

A Study of Indian Stock Market with Reference to Crude Oil and Gold Price

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Abstract

The findings for the study on the relationship between Crude oil price and its impact on Indian stock market indices including Nifty 50 and midcap 100 indicates that the Crude oil significantly influences Nifty 50 and Nifty Midcap 100 index. The correlation between the Crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns was also estimated in the study. The results found that a negative correlation exists between the Crude oil with both the indicators of the Indian stock market. The increase in Crude oil prices provides a negative impact on the Indian economy. The increase in Crude oil increases inflation in the country. The increase in the cost of living causes many adverse effects on the economy. Thus, a negative relationship between the Crude oil and the stock market is expected which is also indicated by the results. The Causality relationship between the Crude oil and the Indian stock market indices was also studied with the help of Grangers causality test and the results found that the null hypothesis cannot be rejected and no lead lag relationship is found between Crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns. Thus, the results from the Grangers causality test showed that there exists no significant lead-lag relationship between the Crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns.

Keywords: Money washing, HAWALA, The deterrence of money laundering Act, 2002.

Introduction

Descriptive statistics

In the descriptive analysis, the average price, maximum and minimum price, standard deviation, skewness, kurtosis, and the density population is estimated [1].

The results of the descriptive analysis for Crude oil and Indian stock market indices are shown in the table-1, given below. The results indicate that the average price of crude oil during the selected period is 3968.653 per ton. The minimum price of crude oil was found to be 1833 during 2008 and the maximum it went to 7617 per ton during the year 2012. For crude oil prices the skewness of the distribution is found to be positive (0.569) and kurtosis (2.509) is leptokurtic. The Jarque-Bera test to check the normal distribution of crude oil prices stated that the probability value is found to be less than 0.05 indicating that the distribution is not normally distributed.

Table 1: Descriptive Statistics (Crude oil and Indian stock market Indices)

	Nifty 50 Index	Nifty Midcap 100 Index	Crude Oil Price
Mean	6114.115	9311.245	3968.653
Median	5647.400	7733.675	3683.000
Maximum	11680.50	21133.50	7167.000
Minimum	1902.500	2865.060	1833.000
Std. Dev.	2423.240	4857.736	1109.955
Skewness	0.400	0.797	0.569
Kurtosis	2.299	2.562	2.509
Jarque-Bera	7.871	19.154	10.705
Probability	0.019	0.000	0.004

The skewness level is normal but the kurtosis is different from normal. The results also indicate that the average price of Nifty50 during the selected period is 6114.115. The minimum price of Nifty50 was found to be 1902 and the maximum went to 11680 during the year 2018. The skewness (0.400) of the distribution is found to be positive and kurtosis (2.299) is leptokurtic. The Jarque-Bera test is applied to check the normal distribution of Nifty50 since the probability value is found to be less than 0.05 the distribution is not normally distributed. Further, in the case of the Nifty Midcap Index, the results indicate that the average price of Nifty Midcap 100 during the selected period is 9311.245. The minimum price of crude oil was found to be 2865.06 and the maximum went to 21133.50. The skewness of the distribution is found to be positive and kurtosis is leptokurtic. The Jarque-Bera test for the normal distribution of crude oil prices found the probability value is found to be less than 0.05 the distribution is not normally distributed. The results of the descriptive analysis for Indian Gold prices and Indian stock market indices are shown in the table-2, given below [2].

Table 2: Descriptive Statistics (Indian Gold Prices and Indian stock market Indices)

	NiftyMidcap100	Nifty50	Gold Price
Mean	9311.245	6114.115	21197.35
Median	7733.675	5647.400	25937.71
Maximum	21133.50	11680.50	31672.83
Minimum	2865.060	1902.500	6030.380
Std. Dev.	4857.736	2423.240	8856.988
Skewness	0.797595	0.400282	-0.413019
Kurtosis	2.562134	2.299760	1.544303
Jarque-Bera	19.15449	7.871529	19.60974
Probability	0.000069	0.019531	0.000055
Sum	1564289.	1021057.	3561155".
Sum Sq. Dev.	3.94E+09	9.75E+08	1.31E+10
Observations	168	167	168

The results indicate that the average price of gold during the selected period is 21197.35 per 10 grams. The minimum and maximum gold price were found to be 6030.380 and 31672.83 per 10 grams respectively. The skewness of the distribution is found to be negative and kurtosis is leptokurtic. The Jarque-Bera test is applied to check the normal distribution of gold prices since the probability value is found to be less than 0.05 the distribution is not normally distributed. The results indicate that the average price of Nifty 50 during the selected period is 6114.115 [3].

