**The Relationship between Crude Oil Prices and Stock Prices: Analysis of India**

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**Abstract**

In this new era of economic growth, increasing crude oil prices across the globe has resulted in inflationary pressure on the economies, affecting the global economy in a wide sense. The present study investigates the effect of changes in crude oil prices on the stock market of India. To explore the relationship between the Oil Price and Stock Price, the study examines the data set of World oil prices and Indian stock prices from 2015-2022. The methodology utilized to achieve the study objectives is Regression analysis, Stationarity Test, VAR Analysis, Johansen Cointegration test, and, the Granger Causality test. The empirical results of the study, using the Johansen Cointegration test show that there exists a long-term relationship between Oil Prices and the Stock Prices of India. However, there does not exist a significant short-term relationship between oil and stock prices which can be proven through the VAR Analysis. The study also used the Granger Causality test, which examined that a series of data for stock prices can be forecasted using the data set of oil prices.

***Keywords****: Oil Prices, Stock Prices*

1. **Introduction**

Oil is the most common source of energy, with close to 1/3 share of the overall energy consumption. It is considered one of the bestows of political and economic power to the countries which are abundant in oil reserves. It has been seen in the last few years that the demand for energy resources has shown a gradual shift to emerging Asian Economies. Taking into consideration the view of IEA, because of the economic prices of emerging economies, there is a 30% rise in fossil fuels by 2040, with the expected daily oil consumption to reach 103.5 million barrels. Thus, crude oil is one of the most traded commodities. However, on the other hand, it also carries a major influence on emerging and industrial economies as it can be seen that a rise in the oil prices not only affects economic policies, but the changes also create an impact on the stock markets with an important consequence that oil prices shocks which are truly unexpected, cause a bearing on the financial markets.

The oil prices have been a scary part of the Indian Economy. Adverse oil shocks often mess up the macroeconomic variables of the Indian Economy. Keeping, in fact, the scenario of the Russian invasion of Ukraine, oil prices have started moving to an uncomfortable zone. Over the last years, Brent crude price has doubled. Keeping, in fact, the different scenarios, huge volatility in the oil prices have been seen. There are several factors that affect the rise in oil prices including domestic inflation. The prices of fuel and energy create a cascading effect as they push up costs at every stage of production. India's GDP has also been negatively affected because of the recent geopolitical turmoil and the impact of the rise in oil prices has also concerned India's Balance of Payment. Several Industries take into consideration oil prices as a major input. When the price of crude oil rises, naturally, the production and input costs also increase. This leads to a fall in the profit margins which in turn reduces the stock price of that company. On the other hand, a fall in oil prices results in the opposite. Companies associated with Airlines, paints, refineries, and other such companies are the most affected in such situations.

The objective of this study is to analyze the relationship between crude oil prices and their relative impact on India’s stock market. The paper remaining part of the paper consists of the following sections. Section 2 consists of the literature review, Section 3 explains the research methodology, Section 4 discusses the empirical results and analysis, and Section 5 provides the conclusion of the study.

1. **Literature Review**

There exists a correlation between the oil prices and the stock markets of a country, which has caught the attention of various financial analysts, policymakers, and researchers. Early empirical studies on this relation have proved that oil has a negative impact on the economy and stock market of the country.

Chittedi (2014) found that the volatility of oil prices significantly impacts the volatility of stock prices in India. Degiannakis et al. (2017) aimed to study the relationship between oil prices and stock market activity. They found that higher oil prices lead to lower stock market returns in stock markets of oil-importing economies. The reverse is applicable in the case of oil-exporting countries. Higher oil prices due to supply-side or precautionary demand shocks trigger negative responses from stock markets, whereas higher oil prices resulting from a boost in the global economy are received as positive news by stock markets.

Sharma et al. (2018) conducted a study on oil future prices, Nifty, and the BSE Energy Index and found that the long-run relationship between the time series of crude oil future prices, Nifty, and BSE Energy Index is absent and any of the time series cannot be used to predict the other time series.

