CO INTEGRATION AND CAUSAL RELATIONSHIP AMONG CRUDE OIL PRICES, EXCHANGE RATE AND STOCK MARKET PERFORMANCE: AN EVIDENCE FROM INDIA

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ABSTRACT

This paper has made an attempt to evaluate the combined impact of crude oil prices and exchange rate on the performance of Indian stock market. As the impact of dollar nominated oil prices on stock prices may not be quite relevant for Indian context. Therefore, in this study WTI Crude oil prices per Dollars along with the USD/ Rupee exchange rate would be more meaningful and relevant to understand the impact of oil prices on stock market by using monthly data from 2003 to 2016 for S&P CNX Nifty Index, WTI Crude oil prices per Barrel (Dollars) and Dollar/Rupee Exchange rate. All the series were found to be stationery at First difference. The Granger causality tests revealed that there exists a Bi-directional causality between stock prices and exchange rates in the short run i.e. stock prices lead exchange rates in the short run, but result of Johansen cointegration suggested that there is no long run relationship between these two financial variables. The results of the Johansen cointegration test suggest absence of any long term relationship between WTI crude oil price, USD/Rupee exchange rate and stock prices in India. The result of forecast error variances suggested that USD/Rupee exchange rate is influenced by Stock market performance. The forecast error variances of USD/Rupee exchange rate is significantly explained by the value of Nifty. Results also indicate that the values of oil price and exchange rate are comparatively less exogenous than the Indian stock market. Particularly, the contribution of Stock market shocks to the USD/Rupee exchange rate is greater than that of WTI Crude oil price shocks in all the periods.

Keywords: Cointegration, Granger Causality, VAR, Variance Decomposition

INTRODUCTION:

Theoretically, oil prices can influence the Stock prices of the company in various ways. The changes in the Stock Market is the result of the fluctuations in demand and supply of the underlying asset i.e. the shareholding of company held by the investors. The share prices of the company are equivalent to the expected present value of discounted cash flows, at any given point of time (Huang, Masulis, & Stoll, 1996).

Oil is an important component of production cost. Oil prices can influence the stock prices of the company by directly affecting the future value of the cash flow. It could also affect the stock prices indirectly by influencing the interest rates used for discounting the future cash flows. Constantly increasing oil prices could increase the cost of doing the business for an oil-related related company in the absence of complete substitution effect between the factors of production. As the price of oil rises, companies pass the cost on to customers in the form of higher prices of the goods and services. The rise in the prices of the goods and services has an adverse affects the profits of the company.

Basically, the value of the firm will be influenced by the foreign exchange rate volatility since the future cash flows of the firm changes with the fluctuations in the foreign exchange rates. Exchange rates have become one of the main determinants of business profitability and equity prices due to the continuous increases in the world trade and capital movements. When there is an appreciation in the Exchange rates, the sales and profits of exporters will shrink and the stock prices will decline since exporters will lose their competitiveness in international market. On the other hand, competitiveness of the importers will increase domestic markets. Therefore, their profit and stock prices will increase.

An alternative explanation for the relation between exchange rates and stock prices can be provided through 'portfolio balance approaches' which stresses on the role of capital account transaction. Like all commodities, exchange rates are being determined by forces of the demand and supply. A blooming stock market would attract capital flows from foreign investors, which may cause an increase in the demand for a country's currency. The reverse would happen in case of falling stock prices where the investors would try to sell their stocks to avoid further losses and would convert their money into foreign currency to move out of the country.

LITERATURE REVIEW:

The financial literature is quite rich with respect to empirical studies that link the fluctuation in oil prices and the stock market performance. (Siddique, 2014), investigated the impact of International oil price fluctuations on the performance of Stock Market in Pakistan and concluded that Oil prices have a positive correlation with Stock Market performance. Several studies such as (Masih, Peters, & De Mello, 2011), (Jennings, 2012) etc examined the relationship between the Crude oil prices and the Stock Market performance. The result of the studies revealed that there exist a statistically significant relationship between Crude oil prices and Stock Market prices.

