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Relationship between International Crude Oil Price and Indian Stock Market (NSE)

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Abstract : In this new era of economic growth, the exceptional increase in the crude oil prices is one of the significant developments that affect the global economy. Crude oil is an important raw material used for manufacturing sectors, so that increase in the price of oil is bound to warn the economy with inflationary inclination. The study examine the long-term relationships between CNX NIFTY FIFTY index of National Stock Exchange and crude price by using various econometric test. The surge in crude oil prices during recent years has generated a lot of interest in the relationship between oil price and equity markets. The study covers the period between 01.01.2010 and 31.12.2014 and was performed with data consisting of 1245 days. The empirical results show there was a co-integrated long-term relationship between CNX index and crude price. Granger causality results reveal that there is unidirectional causality exists and crude oil price causes NSE (CNX) but NSE (CNX) does not cause oil price.

Keywords:-Stock price, Crude price, Correlation, Co-integration, Causality, NSE.

I. INTRODUCTION

Stock market and crude oil markets have developed a mutual relationship over the past few years, with virtually every production sector in the international economy relying heavily on oil as an energy source. Crude oil prices are likely to have significant effects on the production sector. Stock market play a pivotal role in growing industries and commerce of a country that eventually affect the economy. Crude oil is worldwide required commodity. Any variation in crude oil prices can have both direct and indirect impact on the economy of the different countries. The volatility of crude oil prices drove many companies away and its affect the stock market also. India fulfil crude oil requirements by

importing it from oil producing country. India meets crude oil more than 80% of its requirement by importing process. Therefore, any upward and downward motion of prices is closely tracked in the domestic market place. Many times it has been recorded that prices of essential products like crude also acts as a prime driver in becoming reason of up and down movement of price.

The National Stock Exchange of India Limited (NSE) is one of the leading stock exchanges of India, located in Mumbai. NSE was established in 1992 as the first demutualized electronic exchange in the country. NSE was the first exchange in the country to provide a modern, fully automated screen based electronic trading system which offered easy trading facility to the investors spread across the length and breadth of the country. NSE has a market capitalization of more than US\$1.65 trillion, making it the world's 12th largest stock exchange as of 23 January 2015 (<http://www.nseindia.com>). NSE's flagship index, the CNX Nifty, the 50 stock index, is used extensively by investors in India and around the world as a barometer of the Indian capital markets.

The price of oil, or the oil price, generally refers to the spot price of a barrel of benchmark crude oil. In North America this generally refers to the WTI Cushing Crude Oil Spot Price West Texas Intermediate (WTI), also known as Texas Light Sweet, a type of crude oil used as a benchmark in oil pricing and the underlying commodity of New York Mercantile Exchange's oil futures contracts. WTI is a light crude oil, lighter than Brent Crude oil. It contains about 0.24% sulphur, rating it sweet crude, sweeter than Brent. Its properties and production site make it ideal for being refined in the United States, mostly in the Midwest and Gulf Coast regions. WTI has an API gravity of around 39.6 (specific gravity approx. 0.827) per barrel (159 liters) of either WTI/light crudes traded on the New York

Mercantile Exchange (NYMEX) for delivery at Cushing, Oklahoma, or of Brent as traded on the Intercontinental Exchange (ICE, into which the International Petroleum Exchange has been incorporated) for delivery at SullomVoe. Cushing, Oklahoma, a major oil supply hub connecting oil suppliers to the Gulf Coast, has become the most significant trading hub for crude oil in North America. The price of a barrel of oil is highly dependent on both its grade, determined by factors such as its specific gravity or API and its sulphur content, and its location. Other important benchmarks include Dubai, Tapes, and the OPEC basket. The Energy Information Administration (EIA) uses the imported refiner acquisition cost, the weighted average cost of all oil imported into the US, as its "world oil price". The demand for oil is highly dependent on global macroeconomic conditions. According to the International Energy Agency, high oil prices generally have a large negative impact on global economic growth.

There is a scant literature on the empirical relationship between the crude oil & stock market. Jones and Kabul (1996) show the negative reaction of US, Canadian, UK and Japan stock prices to oil price shocks via the impact of oil price shocks on real cash flows. Caner (2001) uses linear and nonlinear causality tests to examine the dynamic relationship between oil prices and stock markets, and concludes that a significant relationship between real stock returns and oil futures price is non-linear. Hammoudeh and Alias (2002) find spill overs from oil markets to the stock indices of oil-exporting countries, including Bahrain, Indonesia, Mexico and Venezuela. Kalian and Park (2009) report that only oil price increases, driven by precautionary demand for oil over concern about future oil supplies, affect stock prices negatively. Dries prong et al. (2008) find a strong relationship between stock market and oil market movements.