Arora et. al (2018) conducted a study and found that conclusions vary depending on whether the studies use symmetric or asymmetric changes in oil prices. Most studies show that oil price volatility gets transmitted to the stock market, including the measures of stock market performance to improve forecasts of oil prices and oil price volatility.

Sahoo et. al. (2023) presented a study to measure the contagion effects of crude oil prices on sectoral stock price indices in India. Using the generalized Pareto distribution (GPD) for estimating excess returns or exceedances i.e., deviations from thresholds, and multinominal logit model (MNL) for assessing the probability of contemporaneous excess returns, the paper finds a significant likelihood of co-exceedances among 10 sectoral stock price indices existence of a contagion effect. This study depicted that the impact of the crude oil prices, regardless of their direct and indirect exposure to oil prices, mainly focuses on the demand for hedging as just diversification of portfolios may not be sufficient to protect the assets from an adverse oil price fluctuation.

1. **Research Methodology**
   1. **Type of Research Study**

The Quantitative method of study has been applied in this research paper.

* 1. **Sources of Data**

This research paper examines the data set of crude oil prices and stock prices from 2012 - 2022 to evaluate the fluctuations in the stock prices (considering the financial reforms introduced in the Indian Economy during this period, repercussions of the COVID-19 Pandemic, and the Ukraine-Russia war).The secondary dataset has been collected from investing.com and indexmundi.com for stock prices and crude oil prices respectively.

* 1. **Tools Used**

The results of descriptive statistics, stationarity test, Johansen cointegration test, granger causality test, regression analysis, and VAR analysis have been evaluated using Excel and EViews.

* 1. **Descriptive Statistics**

Table 1 consists of the descriptive statistics of the dataset of oil prices (Indian Rupee Per Barrel) and stock prices (All Shares) from 2012 – 22.

|  |  |  |  |
| --- | --- | --- | --- |
| **Oil Price (Indian Rupee per barrel)** | | **Stock Price (all shares)** | |
| Mean | 4718.769 | Mean | 33776.41591 |
| Standard Error | 134.6013 | Standard Error | 680.5765442 |
| Median | 4513.35 | Median | 33096.31 |
| Mode | N/A | Mode | 39045.13 |
| Standard Deviation | 1546.451 | Standard Deviation | 7819.229188 |
| Sample Variance | 2391512 | Sample Variance | 61140345.09 |
| Kurtosis | -0.26938 | Kurtosis | -0.554045123 |
| Skewness | 0.445915 | Skewness | 0.40597568 |
| Range | 7516.53 | Range | 33513.63 |
| Minimum | 1603.02 | Minimum | 20123.51 |
| Maximum | 9119.55 | Maximum | 53637.14 |
| Sum | 622877.5 | Sum | 4458486.9 |
| Count | 132 | Count | 132 |
| Confidence Level (95.0%) | 266.2735 | Confidence Level (95.0%) | 1346.342749 |

**Table 1**

1. **Empirical Results and Analysis**
   1. **Stationarity Test**

Graph 1 represents the line graph of the original dataset. The dataset was found to be Non – Stationary.

**Graph 1**

Table 2 consists of the results of unit root test at levels.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **No Drift** | **Drift** | **Drift and Trend** | **Inference** |
| **Oil Prices** | -0.71994 | -1.72356 | -1.68646 | Non-Stationary |
| **Share Prices** | -1.6821 | -1.91925 | -1.95013 | Non-Stationary |

**Table 2**

Using the Augmented Dickey-Fuller test, the dataset was converted into a stationary dataset. Table 3 consists of the results of the unit root tests with the first difference.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **No Drift** | **Drift** | **Drift and Trend** | **Inference** |
| **Oil Prices** | -8.58882 | -8.56248 | -8.60647 | Stationary |
| **Share Prices** | -9.61057 | -9.64778 | -9.60858 | Stationary |

**Table 3**

Graph 2 represents the line graph of the stationary dataset.

