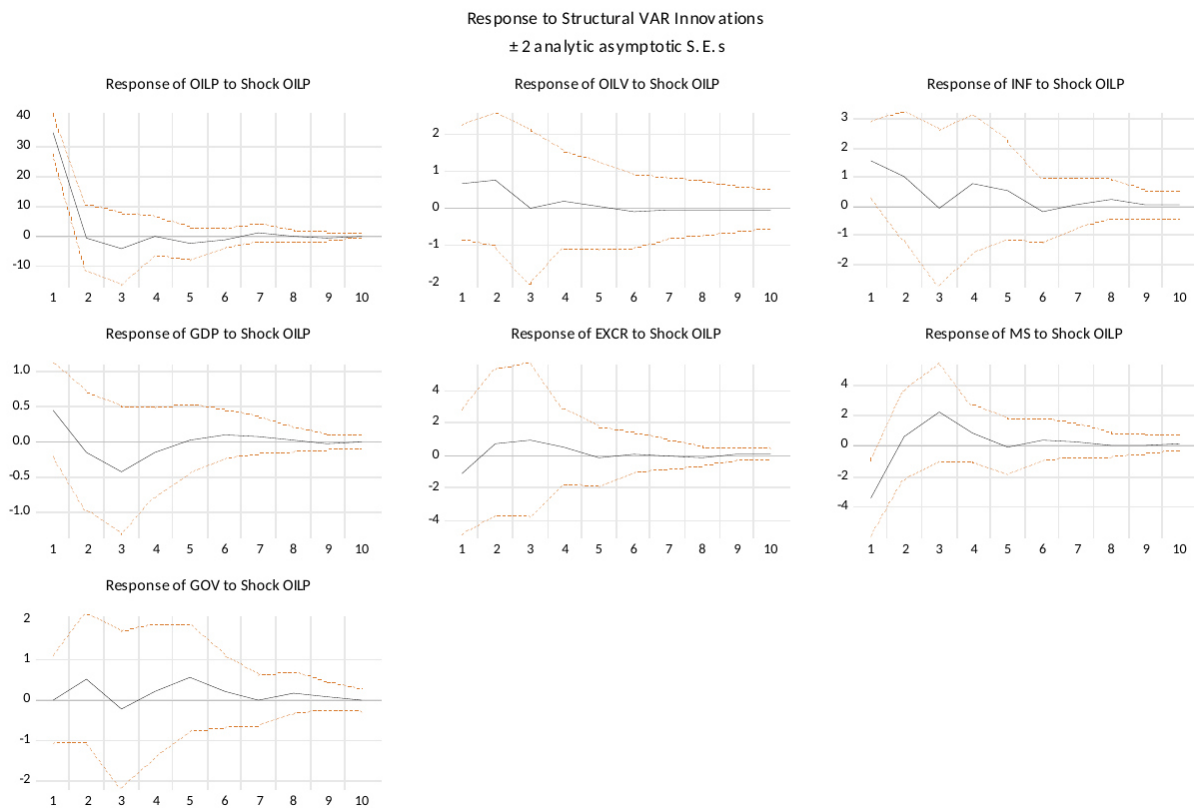


Figure 2: Responses to a Shock in Crude Oil Prices

Source: Authors' computation in EViews 12

A one-standard-deviation shock to oil prices causes an immediate and significant increase in inflation of about 1.5 percentage points in the first year, with the lower confidence band remaining above zero. The effect weakens in the second year and falls to around zero by the third year, after which the response fluctuates around zero and is statistically insignificant. This indicates that oil price shocks influence inflation in Kenya mainly in the short term, specifically in the first one to one and a half years after the shock, and that the effect diminishes over time. The oil price shock also produces short-lived and largely insignificant movements in GDP, the exchange rate and government spending, and an initial decline in money supply that reverses by the second year.

Figure 3 presents the responses to a one-standard-deviation structural shock to oil price volatility.

