Name of Publisher: BRIGHT EDUCATION RESEARCH SOLUTIONS

Area of Publication: Business, Management and Accounting (miscellaneous)

Journal of Management & Social Science

ISSN Online: 3006-4848
ISSN Print: 3006-483X

https://rjmss.com/index.php/7/about

RECOGNIZED IN "Y" CATEGORY BY

Let's Start!

[ANALYZING THE IMPACT OF THE WORLD OIL PRICE ON INFLATION AND GROWTH IN PAKISTAN]

Hoor Babar
MS Economics Scholar, Institute of Management Sciences Peshawar, Pakistan. Email: hoorbabar1998@gmail.com
Mukamil Shah
Assistant Professor Economics, Institute of Management Sciences Peshawar, Pakistan. Email: mukamil.shah@imsciences.edu.pk

Review Type: Double Blind Peer Review

ABSTRACT

This research investigates the dynamic relationship between the global oil prices with other macroeconomic factors including GDP growth, inflation rates, exchange rates, and stock market returns in Pakistan. The research analyses the impacts of oil price shocks with quarterly data ranging from 2000Q1 to 2023Q4, and the Structural Vector Autoregressive (SVAR) model is used. This contribution establishes that an expansion in the price of oil poses a major challenge to GDP growth due to increased cost of production and consequently decreased output. The inflationary pressure further expands because of cost pull factors while fluctuation in the foreign exchange expands the pressure due to high import cost. Variance decomposition also explains the importance of exchange rate volatility for GDP and inflation. The study confirms Pakistan's position as a net oil importer, a situation that makes consumption prices vulnerable to changes in prices in the international market for economic shocks. Measures under policy recommendations include diversification in energy sources, a strong and stable control of the exchange rates and sound monetary as well as fiscal policies which will help to cushion for the shocks in oil prices and therefore foster development in sustainable economic growth.

Key Words: Macroeconomics, GDP growth, Inflation, Exchange rate, Stock price, Oil price

Introduction

Oil is a basic commodity in the world economy, and nations like Pakistan are especially susceptible to changes in the price of oil as they depend so heavily on imports to meet their energy needs. Since imported oil accounts for more than 70% of Pakistan's energy consumption, the country's economy is extremely vulnerable to changes in global oil prices. A spike in oil prices can significantly disrupt macroeconomic stability by influencing important metrics including GDP growth, inflation, exchange rates, and stock market performance. Increased import expenses due to rising oil prices strain foreign exchange reserves and devalue the Pakistani rupee. The cost of necessary imports rises as a result of this devaluation, which further fuels inflation and lowers consumer purchasing power. Inflationary pressures worsen poverty and lower economic welfare in a nation where many people already struggle with little financial means. Rising production and transportation costs have a particularly negative impact on the industrial sector, disrupting supply networks and lowering investment. As a result, there is a greater chance of economic stagnation and slower economic growth.

The economy is made even more uncertain by the volatility of oil prices. Short-term price drops provide little respite because the world's oil markets are still volatile. Chronic inflation, trade deficits, and rising foreign debt are all consequences of ongoing instability that weaken economic resilience. Particularly vulnerable to these swings is the exchange rate. The rupee is under pressure to decline as rising oil prices raise demand for foreign currencies, such as the US dollar, to finance oil imports. This increases the cost of servicing foreign debt and intensifies inflationary pressures. The volatility of the oil price also contributes to greater economic instability, which is reflected in the stock market. Because rising oil prices reduce company profitability, deter investment, and increase market uncertainty, the benchmark KSE-100 index—which frequently reflects the economic effects of these shocks—tends to fall. As a result of investors lowering their exposure, market confidence and liquidity decline. The relevance of comprehending how oil price shocks affect macroeconomic stability is shown by the connection between Pakistan's internal economy and global oil prices. There are important long-term ramifications to the correlation between oil prices and macroeconomic variables, especially GDP growth, inflation, and currency rates. Because rising oil prices discourage investment and restrict industrial output, they raise production costs, lower export competitiveness, and impede economic growth. The long-term detrimental consequences of oil price volatility are not eliminated by times of lower prices, even though they may offer temporary respite. According to historical data, high oil prices hinder GDP growth by raising costs in a number of industries, lowering consumer demand, and stifling investment prospects. Analyzing these links is essential for Pakistan, a developing economy, to create focused policies that promote resilience and lessen the negative consequences of changes in the price of oil. This study uses sophisticated econometric approaches, notably the Structural Vector Autoregressive (SVAR) model, to examine the dynamic relationship between global oil prices and macroeconomic indices like GDP growth, inflation, exchange rates, and the stock market. In order to help policymakers, investors, and company executives successfully manage these risks, the paper will outline the ways in which variations in the price of oil impact important macroeconomic factors.