**Graph 2**

* 1. **VAR Analysis**

Table 4, 5 and 6 consists of the VAR results. Though, collectively all the lagged variables were found to be significant (given the F statistic value of 3.434553 against the critical value of 2.706), however, except the first lagged values of oil prices, the rest of the lagged values of oil prices and stock prices were not found to be statistically significant as their p values were less than the significant level of 0.05.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | | | | |
|  | **Degrees of freedom** | **SS** | **MS** | **F** | **Significance F** |
| **Regression** | 4 | 52960059 | 13240015 | 3.434553 | 0.010645 |
| **Residual** | 124 | 4.78E+08 | 3854945 |  |  |
| **Total** | 128 | 5.31E+08 |  |  |  |

**Table 4**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Coefficients** | **Standard Error** | **t Stat** | **P-value** |
| **C** | -163.997 | 174.7522 | -0.93846 | 0.349834 |
| **Oil\_Prices (-1)** | 1.033209 | 0.44017 | 2.347293 | 0.020495 |
| **Oil\_Prices (-2)** | 0.714428 | 0.443131 | 1.612229 | 0.109454 |
| **Share\_Prices (-1)** | 0.069015 | 0.089432 | 0.771704 | 0.441758 |
| **Share\_Prices (-2)** | -0.06912 | 0.086417 | -0.79989 | 0.425307 |

**Table 5**

Table 6 consists of the summary statistics of VAR. The coefficient of determination was found to be 0.099741 which means that approximately 9.974% of the variation in share prices can be explained by the oil prices and lagged variables. The coefficient of correlation was found to be 0.315819 which indicates a weak positive correlation.

|  |  |
| --- | --- |
| **Regression Statistics** | |
| **Multiple R** | 0.315819 |
| **R Square** | 0.099741 |
| **Adjusted R Square** | 0.070701 |
| **Standard Error** | 1963.401 |
| **Observations** | 129 |

**Table 6**

Thus, there is not a very significant relationship between oil prices and stock prices in the short run.

* 1. **Johansen cointegration test**

The analysis of Johansen cointegration has been examined through the results of the rank test (Trace) and the Eigenvalue test. Table 7 and Table 8 show the results of the rank test (Trace) and the Eigenvalue test respectively.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hypothesized**  **No. of CE(s)** | **Eigenvalue** | **Trace Statistic** | **0.05**  **(Critical Value)** | **Probability \*\*** |
| None \* | 1.000000 | 4389.774 | 15.49471 | 0.0000 |
| At most 1 \* | 0.047421 | 6.121413 | 3.841465 | 0.0134 |

**Table 7**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hypothesized**  **No. of CE(s)** | **Eigenvalue** | **Max-Eigen Statistic** | **0.05**  **(Critical Value)** | **Probability \*\*** |
| None \* | 1.000000 | 4383.652 | 14.26460 | 0.0000 |
| At most 1 \* | 0.047421 | 6.121413 | 3.841465 | 0.0134 |

**Table 8**

The following were the hypotheses taken for the test:

HO: No Cointegration exist

H1: Cointegration exist

In the results, the P-Value which is 0.0134 is less than the significant value which is 0.05. Therefore, the Null hypothesis is rejected which implies that there exists a cointegration between the oil price and the stock price.

* 1. **Granger Causality test**

The Granger Causality test has been used to examine the usefulness of the dataset of oil prices to forecast the dataset of stock prices. Table 9 represents the results of the Granger Causality test. Here, SER03 stands for the dataset of oil price and SER04 stands for the dataset of stock price.

|  |  |  |  |
| --- | --- | --- | --- |
| **Null Hypothesis** | **Observations** | **F-Statistic** | **Probability** |
| SER04 does not Granger Cause SER03 | 129 | 4.42773 | 0.0139 |
| SER03 does not Granger Cause SER04 |  | 0.23492 | 0.7910 |

**Table 9**

In the first case, the following hypotheses have been taken.

H0: SER04 does not Granger Cause SER03

Ha: SER04 Granger Cause SER03

Here, the null hypothesis is that SER04 does not Granger cause SER03 which implies that the stock price series cannot forecast the oil price series whereas the alternative hypothesis is SER04 Granger cause SER03 which implies that the stock price series can forecast the oil price series. In the results, the calculated P value which is 0.7910 is greater than the significant value which is 0.05. Therefore, the null hypothesis is not rejected which implies that SER04 does not Granger Cause SER03 or stock price series cannot forecast oil price series.