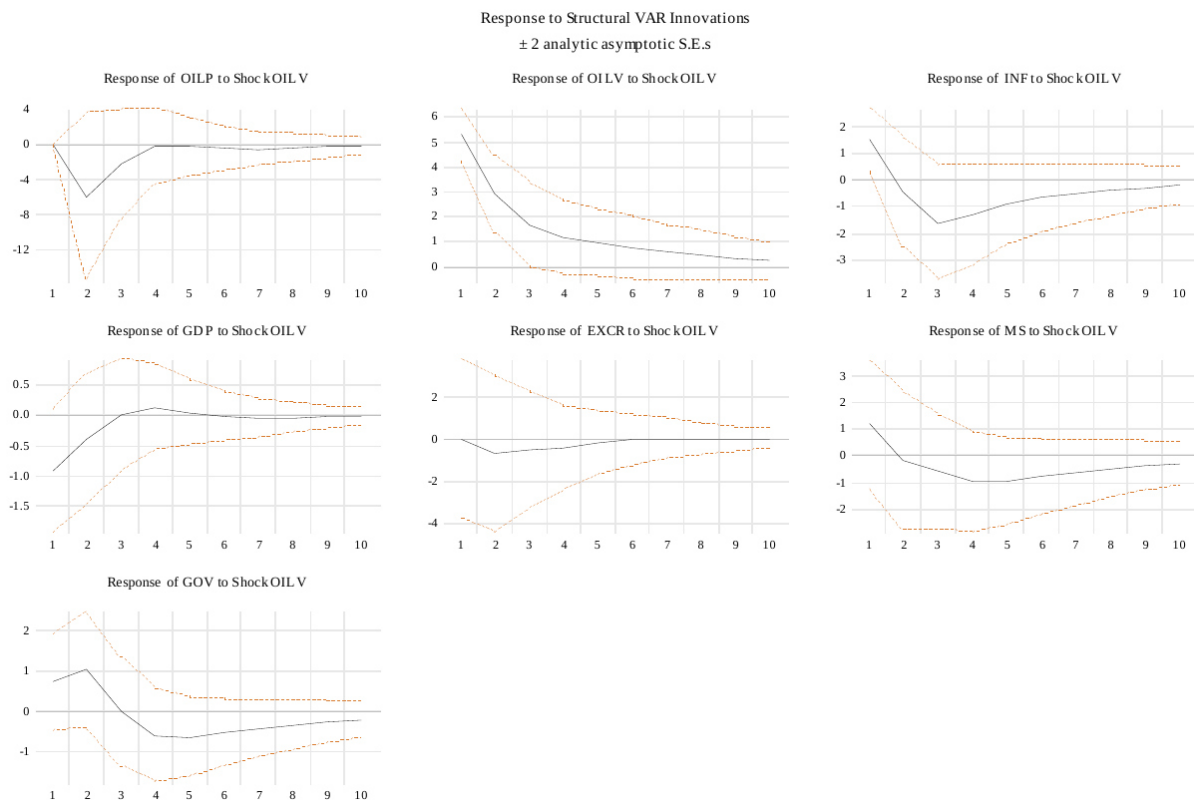


Figure 3: Responses to a Shock in Oil Price Volatility

Source: Authors' computation in EViews 12

A one-standard-deviation shock to oil price volatility also causes a significant increase in inflation in the first year, of about 1.5 percentage points. Inflation then declines, turning negative in the second year and reaching a minimum of about -1.6 percentage points in the third year, before gradually returning towards zero. The confidence bands include zero from the second year onwards, so the negative phase of the response is not statistically significant. A volatility shock also raises government spending up to the second year, lowers GDP on impact and lowers money supply up to about the fifth year, but these responses are largely insignificant. Overall, both oil price and oil price volatility shocks affect inflation in the short run, and their effects fade as the economy adjusts.

Forecast Error Variance Decomposition

Table 5: Forecast Error Variance Decomposition of Inflation (%)

Period	S.E.	OILP	OILV	INF	GDP	EXCR	Ms	GOV
Year 1	4.71	12.87	10.53	76.60	0.00	0.00	0.00	0.00
Year 2	7.59	8.04	4.37	44.68	0.00	30.94	9.61	2.36
Year 3	8.24	6.98	7.52	40.15	0.01	34.79	8.52	2.04
Year 4	8.42	6.69	9.68	39.09	0.07	34.34	8.18	1.95
Year 5	8.50	6.56	10.62	38.69	0.12	34.34	8.02	1.92
Year 6	8.55	6.49	11.07	38.49	0.15	34.06	7.94	1.89
Year 7	8.58	6.45	11.32	38.37	0.16	33.97	7.89	1.88
Year 8	8.60	6.43	11.46	38.30	0.17	33.93	7.86	1.88
Year 9	8.61	6.41	11.54	38.26	0.17	33.89	7.85	1.87
Year 10	8.61	6.41	11.58	38.24	0.18	33.89	7.84	1.87

Source: Authors' computation in EViews 12

Table 5 shows that in the first year 76.6% of the forecast error variance of inflation is explained by its own shocks, indicating that inflation in Kenya is largely determined by its own dynamics in the very short run. Oil prices account for 12.9% and oil price volatility for 10.5% of the variation in inflation in the first year, making global oil shocks the only external sources of inflation variation on impact. As the horizon lengthens, the share explained by inflation's own shocks falls to about 38%, indicating that inflation becomes increasingly endogenously determined by other variables in the system.

The contribution of oil prices declines from 12.9% in the first year to about 6.4% by the tenth year, whereas the contribution of oil price volatility dips in the second year and then rises steadily to about 11.6% by the tenth year. The exchange rate, which explains none of the variation in inflation in the first year, becomes the most important external driver from the second year onwards, accounting for about 34% of the variation. Money supply explains about 8%, while government spending and GDP each account for less than 2%. The FEVD of oil prices further shows that about 83% of the variation in oil prices is explained by their own shocks and only about 11% by Kenyan inflation, and about 85% of the variation in oil price volatility is explained by its own shocks, confirming that global oil prices are essentially exogenous to the Kenyan economy.