The main objective of present study is attempts to examine:

- ✓ Examine whether there exist any correlation between Crude oil prices and stock price index in India (NSE).
- ✓ Crude oil prices have an impact on Indian stock market (NSE).

In the present study, co-integration and causality tests have been applied by using daily closing values of NSE NIFTY Index between years 2010 -2014 and crude price in order to test the causality relationship between stock market in India and crude prices. It has been considered that the long time period which constitutes the scope of the study and separate consideration of the relationship between fundamental index and international oil price distinguish the study from other studies in the literature and would make an important contribution to the field literature.

II. REVIEW OF LITERATURE

A review of the past studies can provide ideas for understanding the situations and finding on the different grounds by which the researcher elaborates the finding with logical reasoning.

Chia-Lin Chang, Michael McAleer and RoengchaiTansuchat (2011) presented empirical research on Conditional Correlations and Volatility Spillovers between Crude Oil and Stock Index Returns. In the case they have taken 12 years data and consider world market Bahrain, Indonesia, Mexico and Venezuela. France, UK and Japan. (WTI and Brent markets, and the FTSE100, NYSE, Dow Jones and S&P500stock index returns). They input models like CCCmodel, DCC model. They found Consistent with the very low conditional correlations between the volatility of crude oil returns and stock index returns using the CCC model.

J. Isaac Miller and Ronald A. Ratti (2008) presented empirical research on Crude Oil and Stock Markets: Stability, Instability, and Bubbles. In the case they have taken 37 years data and consider Canada, France, Germany, Italy, U.K. and U.S stock market. They put VECM model. This finding supports a conjecture of change in the relationship between real oil price and real stock prices in the last decade compared to earlier years, which may suggest the presence of several stock market bubbles and/or oil price bubbles since the turn of century.

Irene Henriques and Perry Sadorsky (2007) presented on Oil prices and the stock prices of alternative energy companies. In this case they have taken 7 years data and consider Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, and Venezuela of these market.

They put VAR model, Granger test. They have found technology stock prices and oil prices each individually Granger causes the stock prices of alternative energy companies. Simulation results show that a shock to technology stock prices has a larger impact on alternative energy stock prices than does a shock to oil prices. These Results should be of use to investors, managers and policy makers.

AmalenduBhunia (2012) explained on Association between Crude Price and Stock Indices: Empirical Evidence from Bombay Stock Exchange. In the case, 10 years data taken and also consider BSE relationships between BSE 500, BSE 200 and BSE 100. Unit root, co- integration and causality test are consider. Results One way causality relationship from all index of the stock market to crude price, but crude price was not the causal of each of the three indexes.

Nidhi Sharma and Kirti Khanna (2011) analysed on Crude oil price velocity & stock market ripple [a comparative study of BSE with NYSE &lse]. In the case they have taken 10 years data and consider New York Stock Exchange (NYSE), Bombay Stock Exchange (BSE) and London Stock Exchange (LSE). Test are used correlation and regression. They found OPEC benchmark and its relation with selected crude oil benchmarks and stock markets. In this the researcher has found that there is no significant impact of OPEC on stock market and other oil benchmarks.

Syed Abul Basher and Alfred A. Haug and Perry Sadorsky (2011) shows relationship between oil Prices, exchange rates and emerging markets equity prices. They include world market countries.

Rong-Gang Cong, Yi-Ming Weia, and Jian-Lin Jiaoc, Ying Fana (2008) analyzed the relationships between oil price shocks and stock market by using VAR.

Nicholas Apergis and Stephen M. Miller (2008) illustrated the response of international stock market returns do not respond in a large way to oil market shocks by using VAR and VEC.

Stavros Degiannakis, George Filis and Christos Floros (2009) examined is there any Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries (Oil-exporting: Canada, Mexico, Brazil and Oil-importing: USA, Germany, Netherlands).

Syed A. Basher and Perry Sadorsky (2006) examined on oil price risk impacts stock price returns in emerging markets by using CAPM.

Maghyereh and Aktham (2004) examined that oil shocks have no significant impact on stock index returns in emerging economies. The results also suggest that stock market returns in these economies do not rationally signal shocks in the crude oil market.

Kilian Lutz and Park Cheolbeom (2007) illustrated the response of aggregate U.S. real stock returns may differ greatly depending on whether the increase in the price of crude oil is driven by demand or supply shocks in the crude oil market.

Jose Alvarez-Ramirez, Jesus Alvarez and Eduardo Rodriguez (2008) examined that the market is tending towards efficiency regime at long time horizons, results do not exclude the possibility of market inefficiencies at short time horizons by using auto-regressive fractionally integrated moving average (ARFIMA).

ChakerAloui and Rania Jammazi (2009) findings that rises in oil price has a significant role in determining both the volatility of stock returns and the probability of transition across regimes.