In the second case, the following hypotheses have been taken.

H0: SER03 does not Granger Cause SER04

H1: SER03 Granger Cause SER04

Here, the null hypothesis is that SER03 does not Granger Cause SER04 which implies that the oil price series cannot forecast the stock price series whereas the alternative hypothesis is that SER03 Granger Cause SER04 which implies that the oil price series can forecast the stock price series. In the results, the calculated P Value which is 0.0139 is less than the significant value which is 0.05. Therefore, the null hypothesis is rejected which implies that oil prices rise can be used to forecast the stock price.

1. **Conclusion**

In the research paper, several tests were conducted, resulting in different conclusions. Through the VAR test, it has been found that in the span of the short run, there is no significant relationship between Oil prices the stock prices. Johansen Cointegration Test highlighted that there exists a long-term relationship between Oil prices and stock prices. Through Granger Causality Test, it was found that the series of oil prices can be used to forecast the series of stock prices. Even though the oil prices affect the movement of the stock prices in the economy (because of which there exists a relationship between them in the long run), however, there might be some other factors which have a greater impact on stock prices compared to oil prices because of which there may not be a significant relationship between oil prices and stock prices in the short run.

**Appendix**

1. **Original Dataset (Non-Stationary Dataset)**

|  |  |  |
| --- | --- | --- |
| **Month** | **Oil Price (Indian Rupee per barrel)** | **Stock Price (all shares)** |
| Dec-22 | 6,429.95 | 51,251.06 |
| Nov-22 | 7,150.11 | 47,660.04 |
| Oct-22 | 7,437.13 | 43,839.08 |
| Sep-22 | 7,079.45 | 49,024.16 |
| Aug-22 | 7,634.90 | 49,836.51 |
| Jul-22 | 8,366.39 | 50,370.25 |
| Jun-22 | 9,119.55 | 51,817.59 |
| May-22 | 8,511.74 | 53,637.14 |
| Apr-22 | 7,877.96 | 49,638.94 |
| Mar-22 | 8,569.88 | 46,965.48 |
| Feb-22 | 7,018.51 | 47,394.53 |
| Jan-22 | 6,247.71 | 46,624.67 |
| Dec-21 | 5,504.55 | 42,716.44 |
| Nov-21 | 5,952.69 | 43,248.05 |
| Oct-21 | 6,146.58 | 42,038.60 |
| Sep-21 | 5,359.17 | 40,221.17 |
| Aug-21 | 5,108.73 | 39,219.61 |
| Jul-21 | 5,460.90 | 38,547.08 |
| Jun-21 | 5,281.48 | 37,907.28 |
| May-21 | 4,870.98 | 38,437.88 |
| Apr-21 | 4,684.64 | 39,840.28 |
| Mar-21 | 4,646.36 | 39,045.13 |
| Feb-21 | 4,399.41 | 39,045.13 |
| Jan-21 | 3,918.56 | 42,412.66 |
| Dec-20 | 3,589.35 | 40,270.72 |
| Nov-20 | 3,141.53 | 35,042.14 |
| Oct-20 | 2,931.66 | 30,530.69 |
| Sep-20 | 2,984.05 | 26,837.42 |
| Aug-20 | 3,243.75 | 25,327.13 |
| Jul-20 | 3,156.01 | 24,693.73 |
| Jun-20 | 2,987.46 | 24,479.16 |
| May-20 | 2,298.55 | 25,267.82 |
| Apr-20 | 1,603.02 | 23,021.01 |
| Mar-20 | 2,392.98 | 21,300.47 |
| Feb-20 | 3,811.78 | 26,216.46 |
| Jan-20 | 4,395.91 | 28,843.53 |
| Dec-19 | 4,509.77 | 26,842.07 |
| Nov-19 | 4,314.32 | 27,002.15 |
| Oct-19 | 4,069.14 | 26,355.35 |
| Sep-19 | 4,282.87 | 27,630.56 |
| Aug-19 | 4,102.97 | 27,525.81 |