Literature Review

With an emphasis on oil-importing nations like Pakistan, this section examines the connections between important macroeconomic factors, including GDP, inflation, stock prices, exchange rates, and world oil prices. Divergent opinions on the effects of changes in oil prices on economic performance are presented by a number of research. The majority of studies emphasizes the negative consequences of rising oil prices on inflation and economic growth, notwithstanding some claims that structural variables and policy settings can lessen these effects. Understanding these dynamics is essential for macroeconomic stability because of Pakistan's reliance on imported oil. Generally speaking, high oil prices decrease purchasing power, slow economic growth, and cause cost-push inflation. Using a Structural Vector Autoregressive (SVAR) model, Ahmed et al. (2023) verify the close relationship between GDP, inflation, and oil prices. . Despite the notion that higher oil prices often slow GDP growth, monetary policy and currency rates have an impact on this relationship. Research highlights how crucial it is to implement suitable policy measures to control the volatility of oil prices. According to country-specific studies, Pakistan's inflation is greatly impacted by changes in the price of oil. According to Asif et al. (2021), rising oil prices raise consumer costs and the need for US dollars to pay for oil imports, which pushes the Pakistani rupee down and contributes to inflation. Shafique and Bhutto (2016) contend that the usual correlation between oil prices and inflation might be distorted by domestic factors, including pricing policies, market conditions, and supply chain inefficiencies. Rising oil prices weaken the rupee, raise import costs, and worsen inflation, as Zaheer Malik et al. (2017) show. The currency rate is a key factor in enhancing these impacts. Similar vulnerabilities in other oil-importing nations, where rising oil prices result in higher production costs and worsening economic performance, are confirmed by comparative research on Thailand and Tunisia. In order to maintain long-term economic stability in Pakistan, structural analysis models like SVAR highlight the necessity of mitigating measures like energy diversification, exchange rate stabilization, and inflation management.

Numerous studies look at how changes in oil prices affect the GDP development of emerging nations that import oil. Using the Johansen co-integration technique, Nazir et al. (2014) examined Pakistan's GDP from 1972 to 2011 and concluded that rising oil prices raise production costs, which in turn limit GDP growth. But they also pointed out that increased oil consumption might spur economic expansion, underscoring oil's dual function as Pakistan's growth engine and vulnerability. Oil prices have a big impact on inflation in nations that import oil, like Pakistan. Using time-series data from 1979 to 2012, Saleem and Ahmad (2015) discovered that a 10% increase in crude oil prices causes the GDP deflator to measure inflation by about 1%. Their analysis emphasizes how crucial energy diversification is to lowering Pakistan's susceptibility to changes in the world oil price. They contend that reliance on imported oil increases the danger of inflation anytime global oil prices rise, which is exacerbated by variables such as interest rates, money supply, and exchange rates. Exchange rate fluctuations and the volatility of the oil price are closely related. Using an SVAR model, Zaheer Malik et al. (2017) demonstrate how rising global oil prices cause the Pakistani rupee to depreciate temporarily since there is a greater need for foreign currency to pay for oil imports. The cost of imported goods rises as a result of this depreciation, further causing economic instability. Higher oil costs eventually slow GDP growth and raise inflation, mirroring trends seen in other oil-importing nations. Stock markets are also impacted by changes in oil prices, particularly in nations that import oil, such as Pakistan. Oil prices have a significant impact on business performance and market mood, which are reflected in the Karachi Stock Exchange (KSE-100) index. According to Wang et al. (2013), in countries that import oil, rising oil prices usually result in decreasing stock markets, increased production costs, and inflation. Pakistan's heavy reliance on imported oil makes its economy especially vulnerable. On the other hand, rising oil prices help oil-exporting nations by enhancing their earnings and competitiveness. Policymakers and investors in oil-importing countries must devise ways to lessen the negative effects of oil price volatility on financial markets.

Methodology and Econometric Model

This study analyzes the dynamic relationship between global oil prices and important macroeconomic indicators in Pakistan, such as GDP growth, inflation, exchange rates, and the stock market, using a quantitative approach and quarterly data from the first quarter of 2000 to the fourth quarter of 2023. Both the immediate and long-term effects of shocks to the price of oil are captured by the Structural Vector Autoregressive (SVAR) model. Finding structural shocks and comprehending how they affect macroeconomic variables are two tasks that this model excels at. While GDP growth, inflation (as determined by the Consumer Price Index), exchange rates (rupee to U.S. dollar), and stock market performance (as measured by the KSE-100 index) are gathered from reputable domestic and international sources, such as the State Bank of Pakistan and the Pakistan Bureau of Statistics, data on oil prices is gathered in U.S. dollars per barrel. The Akaike Information Criterion (AIC) is used to calculate the ideal lag length for the VAR model, and the Augmented Dickey-Fuller (ADF) test is used to verify for stationarity. Variance decomposition and impulse response functions offer further in-depth information about the extent and direction of these effects, while Granger causality tests aid in establishing causal linkages between variables. This comprehensive approach ensures robust results, offering valuable insights for policymakers and stakeholders in understanding and mitigating the risks associated with oil price fluctuations in Pakistan's economy.

SVAR Model Specification

In this study, the Structural Vector Autoregressive (SVAR) model is used to assess the interactive effects of oil prices, stock market prices, exchange rates, inflation, and GDP. The SVAR model is an extension of the VAR model which uses structural restrictions derived from theory for identifying causes of several moments in the variables. The primary strength of applying the SVAR model is in identifying the endogenous response of the system of variables on one hand and, and exogenous shock on the other hand, stage such as global oil prices.