Hui-Ming Zhua, Su-Fang Li and Keming Yu (2011) examined that there is long-run Granger causality between crude oil shocks and stock markets for the OECD and non-OECD panel, and it is concluded that the asymmetric dynamic adjustment behaviour is indeed evident for these countries. Further research should be directed to investigate the country-specific mechanisms by which crude oil prices and disaggregated energy prices affect economic growth and stock prices.

Jeff Fleming and Barbara Ost diek (1999) Findings regarding the relation between futures trading activity and spot market volatility indicate that deep and liquid futures markets have a mitigating effect on volatility in the underlying market. Findings suggest that futures trading improve depth and liquidity in the underlying market, and they contradict the idea that derivatives destabilize the market.

Mohamed El HediArouri (2011) examined any changes on crude oil move stock markets in Europe. Moreover, for some sectors we find strong evidence of asymmetry in the reaction of stock returns to changes in the price of oil.

Imad A. Moosaa and ParamSilvapulle (2000) examined on price–volume relationship in the crude oil futures market using linear and nonlinear causality testing.

Robert W. Faffa and Timothy J. Brailsford (1999) examined on Find that long-term effects persist, although hypothesize that some firms have been able to pass on oil price changes to customers or hedge the risk.

Yue-Jun Zhang and Yi-Ming Wei (2011) examined on empirical results show that the overall shocks are significant, and in the up (down) stock market a positive (negative) impact of oil price risk on stock returns is found.

BabatundeOlatunjiOdusami (2009) examined on empirical results obtained from the model reveals that oil price shocks have significant nonlinear negative effect on aggregate stock return in the United States.

Wensheng Kang and Ronald A. Ratti (2014) examined on the impact of oil price shocks on the stock market return and volatility relationship by using VAR and SVAR.

Hui- Ming Zhu, Rong Li and Sufang Li (2014) examined on that the dependence between crude oil prices and Asia-Pacific stock market returns is generally weak, that it was positive before the global financial crisis.

Rumi Masiha, Sanjay Petersb and Lurion De Mello (2011) examined on co integrating relationship to be stable and find that the linear error correction model to be more favourable than an asymmetric 2 period Markov switching model.

WalidChkili, ChakerAloui and DucKhuong Nguyen (2014) examined on find that investors in the US markets should have more stocks than crude oil asset in order to reduce their portfolio risk.

Christian Conrad, Karin Loch and Daniel Rittler (2014) examined on find that variables that contain information on current and future economic activity are helpful predictors of changes in the oil–stock correlation.

ChakerAlouiand Rania Jammazi (2009) examined on the findings show that rises in oil price has a significant role in determining both the volatility of stock returns and the probability of transition across regimes.

Feng Ma, Yu Wei, Dengshi Huang and Lin Zhao Feng Ma (2013) examined on cross-correlation properties between West Texas Intermediate crude oil and the stock markets of the BRIC.

Li Liu, FengMa and Yudong Wang (2014) examined on find that the forecasting accuracy can be improved after adding oil variables to the traditional predictors. The forecasting gains relative to the benchmark of historical average are statistically and economically significant using by time-varying parameter (TVP).

Nader Naifar and Mohammed Saleh Al Dohaiman (2013) examined on Find that the dependence structure between inflation rates and crude oil prices is asymmetric and orients toward the upper side during the recent financial crisis.

III. RESEARCH METHODOLOGY

The present study based on secondary data. The quantitative approach is opted as the research methodology. The methodology in this research is quantitative because all factual information and knowledge collected is numerical. A quantitative survey is considered to be the most feasible and adequate research strategy for this research as it is beneficial to deal with questions.

The following methodology has been used for the study:

A. Research Question

The study has been conducted with these views;

- ✓ Whether is any correlation between Crude oil and Indian stock market?
- ✓ Whether the changes in crude oil prices have an impact on the stock market returns?

B. Hypothesis

The present study is conducted to test the following hypotheses:

H₀₁: there is no correlation between crude oil price changes and Indian stock market.

H₀₂: crude oil price changes do not affect Indian stock market.

C. Data Set

i. Data

For the fulfilment of the objectives the data has been collected from the different sources. The data has been taken different sources like NSE website ministry of finance. The study has been based on secondary data and analysis have been performed by using 1245 observation consist of daily closing price of NSE and crude oil price. Eviews 7 package program has been used for arranging the data and implementation of econometric analyses.

ii. Data Sources

Data is collected from of the Ministry of Finance and NSE website.

iii. Time period

01.01.2010-31.12.2014 data taken from that period in the daily basis.