(Pavlova, 2011), examined the empirical relationship between the Stock returns and oil prices and reported that linear oil price changes have negative influence on the Stock Price returns. (Olufisayo, 2014), applied VECM Model for examining the relationship between changes in oil price and Stock Market growth. The study suggested that there exist a long run relationship between oil price and Stock Market and a unidirectional causality run from oil price changes to Stock Market development.

Several studies have been conducted to investigate the impact of Oil prices on the performance of the Stock Markets of emerging and developing economies, developed economies as well as major oil producing and consuming countries. (Imarhiagbe, 2010), analyzed the impact of oil prices on Stock Market performance of selected major oil producing and oil consuming countries of the world by applying a VAR Model. The study suggested that there is an existence of oil prices and exchange rates influences over stock prices of all the selected countries. (Fatima & Bashir, 2014), applied VECM Model to study the volatility of international oil prices and emerging Stock Markets of Pakistan and China. The result of the study indicated that oil prices negatively affects the emerging Stock Markets of Pakistan and China as these two are major oil importing nations. Further (Dhaoui & Khraief, 2014), examined the impact of oil price shocks on Stock Market returns for major internationally developed countries such as US, Canada, France, Australia, Japan and Singapore using a E-Garch technique and concluded that there exists a negative correlation between oil prices and Stock Market returns.

(Nath & Samanta, 2003), dynamic linkage between exchange rate and stock prices using daily data from March 1993 to December 2002 and concluded that there is a absence causal link between these variables. (Kutty, 2010), examines the relationship between stock prices and exchange rates in Mexico using VECM Model and reported that stock prices lead exchange rates in the short run but there is no long run relationship between

Exchange rates and Stock prices.

(Gulathi & khakani, 2012), applied Granger Causality to analyze the causal relationship exists between foreign exchange rates and stock market. The study suggested that there exists no relationship between exchange rates and stock market.

(Agrawal, 2010)**,** (Malarvizhi & Jaya, 2012)**,** (Poornima & Ganeshwari, 2013) (Najaf & Nazaf, 2016)**,** applied Granger Causality for investigating the relationship between Indian Rupees/US-Dollar exchange rate and Nifty returns and concluded that there is unidirectional relationship between exchange rate and Nifty returns.

The government of India has given up the administrated price mechanism in oil sector and linked the domestic oil prices with international oil prices. Oil price as external factor certainly affects the Indian economy, especially the Indian currency where US dollar is the acceptable currency in International market

(Zhang, 2013)**,** applied Cointegration to study the relationship between the real price of oil and the real effective exchange rate of US dollar by using monthly data and reported that there exist no Cointegration between the oil price and the value of US dollar unless the effects of two structural breaks in the past i.e. November 1986 and February 2005, are controlled for. (Hidhayathulla & Mahammad, 2014)**,** examined the effects of oil price on exchange rate of Indian rupee against US dollar and the study suggested that the import of crude oil continues to rise up when the crude oil future price increases.

(Basher, Haug, & Sadorsky, 2010)**,** investigated the dynamic relationship between oil prices, exchange rates and emerging Stock Markets and the study reported the fact that positive shocks to oil prices tend to depress US dollar exchange rates and emerging market stock prices in the short run.

(Hussin, Muhammad, Abu, & Razak, 2012)**,** applied VAR framework and studied the relationship between oil price, Exchange rate and Islamic stock market in Malaysia. The findings showed that the Islamic share prices share a positive and significant relationship with the crude oil price but has a negative and not significant relationship with foreign exchange rate. (Kumar, 2014), employed daily data to examine the impact of oil prices on the Stock Market and exchange rates in India and concluded that oil prices, exchange rates and Stock Market returns are not Cointegrated. The study further applied Spillover Index Methodology to analyze the returns and volatility spillovers among oil price, stock market and exchange rates. The results suggested that oil price affects the stock market and exchange rates. In addition, the stock market also affects the exchange rates.