The SVAR model for this study can be expressed as follows:

$$AY_t = c + B(L)Y_{t-1} + ut \qquad (1)$$

Where:

- *A* is a structural parameter matrix.
- Y_t represents the vector of endogenous variables (oil price, stock market prices, exchange rate, GDP, and inflation).
- *c* is the vector of constants.
- *B(L)* is the lag polynomial matrix capturing relationships over time.
- *ut* is Vector of structural shocks $(u_{OPt}, u_{ERt}, u_{SPt}, u_{\pi t}, u_{Yt})$

SVAR for each variable:

1. In the context of this study, the variables in the Y_t vector include:
2. GDP Growth (Y_t): Gross Domestic Product of Pakistan, representing economic output.
3. Inflation (π_t): The rate of inflation in Pakistan, measured by the Consumer Price Index (CPI).
4. Stock Market Prices (SP_t): The Stock market performance measured by the KSE-100 index.
5. Exchange Rate (ER_t): The value of the Pakistani Rupee against the US Dollar (U.SD/PKR) Real Exchange Rate.
6. Oil Prices (OP_t): The global price of crude oil (measured in USD per barrel).

This system can be written in matrix form structural (VAR) as:

$$Y_t = \beta_{10} + \beta_{11}\pi_t + \beta_{12}SP_t + \beta_{13}ER_t + \beta_{14}OP_t + \gamma_{10}Y_{t-i} + \gamma_{11}\pi_{t-i} + \gamma_{12}SP_{t-i} + \gamma_{13}ER_{t-i} + \gamma_{14}OP_{t-i}$$

$$\pi_t = \beta_{20} + \beta_{21}Y_t + \beta_{22}SP_t + \beta_{23}ER_t + \beta_{24}OP_t + \gamma_{20}Y_{t-i} + \gamma_{21}\pi_{t-i} + \gamma_{22}SP_{t-i} + \gamma_{23}ER_{t-i} + \gamma_{24}OP_{t-i}$$

$$SP_t = \beta_{30} + \beta_{31}Y_t + \beta_{32}\pi_t + \beta_{33}ER_t + \beta_{34}OP_t + \gamma_{30}Y_{t-i} + \gamma_{31}\pi_{t-i} + \gamma_{32}SP_{t-i} + \gamma_{33}ER_{t-i} + \gamma_{34}OP_{t-i}$$

$$ER_t = \beta_{40} + \beta_{41}Y_t + \beta_{42}\pi_t + \beta_{43}SP_t + \beta_{44}OP_t + \gamma_{40}Y_{t-i} + \gamma_{41}\pi_{t-i} + \gamma_{41}SP_{t-i} + \gamma_{43}ER_{t-i} + \gamma_{44}OP_{t-i}$$

$$OP_t = \beta_{50} + \beta_{51}Y_t + \beta_{52}\pi_t + \beta_{53}SP_t + \beta_{54}ER_t + \gamma_{50}Y_{t-i} + \gamma_{51}\pi_{t-i} + \gamma_{52}SP_{t-i} + \gamma_{53}ER_{t-i} + \gamma_{54}OP_{t-i} \qquad (2)$$

This system can be written in matrix form structural (VAR) as:

$$\begin{bmatrix} 1 & b_{12} & b_{13} & b_{14} & b_{15} \\ b_{21} & 1 & b_{23} & b_{24} & b_{25} \\ b_{31} & b_{32} & 1 & b_{34} & b_{35} \\ b_{41} & b_{42} & b_{43} & 1 & b_{45} \\ b_{51} & b_{52} & b_{53} & b_{54} & 1 \end{bmatrix} \begin{bmatrix} Y_t \\ \pi_t \\ SP_t \\ ER_t \\ OP_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \\ b_{30} \\ b_{40} \\ b_{50} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} & \gamma_{15} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} & \gamma_{24} & \gamma_{25} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} & \gamma_{34} & \gamma_{35} \\ \gamma_{41} & \gamma_{42} & \gamma_{43} & \gamma_{44} & \gamma_{45} \\ \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & \gamma_{55} \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ \pi_{t-1} \\ SP_{t-1} \\ ER_{t-1} \\ OP_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{Yt} \\ \varepsilon_{\pi t} \\ \varepsilon_{SPt} \\ \varepsilon_{ERt} \\ \varepsilon_{OPt} \end{bmatrix}$$

$$BX_t = B_0 + \gamma^i X_{t-i} + \varepsilon_t \qquad (3)$$

Which can be written in standard reduced from VAR as:

$$X_t = B^{-1}B_0 + B^{-1}\gamma^i X_{t-i} + B^{-1}\varepsilon_t \qquad (4)$$

$$X_t = A_0 + \sum_{i=1}^{p} A_i X_{t-1} + \varepsilon_t \qquad (5)$$

$$X_t = A_0 + A_1 X_{t-1} + \dots\cdots\cdots + A_p X_{t-p} + \varepsilon_t \qquad (6)$$

. From the above theoretical relationship (2) matrix B can be developed as:

$$B= \begin{bmatrix} 1 & b_{12} & 0 & 0 & b_{15} \\ 0 & 1 & 0 & b_{24} & b_{25} \\ 0 & b_{32} & 1 & b_{34} & b_{35} \\ 0 & b_{42} & 0 & 1 & b_{45} \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Empirical Analysis

The short-term dynamics between changes in the price of oil globally and Pakistan's primary macroeconomic indicators, including GDP growth, inflation, exchange rate fluctuations, and stock prices, will be discussed in this section. The study examines how the economy reacts to fluctuations in the price of oil, considering both the short-term and long-term effects, using the Structural Vector Autoregressive (SVAR) model. Since the SVAR framework can estimate the causal impacts of structural shocks while taking endogenous variables into account, it is the most appropriate framework to use for this investigation. The first section of the chapter analyzes the data and the manner in which the analytic variables were produced, as well as the methodological framework. Several econometric approaches, such as Granger causality tests, forecast error variance decomposition (FEVD), and impulse response functions (IRFs), are used to examine the linkages and transmission mechanisms among the variables. As a result, the study helps policymakers and other interested parties better understand how shocks to oil prices ripple across the Pakistani economy.