D. Econometric Tests

i. Descriptive Test:-

Descriptive statistics provides means, minimums, maximums, medians, standard deviations (SD), skewness, kurtosis and the Jarque-Bera. When average values of the variables are considered in terms of the case that data do not have normal distribution, it can be said that variables are not distributed normally in full, but are distributed very close to normal distribution as the median values of variables are very close to average values

ii. Correlation Test:-

Correlation is a technique for investigating the relationship between two quantitative, continuous variables. Pearson's correlation coefficient (r) is a measure of the strength of the association between the two variables. The first step in studying the relationship between two continuous variables is to draw a scatter plot of the variables to check for linearity. The correlation coefficient should not be calculated if the relationship is not linear. Pearson's correlation coefficient (r) for continuous data ranges from -1 to +1.

iii. Unit root Test

A unit root test is used to test a time series for stationarity. The most appropriate and widely used tests are the ADF and PP, which uses the existence of a unit

root as the null hypothesis. The fact whether time series used in this model have unit roots or not, have been investigated by using Augmented Dickey-Fuller (ADF-1979) and Phillips-Perron (PP-1988) test methods.

iv. Co-integration Test

Co-integration is an econometric property of the time series. If two or more series are themselves non-stationary, but a linear combination of them is stationary, then the series are said to be co-integrated. It tests the null hypothesis, that there exists none co-integrating equations.

v. Pair-wise Granger Causality Test

This test involves examining whether lagged values of one series have significant explanatory power for another series. They have null hypotheses of no granger causality.

E. Tools

To judge the impact of crude oil price changes on stock market, the study has been established the relationship between the market returns and oil prices. The study has taken the percentage changes in the figures of both variables. For this purpose descriptive, correlation, unit root test, co-integration test and pair-wise granger test of determination have used through Eviews 7 econometric.

IV. DATA ANALYSIS AND RESULT

There are various test need to analysis the data. These test are descriptive test which is calculated for mean, minimums, maximums, medians, standard deviations (SD), skewness, kurtosis, the Jarque-Bera statistics and probability values. Than Pearson's correlation test which is help to that any Pearson's correlation between stock market and crude oil price. Than unit root test, co-integration test and pair-wise granger causality tests. These test also helpful to calculate data analysis.

i. Descriptive Statistics

Table 1 provides summary statistics about means, minimums, maximums, medians, standard deviations (SD), skewness, kurtosis and the Jarque-Bera.

Table 1: Data Characteristics of Indian Stock Indices and Crude Oil Market

	N	S	E	O	I	L
M e a n	5 8 7 6 . 4 8 8			9 1 . 7 3 0 9 6		
M e d i a n	5 6 7 3 . 4 0 0			9 3 . 4 1 5 0 0		
M a x i m u m	8 5 8 8 . 2 5 0			1 1 3 . 9 3 0 0		
M i n i m u m	4 5 4 4 . 2 0 0			5 3 . 2 7 0 0 0		
S t d . D e v .	8 9 0 . 1 9 2 6			1 0 . 9 4 9 4 0		
S k e w n e s s	1 . 3 6 9 8 2 2			- 0 . 6 7 8 8 7 2		
K u r t o s i s	4 . 2 6 1 1 2 7			3 . 3 4 9 8 8 2		
J a r q u e - B e r a	4 7 1 . 4 8 0 7			1 0 1 . 8 9 8 3		
P r o b a b i l i t y	0 . 0 0 0 0 0 0			0 . 0 0 0 0 0 0		
O b s e r v a t i o n s	1 2 4 4			1 2 4 4		

It is noted from the table 1 above that the standard deviation is higher for NSE other than Crude oil. Thus, NSE NIFTY FIFTY is the more volatile market in the period of study. The results of the Jarque-Bera show that the returns are not normally distributed, which may open the doors to the issue of stationarity of the time series of returns under study.

Basic statistical values of the data were calculated in the first phase regarding the data examined in the study and are shown in Table 1. When descriptive statistics shown in Table 1 related to the variables considered in the scope of the analysis are examined, the mean values of variables were found to be crude price (91.73096), NSE NIFTY FIFTY (5876.488), Median value were found to be crude oil price(93.41500),NSE NIFTY FIFTY (5673.400), maximum value were found crude price 111.9300, NSE (8588.250), minimum crude price (53.27000),NSE (4544.200) standard deviation values are found to be crude price (10.94940), NSE (890.1926). When average values of the variables are considered in terms of the case that data do not have normal distribution, it can be said that variables are not distributed normally in full, but are distributed very close to normal distribution as the median values of variables are very close to average values.

Regarding whether series are distributed normally or not; skewness, kurtosis and Jarque-Bera statistics were considered. If kurtosis value of relevant variables is bigger than 1, it indicates that series is sharp, if it is smaller than 1, it indicates that series is oblate. In consideration of skewness values, if skewness value is equal to zero, it indicates that series has normal distribution, if the skewness value is bigger than zero; it means that series is skewed in the positive direction, if skewness value is smaller than zero; it indicates that

series is skewed in negative direction. Following values were found: skewness value of oil price variable (-0.678872), kurtosis value (3.349882), Jarque-Bera value (101.8983); skewness value of NSE NIFTY FIFTY variable (1.369822), kurtosis value (4.261127), Jarque-Bera value (471.4807). According to these calculated values; it has been found that oil price variable is skew in negative direction and sharp in the positive direction, NSE NIFTY FIFTY variable is skewed positive direction and sharp in positive direction.

ii. Pearson's Correlation Test

Table 2 show the return correlations among the various indices under study.