(Sahu, Bandopadhyay, & Mondal, 2014), studied the crude oil prices in dollar terms along with the exchange rate in order to understand the impact of oil prices on stock market by using VECM Model. The study reported that there exists a long run Cointegrating relation between crude oil price, exchange rate and Indian stock market, but crude oil price or exchange rate is not observed to affect the Indian stock prices significantly.

Although, there are many diverse streams of literature exist scrutinizing the relationship among oil prices and emerging market stock prices, Exchange rates and the Stock prices, oil prices and exchange rates, relatively little is known about the relationship between oil prices, exchange rates and emerging stock markets. This creates a research gap and a need to study the dynamic relation existing between these variables. Understanding the relationship between oil prices, exchange rates and emerging Stock Market prices is an important topic to study because these variables will exert a larger influence over the global economy as emerging economies continues to grow and flourish.

From the review of the earlier literature it can be seen that a large number of studies have been made to determine the relationship between exchange rate, crude oil price, and stock price movement. Undoubtedly, the above mentioned research studies have made a great contribution in this field but the findings of these studies are diverse and inconsistent. These findings are sensitive to the choice of countries, methodology employed and the time period under studied. It is difficult to generalize the results because each market is unique in terms of its own rules, regulations, and types of investors. Thus this paper is an attempt to evaluate the combined impact of crude oil prices and exchange rate on the performance of Indian stock market.

The impact of dollar nominated oil prices on stock prices may not be quite relevant for Indian context. Therefore, in this study WTI Crude oil prices per Dollars along with the USD/ Rupee exchange rate would be more meaningful and relevant to understand the impact of oil prices on stock market.

DATA AND RESEARCH METHODOLOGY:

In order to study the above research objective the following research methodology has been adopted

DATA AND PERIOD OF STUDY:

The study is being carried out using monthly data from 1st March 2003 to 1st March 2016 for S&P CNX Nifty Index, WTI Crude oil prices per Barrel (Dollars) and Dollar/Rupee Exchange rate. Closing prices of S&P CNX

Nifty has been considered as a proxy of the Indian Stock Market as it is a well diversified 50 stock index accounting for 22 sectors of the Indian economy. West Texas Intermediate (WTI) crude oil price per barrel (in Dollar) has been used as a proxy of oil price in Indian economy and USD/Rupee Exchange rate has been used as the US Dollar has remained to be the most dominating foreign currency used for trading oil throughout the period of this study.

STATISTICAL TECHNIQUES:

Augmented Dickey-Fuller unit root Test:

Augmented Dickey-Fuller unit root Test has been employed to examine the stationery property of the S&P CNX Nifty Index, WTI Crude oil prices per Barrel (Dollars) and Dollar/Rupee Exchange rate. When a variable is not stationery, its mean and variance are not constant over time, and an observation is correlated with its more recent lags. Therefore, it is crucial to test data for stationarity. Further difference-stationery process has been used to transform non-stationery series into stationery series. The regression equation for the Difference-stationery process is as follows: $\Delta(\Delta Y_t) = \alpha + \delta \Delta Y_{t-1} + e_t$

Hypothesis Statement:

H0: Variable has a unit root or Variable is not Stationery
H1: Variable does not have a unit root or Variable is Stationery

Granger Causality Test:

In order to test the causality relationship empirically, it is common to apply the Granger causality test that was initially introduced by Granger (1969) by following the methodology adopted by (Zakaria & Shamsuddin, 2012), (Pathak, 2009). In a bivariate framework, the variable y_1 is said to cause the variable y_2 in the Granger sense if the forecast for y_2 improves when lagged variables y_1 are taken into account. In general, conventional Granger causality can be represented by the following bivariate system.

$$y_{1t} = \delta_1 + \sum_{i=1}^{m} \beta_i . y_{1t-i} + \sum_{i=1}^{n} \psi_i . y_{2t-i} + \varepsilon_{1t}$$

$$y_{2t} = \delta_2 + \sum_{i=1}^{q} \pi_i . y_{1t-i} + \sum_{i=1}^{r} \phi_i . y_{2t-i} + \nu_t$$

Four findings are possible in a Granger causality test. First, neither variable Granger causes the other. In other words, independence is suggested when the set of y_1 and y_2 coefficients are not statistically significant in both regressions. Second, unidirectional causality from y_2 to y_2, which means y_2 causes y_1 but not vice versa. Third, unidirectional causality from y_1 to y_2 that means y_1 causes y_2 but not vice versa. Fourth, bilateral causality between two variables, which means y_1 and y_2 Granger cause each other.