Unit Root Test

The Augmented Dickey-Fuller (ADF) test is one of the most commonly used methods for this purpose. It tests the null hypothesis that a unit root is present in the series, indicating non-stationarity. If the p-value of the test is below 0.05, the null hypothesis is rejected, and the series is deemed stationary. In this analysis, the ADF test was applied to several variables to assess their stationarity properties.

Table 1 Unit Root Test (ADF Test)

Variables	Lag	Intercept	Trend	P-Value	Order of Integration
Oil Price	0	Yes	No	0.1	I(1)
ΔOil Price	1	Yes	Yes	0	I(0)
Exchange Rate	0	Yes	No	1	I(1)
ΔExchange Rate	1	Yes	Yes	0	I(0)
Stock Price	1	Yes	No	0.54	I(1)
ΔStock Price	0	Yes	Yes	0.01	I(0)
GDP Growth	2	Yes	No	0.01	I(0)
ΔGDP Growth	1	Yes	Yes	0	I(0)
Log of CPI	0	No	No	0.82	I(1)
ΔLog of CPI	0	No	No	0.01	I(0)

The results show that Oil Price, Exchange Rate, Stock Price, and Inflation are non-stationary at their levels, with p-values of 0.1, 1, 0.54, and 0.82, respectively. However, their first differences (denoted as ΔOil Price, ΔExchange Rate, ΔStock Price, and ΔInflation) are stationary with p-values of 0, confirming that these variables are integrated of order one, I(1). On the other hand, GDP is stationary at the level itself, with a p-value of 0.01, indicating it is integrated of order zero, I(0).

VAR Lag Order Selection Criteria

The procedure for figuring out the ideal lag length for a Vector Autoregressive (VAR) model is summarized in the VAR Lag Order Selection Criteria table. A number of criteria are used, such as the Hannan-Quinn Criterion (HQ), Akaike Information Criterion (AIC), Schwarz Criterion (SC), Final Prediction Error (FPE), Log-Likelihood (LogL), and sequential modified Likelihood Ratio (LR) test statistic. In order to determine the ideal lag time for the VAR model, each of these statistical metrics is essential. Lag 2 is the optimal selection for the VAR model, according to the research. Because the AIC, SC, and HQ values are excessively high at lag 0, the model does not fit well. When lag 1 is added, the model improves a lot—the LR value jumps to 7781.94, and the AIC, SC, and HQ values drop.

Table 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	137.74	NA	0.00	-0.58	0.22	-0.26
1	4291.20	7781.94	0.00	-31.27	-30.14	-30.82
2	**5473.40**	**2171.2***	**3.e-24***	**-39.86***	**-38.40***	**-39.22***
3	5475.33	3.48	0.00	-39.71	-37.90	-38.98
4	5477.59	3.97	0.00	-39.54	-37.40	-38.68
5	5480.29	4.67	0.00	-39.37	-36.90	-38.38
6	5483.65	5.68	0.00	-39.21	-36.40	-38.08
7	5488.01	7.18	0.00	-39.06	-35.92	-37.79
8	5493.88	9.48	0.00	-38.91	-35.44	-37.52

* 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
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

At lag 2, things get even better. The AIC, SC, and HQ values are at their lowest, and the FPE (forecast error) is also the smallest, meaning the model makes more accurate predictions. After lag 2, the model starts to worsen, as the values begin to rise again, showing that adding more lags won't help and might make the model too complicated. In simple terms, lag 2 is the best because it gives the right balance between accuracy and simplicity, avoiding mistakes from adding too many lags.

Granger Causality

The results of the Granger Causality/Block Exogeneity Wald Tests reveal significant insights into the causal relationships among the variables in the model. When GDP is the dependent variable, inflation has a weak effect at the 10% significance level (p = 0.0559). Stock prices have no significant effect (p = 0.895), but the exchange rate (p = 0.042) and world oil prices (p = 0.041) significantly affect GDP. All variables together significantly explain GDP changes (p = 0.0115). For inflation, GDP has a significant impact (p = 0.0201), while stock prices do not (p = 0.1483). The exchange rate (p = 0.0004) and world oil prices (p = 0.0072) strongly affects inflation. Overall, all variables combined significantly explain inflation (p = 0.0014).

Table 3 VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: LGDP			
Excluded	Chi-sq	df	Prob.
INF	5.768898	2	0.0559
LSP	0.221823	2	0.895
LREER	6.341309	2	0.042
LWOP	6.388967	2	0.041
All	19.69717	8	0.0115
Dependent variable: INF			
Excluded	Chi-sq	df	Prob.
LGDP	7.814576	2	0.0201
LSP	3.817607	2	0.1483
LREER	15.44465	2	0.0004
LWOP	9.878571	2	0.0072
All	25.25631	8	0.0014

This shows that external factors like exchange rates and oil prices play an important role in shaping GDP and inflation.