Table 2: Correlations of Returns of the Stock Indices

	N	S	E	OIL PRICE
N	1 . 0 0 0 0 0 0			- 0 . 0 9 3 7 8 9
S		1 . 0 0 0 0 0 0		
E			1 . 0 0 0 0 0 0	
OIL PRICE	- 0 . 0 9 3 7 8 9			1 . 0 0 0 0 0 0

Table 2 shows that there is negative correlation between NSE and OIL PRICE. Correlation is a technique for investigating the relationship between two quantitatives, continuous variables. Pearson's correlation coefficient (r) is a measure of the strength of the association between the two variables. The first step in studying the relationship between two continuous variables is to draw a scatter plot of the variables to check for linearity. The correlation coefficient should not be calculated if the relationship is not linear. Pearson's correlation coefficient (r) for continuous data ranges from -1 to +1.

If the larger sample is considered for study, the strength of correlation is generally found to be low. Positive correlation indicates that both variables increase or decrease together, whereas negative correlation indicates that as one variable increases, so the other decreases, and vice versa. In that case when NSE is 1.000000 and crude oil is -0.093789. Then when Crude oil is -0.093789 and NSE is 1.000000 so on. Thus, there is negative correlation between NSE and Crude oil.

iii. Unit Root Tests

It is necessary to look into the case, whether time series are stationary before making analysis with time series data. Stationarity analysis is also called unit root test. A series, which does not have unit root problem, is regarded as a stationary series. Various parametric and non-parametric tests have been developed for finding

whether a series is stationary or not or includes unit root. A unit root test is used to test a time series for stationarity. The most appropriate and widely used tests are the ADF and PP, which uses the existence of a unit root as the null hypothesis. The fact whether time series used in this model have unit roots or not, have been investigated by using Augmented Dickey-Fuller (ADF-1979) and Phillips-Perron (PP-1988) test methods. It is decided upon rejection or acceptance of the null hypothesis by comparing the statistics obtained by the test with critical value (Enders, 1995). Null hypothesis shows that series is not stationary and has unit root, alternative hypothesis shows that series is stationary. If the calculated value is bigger than the absolute critical value, then null hypothesis is rejected and series is decided to be stationary. Results of the Unit Root Test are contained in Table 3.

Table 3: Augmented Dickey-Fuller (ADF Test)

	NSE				OIL PRICE			
	LEVEL		FIRST DIFFERENCE		LEVEL		FIRST DIFFERENCE	
Test critical values:	1 %	-3.435402	1 %	-3.435402	1 %	-3.435398	1 %	-3.435402
	5 %	-2.863659	5 %	-2.863659	5 %	-2.863657	5 %	-2.863659
	10%	-2.567948	10%	-2.567948	10%	-2.567947	10%	-2.567948
	ADF Statistic	Prob.*	ADF Statistic	Prob.*	ADF Statistic	Prob.*	ADF Statistic	Prob.*
	-2.574574	0.0986	-32.39327	0.000	-3.608194	0.0058	-35.79251	0.0000

Null Hypothesis: NSE and OIL PRICE have a unit
 Exogenous: Constant
 Lag Length: 1 (Automatic based on SIC, M

With purpose of examining the stationarity of the data, unit root test was applied. In the first phase, it was examined whether variables are stationary. Accordingly, ADF and PP tests were performed in terms of two separate models being with constant and constant-trend. PP test is a test that is applied in supporting of ADF test. With purpose of seeing the reliability of the results obtained from ADF and PP tests.

Results of unit root test applied in the levels for variables were presented in Table 3. When Table 3 is examined, it has been observed that all variables are not stationary in both two separate models (constant and constant-trend) in ADF and PP tests and they have unit roots. If both variables are not stationary after unit root tests performed in their levels, relevant variables are made stationary by taking their differences. Accordingly ADF and PP unit root tests were performed again by

taking the first differences in order to make the variables stationary and results are shown in the same Table 4.that is oil price level and difference.

On the other hand it can be said that table 3 can conclude that the null hypothesis about the existence of a unit root cannot be rejected for all the variables using intercept terms in the test equation at the level form. However, for the first differences of all the variables the null hypothesis of a unit root is strongly rejected. So it can be said that all the indices are non-stationary in their level forms, but stationary in their first differenced forms for both the time series.

iv. Co-integration test

Co-integration is an econometric property of the time series. If two or more series are themselves non-stationary, but a linear combination of them is stationary, then the series are said to be cointegrated. It tests the null hypothesis, that there exists none co-integrating equations.