| Jul-19 | 4,230.22 | 27,718.26 |
| Jun-19 | 4,149.67 | 29,966.87 |
| May-19 | 4,664.02 | 31,069.37 |
| Apr-19 | 4,761.33 | 29,159.74 |
| Mar-19 | 4,432.04 | 31,041.42 |
| Feb-19 | 4,352.94 | 31,718.70 |
| Jan-19 | 4,003.08 | 30,557.20 |
| Dec-18 | 3,822.07 | 31,430.50 |
| Nov-18 | 4,476.09 | 30,874.17 |
| Oct-18 | 5,648.69 | 32,466.27 |
| Sep-18 | 5,448.55 | 32,766.37 |
| Aug-18 | 4,942.53 | 34,848.45 |
| Jul-18 | 4,992.51 | 37,017.78 |
| Jun-18 | 4,879.75 | 38,278.55 |
| May-18 | 4,959.75 | 38,104.54 |
| Apr-18 | 4,516.93 | 41,268.01 |
| Mar-18 | 4,171.72 | 41,504.51 |
| Feb-18 | 4,085.16 | 43,330.54 |
| Jan-18 | 4,215.16 | 44,343.65 |
| Dec-17 | 3,930.99 | 38,243.19 |
| Nov-17 | 3,887.81 | 37,944.60 |
| Oct-17 | 3,574.53 | 36,680.29 |
| Sep-17 | 3,413.19 | 35,439.98 |
| Aug-17 | 3,194.46 | 35,504.62 |
| Jul-17 | 3,071.23 | 35,847.75 |
| Jun-17 | 2,975.01 | 33,117.48 |
| May-17 | 3,213.83 | 29,498.31 |
| Apr-17 | 3,365.04 | 25,767.26 |
| Mar-17 | 3,355.09 | 25,516.34 |
| Feb-17 | 3,647.03 | 25,329.08 |
| Jan-17 | 3,649.89 | 26,036.24 |
| Dec-16 | 3,572.84 | 26,874.62 |
| Nov-16 | 3,056.29 | 25,241.63 |
| Oct-16 | 3,290.46 | 27,220.09 |
| Sep-16 | 3,006.05 | 28,335.40 |
| Aug-16 | 3,004.16 | 27,599.03 |
| Jul-16 | 2,966.28 | 28,009.93 |
| Jun-16 | 3,208.66 | 29,597.79 |
| May-16 | 3,072.75 | 27,671.08 |
| Apr-16 | 2,708.63 | 25,062.41 |
| Mar-16 | 2,503.95 | 25,306.22 |
| Feb-16 | 2,117.58 | 24,570.73 |
| Jan-16 | 2,004.00 | 23,916.15 |
| Dec-15 | 2,435.40 | 28,642.25 |
| Nov-15 | 2,847.43 | 27,385.69 |
| Oct-15 | 3,055.95 | 29,177.72 |
| Sep-15 | 3,064.43 | 31,217.77 |
| Aug-15 | 2,973.16 | 29,684.84 |
| Jul-15 | 3,458.51 | 30,180.27 |
| Jun-15 | 3,915.30 | 33,456.83 |
| May-15 | 3,988.78 | 34,310.37 |
| Apr-15 | 3,611.03 | 34,708.11 |
| Mar-15 | 3,299.23 | 31,753.15 |
| Feb-15 | 3,398.51 | 30,103.81 |
| Jan-15 | 2,927.20 | 29,562.07 |
| Dec-14 | 3,806.55 | 34,657.15 |
| Nov-14 | 4,748.53 | 34,543.05 |
| Oct-14 | 5,280.84 | 37,550.24 |
| Sep-14 | 5,835.69 | 41,210.10 |
| Aug-14 | 6,092.56 | 41,532.33 |
| Jul-14 | 6,320.51 | 42,097.49 |
| Jun-14 | 6,471.05 | 42,482.48 |
| May-14 | 6,273.13 | 41,474.40 |
| Apr-14 | 6,329.60 | 38,485.56 |
| Mar-14 | 6,343.00 | 38,748.01 |
| Feb-14 | 6,529.28 | 39,558.89 |
| Jan-14 | 6,344.00 | 40,571.62 |
| Dec-13 | 6,534.28 | 41,329.19 |
| Nov-13 | 6,435.78 | 38,920.85 |
| Oct-13 | 6,497.77 | 37,622.74 |
| Sep-13 | 6,926.83 | 36,585.08 |
| Aug-13 | 6,836.67 | 36,248.53 |
| Jul-13 | 6,292.38 | 37,914.33 |
| Jun-13 | 5,817.69 | 36,159.87 |
| May-13 | 5,468.66 | 37,794.75 |
| Apr-13 | 5,375.04 | 33,440.57 |
| Mar-13 | 5,575.84 | 33,536.25 |
| Feb-13 | 5,784.94 | 33,075.14 |
| Jan-13 | 5,708.32 | 31,853.19 |
| Dec-12 | 5,526.62 | 28,078.81 |
| Nov-12 | 5,536.01 | 26,495.10 |
| Oct-12 | 5,476.43 | 26,430.92 |
| Sep-12 | 5,798.48 | 26,011.64 |
| Aug-12 | 5,848.75 | 23,750.82 |
| Jul-12 | 5,372.19 | 23,061.38 |
| Jun-12 | 5,083.60 | 21,599.57 |
| May-12 | 5,655.94 | 22,066.40 |
| Apr-12 | 5,888.49 | 22,045.66 |
| Mar-12 | 5,927.55 | 20,652.47 |
| Feb-12 | 5,540.26 | 20,123.51 |
| Jan-12 | 5,484.92 | 20,875.83 |