Diagnostic Tests

Table 6: Post-Estimation Diagnostic Tests

Test	Statistic	df	Prob.	Conclusion
Serial correlation (LM, lag 2)	LRE = 53.227	49	0.315	No serial correlation
Heteroscedasticity (White, joint)	$\chi^2 = 414.014$	392	0.213	Homoscedastic residuals
Normality (Jarque-Bera, joint)	JB = 803.240	14	0.000	Residuals not jointly normal
Stability (AR roots)	All inverse roots inside unit circle			Model is stable

Source: Authors' computation in EViews 12

Table 6 summarizes the post-estimation diagnostic tests. The Lagrange Multiplier test ($p = 0.315$) does not reject the null hypothesis of no serial correlation, and the White test ($p = 0.213$) does not reject the null hypothesis of homoscedasticity. All the inverse roots of the AR characteristic polynomial lie inside the unit circle, indicating that the SVAR is stable and that the impulse responses and variance decompositions are valid. The Jarque-Bera test rejects joint normality of the residuals; at the component level, normality is not rejected for two of the seven equations, including the inflation equation. Departures from normality are common in annual macroeconomic data affected by large shocks such as the oil crises, and do not invalidate the stability or the consistency of the estimates, although they suggest that the confidence bands should be interpreted with some caution.

Taken together, the impulse responses and the variance decomposition show that both oil price and oil price volatility shocks have a statistically significant effect on inflation in Kenya in the short run. Consequently, the null hypotheses H_{01} and H_{02} were rejected for the short run.

These findings are consistent with Hijazine and Al-Assaf (2022), who found a significant short-run but minimal long-run effect of oil prices on headline inflation in Jordan, and with Baba and Lee (2022), who emphasize that oil price volatility disrupts production, demand and supply and results in unstable inflation. The fading of the inflation response is consistent with the Expectations-Augmented Phillips Curve, under which the effect of a supply shock dissipates as agents adjust their expectations. The pattern differs from Kose and Unal (2021), who found that the effects of oil prices and their volatility on inflation in Turkey were small initially and grew over time, and it contrasts with Odera (2015), who found no short-run link between oil prices and inflation in Kenya. The negative, though insignificant, phase of the inflation response to volatility shocks after the first year is in line with Ogede *et al.* (2020), who observed an inverse association between oil price volatility and inflation in African oil-exporting countries. The prominence of the exchange rate in explaining inflation over longer horizons is consistent with Akinsola and Odhiambo (2022), who identified the exchange rate as a key channel through which oil price shocks are transmitted in oil-importing Sub-Saharan African economies.

CONCLUSION

The study concludes that inflation in Kenya has not followed a linear trend since 1970, while global crude oil prices have followed an upward trend on average, punctuated by periods of extreme volatility. Global oil prices are exogenous to the Kenyan economy, but they transmit significant inflationary pressure to it. A one-standard-deviation shock to either oil prices or oil price volatility causes a significant rise in inflation within the first year, after which the effect diminishes and becomes statistically insignificant from about the second year as consumers and firms adjust their expectations to the prevailing economic conditions.

In the short run, oil prices and their volatility together explain nearly a quarter of the variation in inflation, making them the only significant external drivers of inflation on impact. Over longer horizons, the exchange rate becomes the dominant external determinant of inflation, while the contribution of oil price volatility stabilizes at about 11% and that of oil prices at about 6%. The null hypotheses that oil prices and oil price volatility do not significantly affect inflation were therefore rejected for the short run.

Recommendations

Given that oil price shocks have a short-term effect on inflation, the Central Bank of Kenya should closely monitor global oil price developments and their effects on inflation expectations. Inflation-targeting policies that take short-term oil price fluctuations into account, through timely adjustments in the policy rate or other stabilization tools, can help prevent oil shocks from feeding into persistent inflation.

The Energy and Petroleum Regulatory Authority (EPRA) should institute and strengthen measures that cushion the economy during oil price fluctuations, such as a well-funded and transparently managed fuel price stabilization mechanism, so that global price spikes are not passed on abruptly to consumers and producers.

Because the exchange rate is the dominant external driver of inflation over longer horizons and amplifies the cost of oil imports, monetary and fiscal authorities should pursue policies that promote exchange rate stability, including adequate foreign exchange reserves and a sustainable external balance.

To reduce dependence on imported oil, the government should continue to support renewable energy sources, implement energy efficiency measures, and promote economic diversification towards sectors less dependent on oil, such as agriculture, technology and manufacturing, thereby reducing the economy's sensitivity to global oil price shocks.

While this study used annual data for the period 1970 to 2022, future studies could use higher-frequency (monthly or quarterly) data to capture the short-run dynamics more precisely, examine the specific sectoral channels through which oil price volatility affects inflation in Kenya, distinguish between headline and core inflation, and employ cointegration-based approaches to evaluate long-run relationships and the speed of adjustment to equilibrium.

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