In this paper, the relationship between CNX Nifty Index, Dollar/Rupee Exchange rate and WTI Crude oil prices per Barrel in Dollar has been tested using the Granger Causality test. These tests require that the variables used in a given model be stationery, that is, their stochastic properties are time invariant.

Johansen's Cointegration Test:

Johansen's co-integration test has been used for investigating the long term relationship between the CNX Nifty Index, Dollar/Rupee Exchange rate and WTI Crude oil prices per Barrel in Dollar. The Johansen's test approaches the testing for co-integration by examining the number of independent linear combinations for time series variables that yields a stationarity process.

As Johansen's co-integration test is sensitive to the choice of lag length an appropriate lag structure has been selected using Akaie Information Criterion (AIC), Schwarz Criterion (SC) and the Likelihood Ratio (LR) test. Johansen's co-integration is used for recognizing the cointegrating relationship among the variables. If two or more variables are integrated of the same order and if their linear combination is found to be stationery then these variables are said to be co- integrated.

Hypothesis Statement:

H0: There is no co-integration among the variables in long run
H1: There is co-integration among the variables in long run

Variance Decomposition:

VAR system is characterized by its ability to conditionally forecast, especially short-term forecasts, future movement of the variables in the system by capturing the individual patterns of movement in the system.

Therefore, the multi-period forecast error variance decompositions show that how much a random shock to one innovation is responsible for predicting subsequent fluctuation of the other innovation that is not already accounted for by its own prior fluctuation. Variance decomposition test is used to explore the degree of exogeneity of the variables involved in this study.

STATISTICAL ANALYSIS:

Table 1: Augmented Dickey-Fuller Test for the Variables

Instrument/Indices	At level			At First Difference
	Trend	Trend and Intercept	Trend	
S&P CNX Nifty Index	-0.9692	-2.9041	1.3560	-10.22
	0.7635	0.1640	0.9558	0.000
Dollar/Rupee exchange rate	-0.1208	-2.302	1.1501	-10.123
	0.9442	0.4299	0.9352	0.000
WTI crude oil price per barrel (in Dollar)	-2.6049	-2.332	-0.7291	-8.2398
	0.0940	0.4137	0.3994	0.0000

Source: Author's compilation

The result of the Stationery test is given in the table.1. All the Variables are found to be non-stationery at its level and they are not significant at 5% level, since the P-value is more than 0.05%. Therefore, unit root test is conducted in first differences. All the series are now found to be stationery at First difference. So this data can be used to find the Johansen (1998) and Johansen and Juselius (1990) Co-integration for long term relationship.

Table 2: Granger Causality Test between CNX Nifty Index, Dollar/Rupee Exchange rate and WTI Crude oil prices per Barrel in Dollar

Null Hypothesis	F-Stat	P-Value	Result
Rupee/Dollar Exchange rate does not Granger cause CNX Nifty Index	4.65913	0.0038	Rejected
CNX Nifty Index does not Granger cause Rupee/Dollar Exchange rate	5.10559	0.0021	Rejected
WTI Crude oil prices does not Granger cause CNX Nifty Index	2.66313	0.0500	Accepted
CNX Nifty Index does not Granger cause WTI Crude oil prices	3.34726	0.0207	Accepted
WTI Crude oil prices does not Granger cause Rupee/Dollar Exchange rate	3.11984	0.0278	Accepted
Rupee/Dollar Exchange rate does not Granger cause WTI Crude oil prices	0.94462	0.4207	Accepted

Source: Author's compilation

Table 2 shows the results of Granger Causality for S&P CNX NIFTY Index, WTI Crude oil prices per Barrel (Dollar), Dollar/Rupee exchange rate. The result indicates that there exist a Bi-directional causal link between USD/Rupee Exchange rate and CNX Nifty Index as the P-Value is significant. It could be concluded saying that Stock Market performance is influenced by Dollar/Rupee exchange rate in short run and vise versa. Apart from these two variables, the result of Granger Causality test does not indicate the existence of Causal relationship between any of the variables.