1. **Stationary Dataset**

|  |  |
| --- | --- |
| **Oil Prices** | **Stock Prices** |
| 720.16 | -3591.02 |
| 287.02 | -3820.96 |
| -357.68 | 5185.08 |
| 555.45 | 812.35 |
| 731.49 | 533.74 |
| 753.16 | 1447.34 |
| -607.81 | 1819.55 |
| -633.78 | -3998.2 |
| 691.92 | -2673.46 |
| -1551.37 | 429.05 |
| -770.8 | -769.86 |
| -743.16 | -3908.23 |
| 448.14 | 531.61 |
| 193.89 | -1209.45 |
| -787.41 | -1817.43 |
| -250.44 | -1001.56 |
| 352.17 | -672.53 |
| -179.42 | -639.8 |
| -410.5 | 530.6 |
| -186.34 | 1402.4 |
| -38.28 | -795.15 |
| -246.95 | 0 |
| -480.85 | 3367.53 |
| -329.21 | -2141.94 |
| -447.82 | -5228.58 |
| -209.87 | -4511.45 |
| 52.39 | -3693.27 |
| 259.7 | -1510.29 |
| -87.74 | -633.4 |
| -168.55 | -214.57 |
| -688.91 | 788.66 |
| -695.53 | -2246.81 |
| 789.96 | -1720.54 |
| 1418.8 | 4915.99 |
| 584.13 | 2627.07 |
| 113.86 | -2001.46 |
| -195.45 | 160.08 |
| -245.18 | -646.8 |
| 213.73 | 1275.21 |
| -179.9 | -104.75 |
| 127.25 | 192.45 |
| -80.55 | 2248.61 |
| 514.35 | 1102.5 |
| 97.31 | -1909.63 |
| -329.29 | 1881.68 |
| -79.1 | 677.28 |
| -349.86 | -1161.5 |
| -181.01 | 873.3 |
| 654.02 | -556.33 |
| 1172.6 | 1592.1 |
| -200.14 | 300.1 |
| -506.02 | 2082.08 |
| 49.98 | 2169.33 |
| -112.76 | 1260.77 |
| 80 | -174.01 |
| -442.82 | 3163.47 |
| -345.21 | 236.5 |
| -86.56 | 1826.03 |
| 130 | 1013.11 |
| -284.17 | -6100.46 |
| -43.18 | -298.59 |
| -313.28 | -1264.31 |
| -161.34 | -1240.31 |
| -218.73 | 64.64 |
| -123.23 | 343.13 |
| -96.22 | -2730.27 |
| 238.82 | -3619.17 |
| 151.21 | -3731.05 |
| -9.95 | -250.92 |
| 291.94 | -187.26 |
| 2.86 | 707.16 |
| -77.05 | 838.38 |
| -516.55 | -1632.99 |
| 234.17 | 1978.46 |
| -284.41 | 1115.31 |
| -1.89 | -736.37 |
| -37.88 | 410.9 |
| 242.38 | 1587.86 |
| -135.91 | -1926.71 |
| -364.12 | -2608.67 |
| -204.68 | 243.81 |
| -386.37 | -735.49 |
| -113.58 | -654.58 |
| 431.4 | 4726.1 |
| 412.03 | -1256.56 |
| 208.52 | 1792.03 |
| 8.48 | 2040.05 |
| -91.27 | -1532.93 |
| 485.35 | 495.43 |
| 456.79 | 3276.56 |
| 73.48 | 853.54 |