Table 4: Co-integration Tests: Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.014904	26.23824	15.49471	0.0008
At most 1	0.006142	7.633724	3.841466	0.0057

Trace test indicates 2 cointegratingeqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon- Haug-Michelis (1999) p-values

Table 5: Co-integration Tests: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen	0.05 Critical Value	Prob.**
None	0.014904	18.60452	14.26460	0.0097
At most 1	0.006142	7.633724	3.841466	0.0057

Max-eigenvalue test indicates 2 cointegratingeqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values

First test of the co-integration test the trace test and the second is maximum Eigen value test. These tests indicate there exists two co-integrating vector at 5% level. It can also accept the null hypothesis, that there exists two co-integrating equation.

Results of Johansen cointegration test applied with purpose of finding whether there is a long term relationship between oil price and NSE NIFTY FIFTY

variables within the scope of the analysis, are shown in table 4 and table 5.

Eigen values found with Johansen co-integrations test are follows: none= 0.014904, at most 1 = 0.006142. When eigen value results pertaining to variables as shown in (Table 4) are examined in terms of trace statistics, it was observed that Johansen trace statistics values are (26.23824, 7.633724) in the models are bigger than critical value (15.49471, 3.841466) in the statistical significance level of 5% and there is one co-integration vector (co-integration relationship). In this way the hypothesis asserting that there is no co-integration relationship can be rejected.

When eigen value results pertaining to variables as shown in (Table 5) are examined in terms of maximum eigen value statistics, it was observed that Johansen maximum eigen value statistics values (18.60452 and 7.633724) are bigger than critical value (14.26460, 3.841466) in the statistical significance level of 5% and there is one co-integration vector (co-integration relationship). As same as in the result of the trace statistics value, nullity hypothesis mentioning that there is no co-integration relationship can be rejected for maximum value statistics. Consequently, both trace and maximum eigen value show that there is a long term relationship (co-integration) between relevant variables, in other words there is a long term relationship between NSE NIFTY FIFTY and CRUDE oil price.

V. PAIR-WISE GRANGER CAUSALITY TESTS

This test involves examining whether lagged values of one series have significant explanatory power for another series. They have null hypotheses of no granger causality. The results of this test are summarized in Table 6 and it indicates whether there exists significant Granger Causality and if it exists.

Table 6: Pair-wise Granger Causality Tests

N u l l H y p o t h e s i s	O b s	F-Statistic	P r o b .
OIL_PRICE does not Granger Cause NSE	1 2 4 2	3.26998	0 . 0 3 8 3
NSE does not Granger Cause OIL_PRICE		2.91281	0 . 0 5 4 7

Results of Granger Causality with purpose of revealing whether there is a causality relationship between variables in each model are shown in table 6. It can be seen from table 6 that H_0 that oil price does not granger causes NSE rejected because its probability value is less than 0.05 so it rejected. While NSE does

not granger cause oil price is accepted because, its probability value is greater than 0.05 so it accepted. There is unidirectional causality exist and Oil price causes NSE but the NSE does not cause Oil price. According to the obtained results, it can be said that NSE NIFTY50 index have one way causality relationship in the direction of CRUDE oil price.

V. CONCLUSION

In this study, long term relationship and causality relationship between NSE NIFTY 50 of National Stock Exchange and crude price were examined by using econometric techniques in the scope of the study is limited to time period for jan2010 to dec2014. As a result of analyses made, a long term relationship between stock market index and international oil price in the period of examination was found in other words, it has been observed that Indian stock index is co-integrated with crude price. This result obtained interprets that relevant variables act together in the long term.

When results obtained from Granger causality analysis are considered, it has been revealed that each stock index has one way causality relationship towards crude price, and crude price is not a caused by NSE index. Findings obtained from co-integration analysis show is line with results obtained from the studies of Anoruo and Mustafa (2007) and Miller and Ratti (2009), and findings obtained from Granger causality analysis are in line with results obtained by Maghyreh (2004), Sari and Soytaş (2006), Anoruo and Mustafa (2007).

The empirical findings in this research shed light on the effectiveness of stock market efficiency, investment decisions and international diversification. For any stock market, different stakeholders or operators are individual/ institutional investors, portfolio managers, policy makers and agents/brokers. Present research work and its findings may be considered by them to draw meaningful conclusions while operating in the stock markets. They can use this study for quitting or continuing with the existing portfolios. When managerial implications of the present study are looked upon, it can be suggested that since the markets are not following the random walk, the investors and policy makers may consider the findings of the present study for making time-dependent investment strategies. The returns of such markets provide investors the opportunity to

explore the arbitrage profits. The findings can be considered by the market players for price discovery and for further improving the process of price discovery. Economically, these results may be useful in better allocation of available capital so as to have a positive impact on the growth of an economy.