The minimum and maximum price of Nifty 50 were found to be 1902 and 11680 respectively. The skewness of the distribution is found to be positive and kurtosis is leptokurtic. The Jarque-Bera test is applied to check the normal distribution of Nifty 50 since the probability value is found to be less than 0.05 the distribution is not normally distributed. The results indicate that the average price of Nifty Midcap100 during the selected period is 9311.245. The minimum price of crude oil was found to be 2865.06 and the maximum went to 21133.50. The skewness of the distribution is found to be positive and kurtosis is leptokurtic.

Unit root test for Crude oil in India and Indian Stock Indices.

The ADF test is applied on the time series indicating the monthly prices of Crude oil in India with the assumption of the null hypothesis that the ADF unit root test assumes that the series under observation is having unit root. The results for crude oil prices indicate that the p-value of the ADF statistic is found to be greater than 0.05 (significance level = 5 %). Hence it can be concluded that the crude oil price series is a random walk and contains the unit root. Since the series is found to be non-stationary it should be transformed into a stationary series. The log difference transformation is applied to the series and further ADF test is used to check whether the transformed series is stationary or non-stationary. The results of the transformed series are shown in table-3, given below.

Table 3: Results of the ADF unit root test for crude oil prices

Exogenous variable: Constant				
Lag Length: 0 (Automatic - based on SIC, Max lag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-10.682	0.000
Test critical values:	1% level		-3.470	
	5% level		-2.879	
	10% level		-2.576	
*MacKinnon (1996) one-sided p-values.				

The results of the ADF unit root test on the log differenced transformed series of crude oil prices indicate that the probability value of ADF statistic is found less than 0.05. Hence it can be concluded that the log difference transformation applied to Crude oil prices makes the series stationary. Here the transformed series which is also known as return on crude oil prices can be further used in econometric analysis [4].

Unit root test for Indian Gold prices and Indian Stock Indices

The results for Indian Gold prices indicate that the p-value of the ADF statistic is found to be greater than 0.05 (significance level = 5 %). Hence it can be concluded that the Indian Gold price series is a random walk and contains the unit root. The results of the transformed series are shown in table-4, given below:

Table 4: Results of the ADF unit root test for gold price returns

Exogenous variable: Constant			
Lag Length: 1 (Automatic - based on SIC, Max lag = 13)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.26837	0.0000
Test critical values:	1% level	-3.470679	
	5% level	-2.879155	
	10% level	-2.576241	
*MacKinnon (1996) one-sided p-values.			

The results of the ADF unit root test on the transformed series of gold price series indicate that the probability value of the ADF statistic is found less than 0.05. Hence it can be concluded that the Log difference transformation applied to the gold price series makes the series stationary. Hence the transformed series which is also known as return on gold price series can be further used in econometric analysis [5].

Correlation

Correlation between crude oil and Indian stock indices

The correlation between the crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns is estimated in the research paper. The Pearson correlation is estimated in the study [6]. The result of the correlation analysis is shown in table-5, given below:

Table 5: Covariance and Correlation Analysis (Crude oil return)

Covariance Analysis: Ordinary			
Covariance	Nifty Midcap 100 return	Nifty 50 return	Crude Oil Return
Nifty Midcap 100 return	1.000		
Nifty 50 return	0.853	1.000	
Crude Oil Return	-0.105	-0.067	1.000

The results indicate that a negative correlation exists between the crude oil return with both the indicators of the Indian stock market [7][8]. The increase in crude oil prices provides a negative impact on the Indian economy [9]. The increase in crude oil price increases inflation in the

country. The increase in the cost of living causes many adverse effects on the economy. Thus the negative relationship between the crude oil return and the stock market is expected which is also indicated by the results.

Correlation between Indian Gold prices and Indian stock indices

The correlation between the Gold prices and Nifty 50 returns and Nifty Midcap 100 returns is estimated in the study. The null hypothesis assumes that there exists no significant correlation between the Gold price returns, Nifty 50 returns and Nifty Midcap 100 returns. The Pearson correlation is estimated in the study. The result of the correlation analysis is shown in table-6, given below:

Table 6: Correlation analysis (Indian Gold prices and Indian stock indices)

	Crude oil	Gold price	NIFTY50	NIFTY MIDCAP 100
Crude oil	1			
Gold price	.436**	1		
NIFTY50	.110	.786**	1	
NIFTY MIDCAP 100	.044	.727**	.977**	1
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 6 indicates the significant positive correlation between the Crude oil and Gold price, Gold price and Nifty 50, Gold price and Nifty Midcap 100. Any price movement in Gold price is found to be correlated with stock market movement [10].