Variance Decomposition

The variance decomposition analysis provides a detailed understanding of how each variable in the model influences itself and others over time. For LGDP (Log of GDP), the results indicate that its variance is fully explained by its own shocks in the initial period (100% in Period 1). However, as time progresses, the contribution of LGDP's own shocks diminishes, and other variables, particularly LREER (Log of Real Effective Exchange Rate), begin to play a more significant role. By Period 5, LGDP explains 83.68% of its variance, while LREER contributes 15.41%, demonstrating the increasing influence of exchange rate dynamics.

Table 4: Variance Decomposition of LGDP:

Period	S.E.	LGDP	INF	LSP	LREER	LWOP
1	0.005	100.000	0.000	0.000	0.000	0.000
2	0.009	98.852	0.073	0.020	1.055	0.000
3	0.014	95.729	0.139	0.059	4.040	0.033
4	0.018	90.551	0.154	0.112	8.981	0.202
5	0.022	83.675	0.130	0.192	15.410	0.593
6	0.026	75.955	0.099	0.319	22.433	1.195
7	0.030	68.404	0.075	0.525	29.093	1.902
8	0.033	61.791	0.063	0.849	34.721	2.576
9	0.036	56.479	0.057	1.331	39.025	3.108
10	0.039	52.497	0.054	1.997	42.004	3.447
11	0.042	49.684	0.053	2.854	43.809	3.601
12	0.044	47.811	0.055	3.874	44.651	3.609

Variance Decomposition of INF:

Period	S.E.	LGDP	INF	LSP	LREER	LWOP
1	0.711	12.983	87.017	0.000	0.000	0.000
2	1.378	9.859	89.217	0.171	0.735	0.018
3	2.028	6.991	88.995	0.809	3.019	0.186
4	2.665	4.651	85.772	2.029	6.898	0.650
5	3.314	3.048	80.096	3.693	11.766	1.397
6	3.988	2.135	73.441	5.493	16.691	2.240
7	4.685	1.687	67.255	7.147	20.959	2.952
8	5.388	1.466	62.344	8.509	24.286	3.395
9	6.083	1.319	58.880	9.555	26.703	3.543
10	6.760	1.181	56.671	10.317	28.381	3.450
11	7.415	1.040	55.385	10.852	29.523	3.201
12	8.052	0.904	54.678	11.215	30.324	2.879

By Period 12, GDP's self-explanatory power drops to 47.81%, while the exchange rate (LREER) becomes the main factor, explaining 44.65%. Oil prices (LWOP) and stock prices (LSP) have smaller but growing effects, with LWOP reaching 3.61%. For inflation (INF), 87.02% of its variation in Period 1 is due to its own shocks, with 12.98% explained by GDP. Over time, the exchange rate plays a bigger role. By Period 12, inflation's self-explanatory power drops to 54.68%, with LREER explaining 30.32% and LSP contributing 11.22%. Overall, the results show that the exchange rate (LREER) strongly influences both GDP and inflation. For long-term growth, exchange rate management is crucial. Inflation is increasingly shaped by external factors like exchange rate changes and stock market performance, highlighting the need for policies to manage these risks and maintain economic stability.

Structural VAR

The results of the Structural VAR (SVAR) model estimation provide insights into the relationships and dynamics among the variables within the system. The model, specified as Ae =Bu with E[uu′]=I, uses identified restrictions to estimate the coefficients of matrices A and B. In matrix A, several coefficients are statistically significant, highlighting important structural relationships. C(1), C(5), and C(6) are highly significant (p = 0.000), with values of 1.35, 0.45, and 0.56, indicating their strong positive impact. C(8) (-1.87) and C(9) (-0.35) also show significant negative effects (p = 0.000). Coefficients C(2), C(3), C(7), and C(10) are not significant, suggesting limited influence. In matrix B, C(13) (2.01) and C(14) (1.01) are highly significant (p = 0.000), while C(15) (0.92) is significant at 5% (p = 0.04). Coefficients C(11) and C(12) are not significant, indicating minimal impact.

Table 5: Structural VAR

Structural VAR is just-identified				
Model: Ae = Bu where E[uu']=I				
B =				
1	C(2)	0	0	C(7)
C(1)	1	0	C(5)	C(8)
0	C(3)	1	C(6)	C(9)
0	C(4)	0	1	C(10)
0	0	0	0	1
A =				
C(11)	0	0	0	0
0	C(12)	0	0	0
0	0	C(13)	0	0
0	0	0	C(14)	0
0	0	0	0	C(15)
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	1.35	-0.201	-6.73	0.000
C(2)	0.00	-0.090	0.02	0.900
C(3)	0.00	-0.002	-0.79	0.320
C(4)	0.00	-0.001	6.02	0.000
C(5)	0.45	-0.056	-8.04	0.000
C(6)	0.56	-0.026	-21.28	0.000
C(7)	-0.12	-4.056	0.03	0.760
C(8)	-1.87	-0.088	21.16	0.000
C(9)	-0.35	-0.035	9.77	0.000
C(10)	-0.13	-0.139	0.97	0.345
C(11)	0.00	-0.073	-0.06	0.432
C(12)	0.83	-11.248	-0.07	0.540
C(13)	2.01	-0.245	-8.21	0.000
C(14)	1.01	-0.098	-10.27	0.000
C(15)	0.92	-0.385	-2.40	0.04
Log likelihood	1106.746			

The model's log likelihood of 1106.75 confirms a good fit. Significant coefficients highlight key relationships, while non-significant ones suggest weaker or absent connections, offering insight into the system's dynamics.