Table 3: Johansen's Cointegration Test for the Closing daily price returns of S&P CNX Nifty, USD/Rupee Exchange Rate and WTI Crude Oil Prices

Hypothesized Number of Cointegrating Equations	Eigen Value	Trace Statistics	Critical Value at 5% (p-value)	Maximum Eigen statistics	Critical Value at 5% (p-value)
None	0.097067	25.22924	29.7970 (0.1534)	16.23499	21.13162 (0.2114)
At most 1	0.054340	8.994250	15.4947 (0.3659)	8.883668	14.26460 (0.2960)
At most 2	0.000695	0.110582	3.84146 (0.7395)	0.110582	3.84146 (0.7395)

* denotes rejection of the hypothesis at the 0.05 level

Table 3 displays the result of Johansen's Cointegration test. The following test has been performed by taking lag

interval as 1 to 2, which has been selected as per the optimum lag length suggested by different tests like Akaie Information Criterion (AIC), Schwarz Criterion (SC) and the Likelihood Ratio (LR) test. The result of Johansen's cointegration test indicates absence of cointegrating vectors at the 5% level of significance. This result has been supported by Trace test as well as Max Eigen values. Therefore null hypothesis of no cointegration cannot be rejected at 5% level of significance. Thus on the basis of above observation, it can be concluded that the S&P CNX Nifty Index, WTI Crude oil prices and Dollar/Rupee Exchange rate are not cointegrated and there exist no long term cointegrating relationship between these variables. Therefore the VAR model in unrestricted framework is being used to model the joint dynamics and causal relations among S&P CNX Nifty Index, WTI Crude oil prices and Dollar/Rupee Exchange rate.

Hypothesis 1
H0: USD/Rupee Exchange Rate & WTI Crude Oil (Lag 1 & Lag 2) is not significant to explain S&P CNX NIFTY
H1: USD/Rupee Exchange Rate & WTI Crude Oil (Lag 1 & Lag 2) is significant to explain S&P CNX NIFTY
Hypothesis 2
H0: S&P CNX NIFTY and WTI Crude Oil (Lag 1 & Lag 2) is not significant to explain USD/Rupee Exchange Rate
H1: S&P CNX NIFTY and WTI Crude Oil (Lag 1 & Lag 2) is significant to explain USD/Rupee Exchange Rate
Hypothesis 3
H0: S&P CNX Nifty and USD/Rupee Exchange Rate (Lag 1 & Lag 2) is not significant to explain WTI Crude Oil
H1: S&P CNX NIFTY and USD/Rupee Exchange Rate (Lag 1 & Lag 2) is not significant to explain WTI Crude Oil

Equation 1:
NIFTY= C (1)*NIFTY (-1) + C(2)*NIFTY (-2) + C(3)* USD/RUPEE (-1) + C(4)* USD/RUPEE(-2) + C(5)* WTI CRUDE OIL (-1) + C(6)* WTI CRUDE OIL (-2) + C(7)
Equation 2:
RUPEE/USD = C (8)*NIFTY (-1) + C(9)*NIFTY (-2) + C(10)* USD/RUPEE(-1) + C(11)*USD/RUPEE(-2) + C(12)* WTI CRUDE OIL (-1) + C(13)* WTI CRUDE OIL (-2) + C(14)
Equation 3:
WTI CRUDE OIL = C (15)* NIFTY (-1) + C (16)* NIFTY (-2) + C (17)* USD/RUPEE (-1) + C (18)*USD/RUPEE (-2) + C (19)* WTI CRUDE OIL (-1) + C(20)* WTI CRUDE OIL (-2) + C(21)