Although the researcher has tried her best to come out with the present thesis but still like any other research work, this study also has the following limitations:

- ✓ Since the present study is based on the Indian stock markets, the results of the study are cannot be generalized for global stock markets.
- ✓ While the present study focuses on the effect of the change in crude oil prices on stock markets.
- ✓ This study has been done with the limitations of time and resources.

There are many research scope

- ✓ Further researches may also focus on the possibility to explore how stock price informational efficiency effect financial openness and economic growth in general.
- ✓ The study can be extended to include a greater number of stock markets representing various other regions of the world. Empirical studies on the issue can cover broader areas of market integration and use more advanced techniques (like copula) of estimation.

Further, these markets can be tested on the basis of weekly, monthly or intra-day (high frequency) data and different indices since the stock markets under this study are tested on the basis of daily stock data.

- ✓ Future studies may allow for risks, such as foreign exchange risk, political risk, etc. which could mark themselves through the time-varying integration.

This research work has used equity market indices to test market integration. Though the empirical results indicate that stock markets under study are integrated, it will be interesting to know whether different industries in those countries are integrated.

REFERENCES

[1] Aktham, M. (2004). "Oil Price Shocks And Emerging Stock Markets: A Generalized Vary Approach", *International Journal of Applied*

Econometrics and Quantitative Studies, 1-2, pp. 27-40.

- [2] Aloui,C andAloui,R.(2009). "The Effects Of Crude Oil Shocks On Stock Market Shifts Behaviour:A Regime Switching Approach", *Energy Economics*, 31, pp. 789–799.
- [3] Alvarez-Ramirez,j, Alvarez,j andRodriguez,E. (2008). "Short-Term Predictability Of Crude Oil Markets: A Detrended Fluctuation Analysis Approach", *Energy Economics*, 30, pp. 2645–2656.
- [4] Apergis,N and Miller,S-M. (2008). "Do Structural Oil-Market Shocks Affect Stock Prices?"*Economics Working Papers*, 200851, pp.1-28.
- [5] Basher,S.A, Haug,A.A., andSadorsky,P. (2011). "Oil Prices, Exchange Rates And Emerging Stock Market", *Economics Working Papers*, 3014, pp. 1- 40.
- [6] Basher,S-A, andSadorsky,P.(2006). "Oil price risk and emerging stock markets",*Global Finance Journal*, 17, pp. 224-251.
- [7] Bhunia,A. (2012). "Association Between Crude Price And Stock Indices: EmpiricalEvidence FromBombay Stock Exchange",*Journal of Economics and Sustainable Development*, 3, pp. 25-35.
- [8] Chang, C.-L, A. J., McAleer, M. andTansuchat, R. (2013). "Conditional Correlations and Volatility Spillovers between Crude Oil and Stock Index Returns",*Economic finance*, 25, pp. 116-138.
- [9] Chkili,W, Aloui,C andNguyen,D-K.(2014). "Instabilities In The Relationships And Hedging Strategies Between Crude Oil And US Stock Markets: Do Long Memory And Asymmetry Matter?" *Journal of International Financial Markets, Institutions & Money*,33, pp. 354-366.
- [10] Cong,R-G, Wei,Y-M, Jiao,J-L, andFan,Y. (2008). "Relationships Between Oil Price Shocks And Stock Market: An Empirical Analysis FromChina", *Energy Policy*, 36, pp. 3544–3553.
- [11] Conrad,C, Loch,K andRittler,D. (2014). "On The Macroeconomic Determinants Of Long-Term Volatilities And Correlations In U.S. Stock And Crude Oil Markets", *Journal of Empirical Finance*, 29, pp. 26-40.
- [12] Degiannaki,S, Filis, G andFloros,C. (2011). "Dynamic Correlation Between Stock Market