Test of Causality

The Causality relationship between the crude oil and the Indian stock market indices.

The lead-lag relationship between the crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns are analyzed using the Grangers causality test. The Granger's causality test assumes the null hypothesis that there exists no significant lead-lag relationship between the crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns. The result of the Grangers causality test is shown in table-, given below [11].

Table 7: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
Nifty 50 return does not Granger Cause Crude Oil Return	161	1.88184	0.1558
Crude Oil Return does not Granger Cause Nifty 50 return		0.51942	0.5959
Nifty Midcap 100 return does not Granger Cause Crude Oil Return	161	2.61104	0.0767
Crude Oil Return does not Granger Cause Nifty Midcap 100 return		1.53920	0.2178
Nifty Midcap 100 return does not Granger Cause Nifty 50 return	161	1.73688	0.1795
Nifty 50 return does not Granger Cause Nifty Midcap 100 return		2.01097	0.1373

The results indicate that the p-value of F statistics is found to be greater than the five percent level of significance. Hence, the null hypothesis cannot be rejected and no lead-lag relationship is found between Crude oil returns and Nifty 50 returns and Nifty Midcap 100 returns [12].

The Causality relationship between the Gold Price and the Indian stock market indices.

The lead-lag relationship between the Gold price returns series and Nifty 50 returns and Nifty Midcap 100 returns are analyzed using the Grangers causality test. The Granger's causality test assumes the null hypothesis that there exists no significant lead-lag relationship between the Gold price returns series and Nifty 50 returns and Nifty Midcap 100 returns [13]. The result of the Grangers causality test is shown in table-8, given below:

Table 8: Other Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
NIFTY Midcap return does not Granger Cause NIFTY return	161	1.71646	0.1209
The NIFTY return does not Granger Cause NIFTY Midcap return		1.16985	0.3255
The interest rate does not Granger Cause NIFTY return	153	2.62283	0.0193
The NIFTY return does not Granger Cause Interest rate		4.69644	0.0002
The interest rate does not Granger Cause NIFTY Midcap return	153	3.06902	0.0075
NIFTY Midcap return does not Granger Cause Int. rate		4.04426	0.0009

The results indicate that the p-value of F statistics is found to be greater than the five percent level of significance.

Hence the null hypothesis cannot be rejected and no lead-lag relationship is found between Gold price returns, Nifty 50 returns, and Nifty Midcap 100 returns.

DISCUSSION AND CONCLUSION

The findings for the study on the relationship between Crude oil price and its impact on Indian stock market indices including Nifty 50 and midcap 100 indicates that the Crude oil significantly influences Nifty 50 and Nifty Midcap 100 index. The correlation between the Crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns was also estimated in the study. The results found that a negative correlation exists between the Crude oil with both the indicators of the Indian stock market. The increase in Crude oil prices provides a negative impact on the Indian economy. The increase in Crude oil increases inflation in the country. The increase in the cost of living causes many adverse effects on the economy. Thus, a negative relationship between the Crude oil and the stock market is expected which is also indicated by the results. The Causality relationship between the Crude oil and the Indian stock market indices was also studied with the help of Grangers causality test and the results found that the null hypothesis cannot be rejected and no lead-lag relationship is found between Crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns. Thus, the results from the Grangers causality test showed that there exists no significant lead-lag relationship between the Crude oil returns series and Nifty 50 returns and Nifty Midcap 100 returns.

Similarly, it was found from the study on the relationship between Indian Gold prices and its impact on Indian stock market indices including Nifty 50 and Nifty Midcap 100 from descriptive statistics that Indian Gold prices significantly influence Nifty 50 and Nifty Midcap 100 index. The correlation between the Indian Gold prices returns series and Nifty 50 returns and Nifty Midcap 100 returns are estimated in the study. The Pearson correlation is estimated in the study. The correlation between the Indian gold prices and Indian stock indices (Nifty 50 returns and Nifty Midcap 100 returns) found to have a negative correlation. The causality relationship found that there exists a significant lead-lag relationship between gold prices and both of the Indian stock indices namely Nifty 50 returns and Nifty Midcap 100 returns. It was also found that the Granger causality, the p-value of F statistics is found to be less than the five percent level of significance between the Gold prices series and both of the Indian stock indices. Hence with a five percent confidence level, the null hypothesis (no significant causal relationship between the Gold prices and Indian stock.

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