Table 4: VAR Coefficients and Probabilities (S&P CNX NIFTY, USD/Rupee Exchange Rate and WTI Crude Oil Prices)

	Probability
C(1)	0.0000
C(2)	0.0079
C(3)	0.2404
C(4)	0.1704
C(5)	0.3977
C(6)	0.3382
C(7)	0.6867
C(8)	0.0039
C(9)	0.0023
C(10)	0.0000
C(11)	0.0140
C(12)	0.1777
C(13)	0.3531
C(14)	0.9583
C(15)	0.0004
C(16)	0.0017
C(17)	0.1582
C(18)	0.3464
C(19)	0.0000
C(20)	0.0000
C(21)	0.0052

Source: Author's compilation

In Equation 1, the Coefficients associated with the CNX Nifty Lag (1) and Lag (2) are C (1) and C (2) for which probability values are 0.000 & 0.0079 respectively. Since the P-Values are less than 5%, the null hypothesis that Nifty lag (1) and lag (2) are not significant to influence CNX Nifty could be rejected. This proves that CNX Nifty monthly Closing prices are being affected by its past values.

Further, the coefficient associated with lag (1), lag (2) USD/Rupee Exchange rate and lag (1), and lag (2) of WTI Crude oil prices are C(3), C(4), C(5) and C(6) for which the probability values are 0.2404, 0.1704, 0.3977 and 0.3382 respectively. Since the p-values for the lag (1) and lag (2) of USD/Rupee Exchange rate and WTI Crude oil prices are more than 5% we are needed to accept the null hypothesis. Therefore USD/Rupee Exchange Rate & WTI Crude Oil (Lag 1 & Lag 2) is not significant to explain S&P CNX NIFTY.

In Equation 2 the coefficients associated with CNX Nifty Lag (1) and lag (2) are C (8) and C (9) for which the coefficient values are 0.0039 and 0.0023. Since the p-values are significant at 5% level of significance, the null hypothesis could be rejected. Therefore it could be concluded that CNX Nifty Index (Lag 1 & Lag 2) is significant to explain USD/Rupee Exchange Rate. Coefficients associated with USD/ Rupee Exchange rate (Lag 1 and Lag 2) and WTI Crude oil prices (Lag 1 and Lag 2) are C (10), C (11), C (12) & C (13) for which the coefficient values are 0.000, 0.0140, 0.1777 and 0.3531 respectively. So in case of USD/ Rupee Exchange rate (Lag 1 and Lag 2) the null hypothesis could be rejected as the p-values are less than 5%. But as far as WTI Crude oil prices (Lag 1 and Lag 2) are concern the null hypothesis cannot be rejected as p-values are more than 5%. Therefore it could be concluded that the USD/ Rupee Exchange rate is influenced by its past value.

In Equation 3 Coefficients associated with CNX Nifty Index (Lag 1 & Lag 2) and WTI Crude oil prices (Lag 1 and Lag 2) are found to be significant. Therefore it could be concluded that CNX Nifty Index (Lag 1 & Lag 2) and WTI Crude oil prices (Lag 1 and Lag 2) are significant to explain the WTI Crude oil prices. The coefficients obtained from the estimation of the VAR model may not be proper to interpret directly. Therefore, the variance decomposition has been used.