Impulse Response Function

The impulse response function generated from a two standard error shock to the stock prices exchange rate and oil prices is reported below.

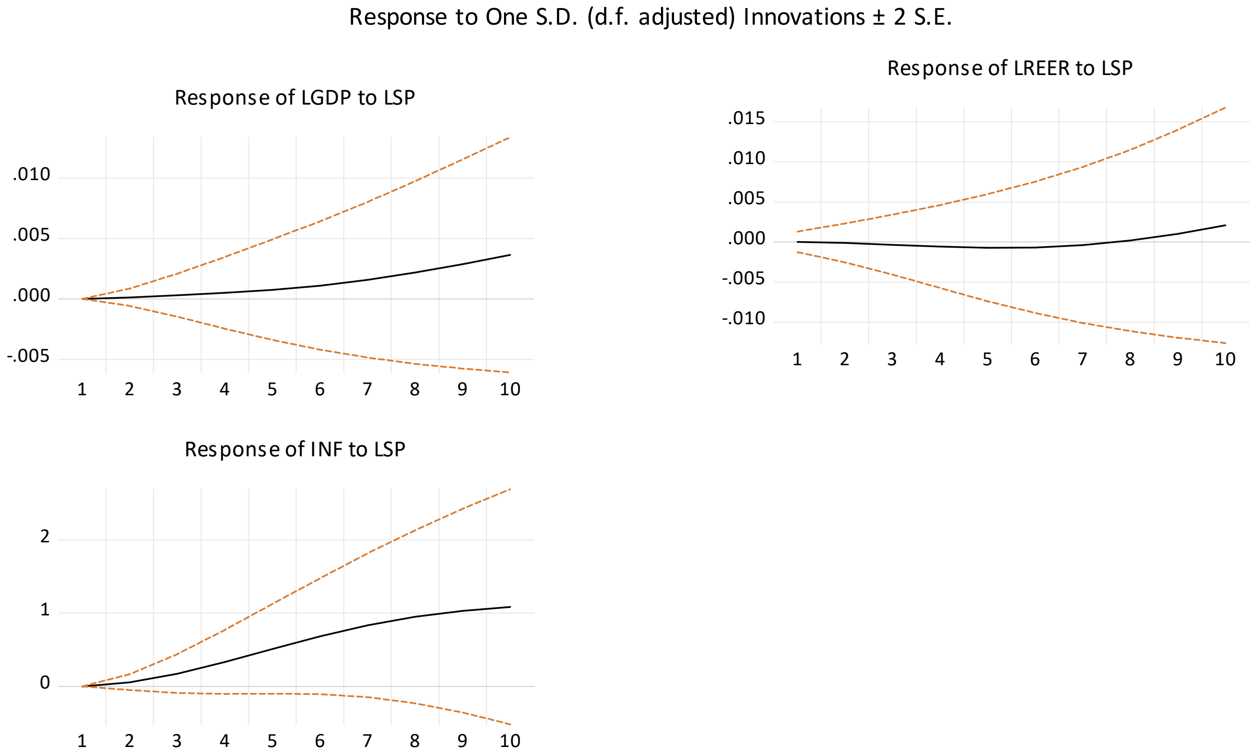

Figure 1: Impulse Response function – Stock Price Shock

Over ten periods, the impulse response function (IRF) illustrates the effects of a stock price shock (LSP) on GDP (LGDP), the real exchange rate (LREER), and inflation (INF). The favorable response from LGDP reflects both economic growth and heightened investor confidence. Although the effect eventually stabilizes, LREER also increases, suggesting possible capital inflows and currency strengthening. Higher company performance and demand-pull effects cause inflation (INF) to rise steadily, highlighting the necessity of keeping an eye on inflationary threats from stock market shocks.