| -377.75 | 397.74 |
| -311.8 | -2954.96 |
| 99.28 | -1649.34 |
| -471.31 | -541.74 |
| 879.35 | 5095.08 |
| 941.98 | -114.1 |
| 532.31 | 3007.19 |
| 554.85 | 3659.86 |
| 256.87 | 322.23 |
| 227.95 | 565.16 |
| 150.54 | 384.99 |
| -197.92 | -1008.08 |
| 56.47 | -2988.84 |
| 13.4 | 262.45 |
| 186.28 | 810.88 |
| -185.28 | 1012.73 |
| 190.28 | 757.57 |
| -98.5 | -2408.34 |
| 61.99 | -1298.11 |
| 429.06 | -1037.66 |
| -90.16 | -336.55 |
| -544.29 | 1665.8 |
| -474.69 | -1754.46 |
| -349.03 | 1634.88 |
| -93.62 | -4354.18 |
| 200.8 | 95.68 |
| 209.1 | -461.11 |
| -76.62 | -1221.95 |
| -181.7 | -3774.38 |
| 9.39 | -1583.71 |
| -59.58 | -64.18 |
| 322.05 | -419.28 |
| 50.27 | -2260.82 |
| -476.56 | -689.44 |
| -288.59 | -1461.81 |
| 572.34 | 466.83 |
| 232.55 | -20.74 |
| 39.06 | -1393.19 |
| -387.29 | -528.96 |
| -55.34 | 752.32 |

**References**

1. Alqattan, A. A., & Ahlia, A. A. (2016). Impact of Oil Prices on Stock Markets: Evidence from Gulf Cooperation Council (GCC) Financial Markets. *Amity Journal of Finance,* 1(1).
2. Bashir, M. A. (2022). Oil price shocks, stock market returns, and volatility spillovers: a bibliometric analysis and its implications. *Environmental Science and Pollution Research*, *29*(16), 22809–22828. <https://doi.org/10.1007/s11356-021-18314-4>
3. Chittedi, K. R. (2012). Do Oil Prices Matters for Indian Stock Markets? An Empirical Analysis. *Journal of Applied Economics and Business Research*, *2*(1), 2–10. <https://www.researchgate.net/publication/230793496>
4. Degiannakis, S., Filis, G., & Arora, V. (2017). Oil Prices and Stock Markets. *Independent Statistics & Analysis.*
5. Sahoo, M., Shrivastava, A. K., Anthony, J. M., & Sonna, T. (2023). Measuring Contagion Effects of Crude Oil Prices on Sectoral Stock Price Indices in India. *RBI Working Paper Series*.
6. Sharma, A. (2018). Relationship between crude oil prices and stock market. *International Journal of Energy Economics and Policy (IJEEP)*, *8*(4), 331–337. <http://hdl.handle.net/11159/2171>