Table 5: Variance decomposition result

Variance Decomposition of :	Period	Percentage of Forecast Error Variance Explained by Innovation in:		
		S&P CNX NIFTY	WTI Crude Oil	USD/Rupee Exchange rate
S&P CNX NIFTY	1	100.0000	0.000000	0.000000
	2	99.53439	0.311798	0.153810
	3	99.26621	0.494331	0.239454
	4	99.19805	0.546418	0.255532
	5	99.23738	0.525596	0.237020
	6	99.31852	0.473424	0.208058
	7	99.40287	0.416024	0.181110
	8	99.46915	0.369646	0.161199
	9	99.50623	0.344492	0.149279
	10	99.50870	0.346961	0.144339
WTI Crude Oil	1	3.067125	96.93288	0.000000
	2	1.305519	98.29946	0.395016
	3	0.885615	98.19039	0.923996
	4	0.659076	97.79081	1.550113
	5	0.524891	97.20648	2.268629
	6	0.500357	96.43594	3.063700
	7	0.603348	95.48439	3.912258
	8	0.840714	94.36969	4.789596
	9	1.210722	93.11653	5.672747
	10	1.706243	91.75170	6.542058
USD/Rupee Exchange rate	1	0.029356	0.248307	99.72234
	2	2.879120	0.153876	96.96700
	3	5.949819	0.568031	93.48215
	4	8.546622	1.222960	90.23042
	5	10.65044	1.980214	87.36935
	6	12.35846	2.781663	84.85988
	7	13.76423	3.603227	82.63254
	8	14.93740	4.433461	80.62914
	9	15.92639	5.265096	78.80851
	10	16.76461	6.092051	77.14334

Source: Author's compilation

The study has estimated the variance decompositions and impulse response functions under the VAR framework to investigate the dynamic relationship among the WTI crude oil price, USD/Rupee exchange rate and stock prices in India. Table 5 indicates that the S&P CNX Nifty closing prices are strongly exogenous in nature because almost 99.50 percent of their own variances are explained by its own shock even after 10 months, while the explanatory powers of oil price and exchange rate to forecast the error variance of Nifty are found to be negligible.

In table variance decomposition of WTI Crude Oil Prices in short run is concern Nifty account for 3.06% fluctuation in oil prices in India, whereas in the long run it decreases to 1.706%. So, in Indian context we found that shock in market index cause marginal fluctuation in oil prices. As far as Variance decomposition of WTI Crude Oil Prices in short run is concern USD/Rupee exchange rate account for 0.000% fluctuation in oil prices in India, whereas in the long run it increases marginally to 6.542% in the span of 1 month to 10 month. Even WTI Crude oil prices also found to be strongly exogenous in nature as almost 91.75 percent of their own variances are explained by its own shock even after 10 months.

The forecast error variances of USD/Rupee exchange rate is significantly explained by the value of Nifty i.e. by 16.74%. The results also indicate that the values of oil price and exchange rate are comparatively less exogenous than the Indian stock market in the sense that the percentage of the error variance of oil price and exchange rate accounted by their own are approximately 91.751 percent and 77 percent respectively at time horizon of 10 months.

CONCLUSION:

The study made an attempt to study the dynamic relationship between WTI crude oil price, USD/Rupee exchange rate and S&P CNX Nifty using monthly data. The Granger causality tests reveal that there exists a Bi-directional causality between stock prices and exchange rates in the short run i.e. stock prices lead exchange rates in the short run, but result of Johansen cointegration suggest that there is no long run relationship between these two financial variables. This is in line with the conclusion drawn by (Kutty, 2010), (Adebiyi, Adenuga, & Abeng, 2010). The results of the Johansen cointegration test suggest absence of any long term relationship between WTI crude oil price, USD/Rupee exchange rate and stock prices in India. The absence of any long term relationship between these variables is in line with the results of the study conducted by (Nath & Samanta, 2003), (Basher, Haug, & Sadorsky, 2010), (Adebiyi, Adenuga, & Abeng, 2010), (Kumar, 2014) . The result of forecast error variances of USD/Rupee exchange rate is significantly explained by the value of Nifty i.e. by 16.74%. This suggests that USD/Rupee exchange rate is influenced by Stock market performance. The forecast error variances of USD/Rupee exchange rate is significantly explained by the value of Nifty. Results also indicate that the values of oil price and exchange rate are comparatively less exogenous than the Indian stock market. Particularly, the contribution of Stock market shocks to the USD/Rupee exchange rate is greater than that of WTI Crude oil price shocks in all the periods.

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