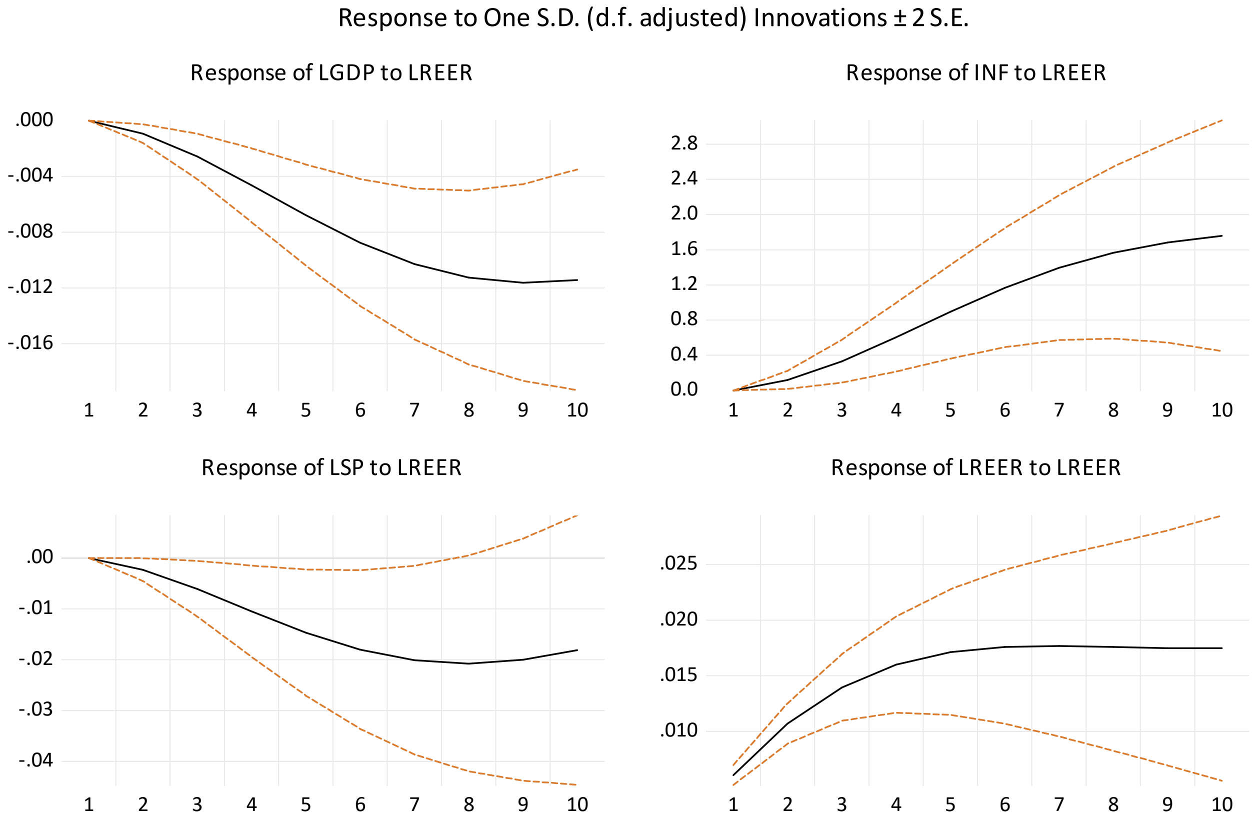

Figure 2: Impulse Response Function-Real Effective Exchange Rate Shock

Exchange rate shocks (LREER) have a contractionary impact on GDP (LGDP), which initially gets worse because of increased import prices and decreased investment. Import prices and demand-pull effects are the main causes of the steady increase in inflation (INF). Investor uncertainty causes an early dip in the stock market (LSP), which stabilizes but does not fully recover. LREER first rises in response to its own shock before progressively leveling out as a result of market and regulatory changes.