- And Oil Prices: The Case Of Oil-Importing And Oil-Exporting Countries”, *International Review of finance analysis*, 20, pp. 1-43.
- [13] Faff, R-W and Brailsford, T-J. (1999). “Oil Price Risk And The Australian Stock Market”, *Journal of Energy Finance & Development*, 4, pp. 69-87.
- [14] Fleming, J and Ostadi, B. (1999). “The Impact Of Energy Derivatives On The Crude Oil Market”, *Energy Economics*, pp. 1-40.
- [15] Hedi Aroui, M-E. (2011). “Does Crude Oil Move Stock Markets In Europe? A Sector Investigation”, *Economic Modelling*, 28, pp. 1716–1725.
- [16] Henriques, L., and Sadorsky, P. (2008). “Oil Prices And The Stock Prices Of Alternative Energy Companies”, *Energy Economics*, 30, pp. 998–1010.
- [17] Kang, W, Ratt, R-A, and Yoon, K-H. (2014). “The Impact Of Oil Price Shocks On The Stock Market Return And Volatility Relationship”, *Centre for Applied Macroeconomic Analysis*, pp. 1-39.
- [18] Kilian, L and Park, V. (2007). “The Impact of Oil Price Shocks on the U.S. Stock Market”, *International economic review*, 50, pp. 1-46.
- [19] Liu, L, Ma, F and Wang, Y. (2014). “Forecasting Excess Stock Returns With Crude Oil Market Data”, *Energy Economics*, pp. 1-9.
- [20] Ma, F, Wei, Y, Huang, D and Zhao, L. (2013). “Cross-correlations between West Texas Intermediate Crude Oil and The Stock Markets of The BRIC”. *Physica A*, 392, pp. 5356–5368.
- [21] Masih, R, Peters, S and Mello, L-D. (2011). “Oil Price Volatility and Stock Price Fluctuations In An Emerging Market: Evidence from South Korea”, *Energy Economics*, 33, pp. 975-986.
- [22] Miller, J, Isaac, R and Ratti, A, R. (2009). “Crude Oil and Stock Markets: Stability, Instability and Bubbles”, *Energy Economics*, 31, pp. 559-568.
- [23] Moosa, I-A and Silvapulle, P. (2000). “The Price–Volume Relationship In The Crude Oil Future Market Some Results Based On Linear And Nonlinear”, *International Review of Economics & Finance*, 9, pp. 11-30.
- [24] Naifar, N and Dohaiman, M-S-A. (2013). “Nonlinear Analysis Among Crude Oil Prices, Stock Markets' Return And Macroeconomic Variables”, *International Review of Economics and Finance*, 27, pp. 416-427.
- [25] Odusami, B-O. (2009). “Crude Oil Shocks and Stock Market Returns”, *Applied Financial Economics*, 19, pp. 291–303.
- [26] Phan, D-H-B, Sharma, S-S and Narayan, P-K. (2014). “Oil Price And Stock Returns Of Consumers and Producers Of Crude Oil”, *Journal of International Financial Markets, Institutions & Money*, 34, pp. 245-262.
- [27] Zhang, Y-J and Wei, Y-M. (2011). “The Dynamic Influence Of Advanced Stock Market Risk On International Crude Oil Returns: An Empirical Analysis”, *Quantitative Finance*, 11:7, pp. 967-978.
- [28] Zhu, H-M, Li, R and Li, S. (2014). “Modelling Dynamic Dependence Between Crude Oil Prices And Asia-Pacific Stock Market Returns”, *International Review of Economics and Finance*, 29, pp. 208–223.
- [29] Zhu, H-M, Zhu, S-F and Yu, K. (2011). “Crude Oil Shocks And Stock Markets: A Panel Threshold Cointegration Approach”, *Energy Economics*, 33, pp. 987–994.
- [30] www.nse.com
- [31] www.investing.com
- [32] www.moneycontrol.com
- [33] www.ministryfinance.in
- [34] www.investopedia.com

Annexures:-1

The following figures represent the data set.

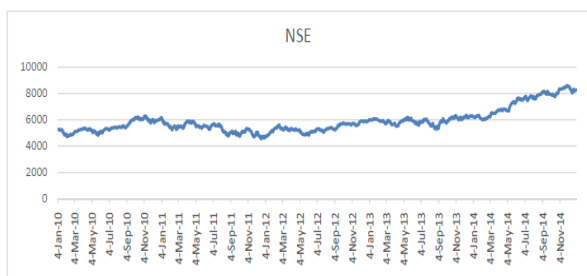


Fig.1 NSE CNX NIFTY

This figure shows the NSE’s CNX Nifty index price from January 01, 2010 to December 31, 2014. In January 04, 2010, the price of this index was Rs. 5200, but on the November 04, 2010 the index price is increased to Rs. 6281. The prices are fluctuating to December 04, 2014 and reached up to Rs. 8564.

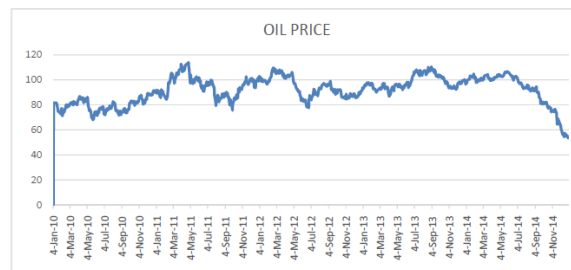


Fig.2 CRUDE OIL PRICE

This figure shows the international crude oil price from January 04, 2010 to December 31, 2014. In January 04, 2010, the price of oil was Rs. 81.51, but on the May 20, 2010 the price is decreased to Rs. 69. The prices are fluctuating to December 31, 2014 and reached up to Rs.53.13.