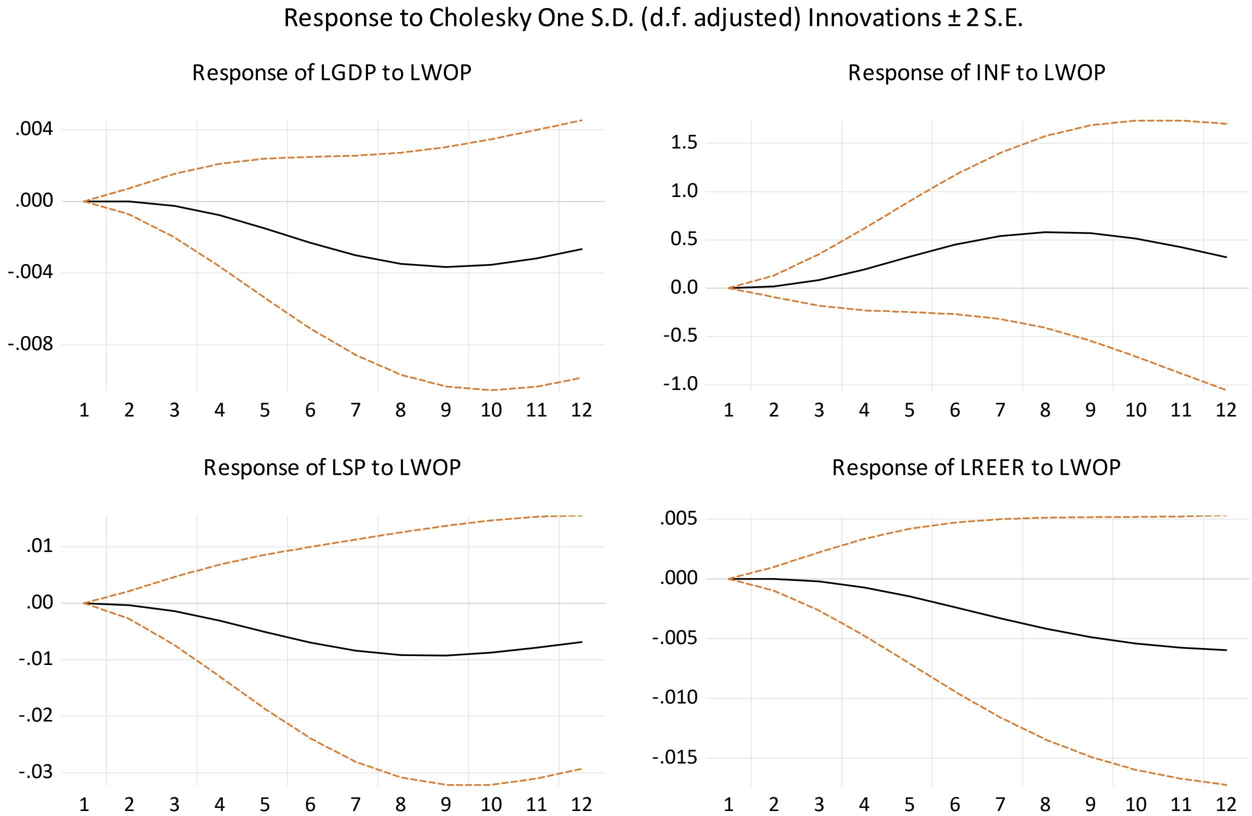

Figure 3: Impulse response function -The World Oil Price Shock

The way macroeconomic variables respond to shocks in the price of oil is shown by the impulse response functions, or IRFs. Higher production costs and lower consumption cause the GDP to first drop before stabilizing over time. A brief cost-push impact causes inflation to peak at the sixth period. When investor confidence declines, stock prices momentarily decline but then rise again as the market corrects. Rising import costs cause the actual exchange rate to first decline before eventually stabilizing. These reactions highlight the short- and medium-term implications of oil price shocks on Pakistan's economy.

The analysis emphasizes how Pakistan's economy is significantly impacted by shocks to the world oil price, which have an effect on GDP growth, inflation, exchange rates, and stock prices. In line with Nazir et al. (2014), the Structural Vector Autoregressive (SVAR) model shows that shocks to the price of oil cause an instant drop in GDP because they raise production costs. Cost-push factors cause inflation to peak at the sixth period, which is consistent with Saleem and Ahmad's (2015) research on the inflationary consequences of rising oil prices. The results of Zaheer Malik et al. (2017) are supported by the exchange rates' strong sensitivity to changes in the price of oil and the early depreciation brought on by growing import expenses. Exchange rate fluctuations have an essential part in maintaining macroeconomic stability, as evidenced by variance decomposition, which shows that they account for 44.65% of GDP variance by the 12th period (Ahmed et al., 2023). Similar to Wang et al. (2013), stock prices also fall in reaction to shocks to the price of oil, indicating a reduction in investor confidence and a decrease in business profitability. In order to lessen economic vulnerability and encourage sustainable growth, our findings support the necessity of policies that prioritize energy diversification, exchange rate stabilization, and inflation control.

Conclusion and Recommendation

The Structural Vector Autoregressive (SVAR) model was used in this study to assess the long-term relationship between global oil prices, GDP growth, inflation, exchange rates, and stock prices. The results validate Pakistan's over dependence on imported oil (over 70%) making its economy highly susceptible to external price shocks. Higher oil prices raise production costs which lead to cost -push inflation and lower the GDP growth and reduce the exchange rate. It causes an inflationary cycle of economic instability that goes beyond temporary changes in oil prices (Choi et al, 018). Global oil price volatility negatively affects investor confidence, company profitability, and financial markets.

A comprehensive policy approach is needed to minimize impacts of oil price volatility on Pakistan's economy. A strong first step toward this energy diversification is a reduction in reliance on imported oil. Expanding renewable energy sources such as solar, wind, hydroelectric power, and natural gas will enhance energy security and reduce vulnerability to external shocks. Strengthening exchange rate stability through active foreign exchange management and building substantial reserves can help shield the economy from currency depreciation, which exacerbates inflation and increases the cost of debt servicing (Nazir et al., 2014). Improved monetary policies focused on inflation targeting and better fiscal discipline will help manage short-term shocks while promoting long-term economic resilience. Additionally, financial market reforms are necessary to reduce risks associated with oil price fluctuations. These reforms should include stronger investor protections, the promotion of market diversification, and the development of more robust regulatory frameworks to boost investor confidence and maintain market stability (Shabbir et al., 2020). By implementing these measures, Pakistan can reduce its economic vulnerability to global oil price fluctuations and achieve more sustainable and stable growth.

References

Ahmed, Z., Khan, M., & Ali, S. (2023). The impact of oil price volatility on inflation and GDP in Pakistan: Evidence from a Structural Vector Autoregressive (SVAR) model. Journal of Macroeconomic Analysis, 10(1), 45-62.

Asif, M., Rehman, U., & Younis, T. (2021). Oil price shocks and exchange rate volatility: The case of Pakistan. Pakistan Economic Review, 14(2), 99-115.

Choi, S., Lee, D., & Park, J. (2018). Cost-push inflation and oil price dependence in emerging markets. Energy Economics, 70, 145-155.

Malik, Z., Raza, M., & Hussain, A. (2017). Exchange rate fluctuations and their effect on inflation in Pakistan: A Structural Analysis. Economic Review, 18(4), 221-236.

Nazir, N., Ahmed, F., & Sharif, R. (2014). Oil price and economic growth: Evidence from Pakistan using Johansen co-integration technique. International Journal of Energy Economics and Policy, 4(3), 199-209.

Saleem, M., & Ahmad, A. (2015). The relationship between crude oil prices and inflation in Pakistan: A time-series analysis. Pakistan Journal of Economic Studies, 7(1), 23-37.

Shabbir, S., Rehman, A., & Khan, Z. (2020). Oil price volatility and stock market performance in Pakistan: Evidence from KSE-100 index. Journal of Financial Studies, 15(2), 155-172.

Wang, Y., Chen, X., & Huang, Z. (2013). Oil price shocks and stock market returns: Evidence from oil-importing countries. Energy Policy, 55, 45-56.