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# Relationship between Oil Prices and Stock Market Index: A Case of Pak, India & China

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**Abstract-** Cost of oil affects the profit and loss of the organization as oil is immediate or circuitous expense of operation. In this way, the ascent in crude oil costs will be relied upon to bring about the decline in income, which brought about a decrease of prompt stock market index. The goal of the examination is to get precise answers of exploration inquiries said in particular settings of Pakistan, India and China. This paper utilized regression, Durbin Watson test and correlation analysis to discover the answers of exploration inquiries and goals. The time of study is 21 years (From Jan 1995 to June 2015 on the bases of month to month variations) of dependent and predictor variables. It could be seen that the model is superbly fitted to the regression. In all instances of these three stock trades there is sure relationship between oil costs and stock exchange 100 index. We can say expanding the oil costs in the business sector will build the stock market index and diminishing the oil costs would diminish the stock market return. In each of the three cases there is certain connection among the variables characterized as oil costs and stock exchange 100 index; however relationship among variables of the Chinese and Pakistan's setting is feeble.

**Keywords:** oil prices, emerging market, stock market index, stock market return.

## I. INTRODUCTION

Stock market plays a vital role in surveying any nation's financial circumstance through enhanced stock return appeared by the higher interests of the organization as a consequence of monetary development. Stock market is a standout amongst the most pertinent and most essential measurements for administration and shareholders of an association. In view of the scholars and the candidates need to improve the administration procedure that might want to offer to balance out the execution components of examination that influence stock market index return rushing to ensured and predominantly look into database (Malik, 2007).

High oil costs are managing serious macroeconomic modification nation is running an extensive deficiency of outside trade saves. The objective in this paper is to reveal insight into the way of the effect of the oil stun in the full scale monetary circumstance for Pakistan. You can utilize the open

economy to dissect the effect of crude oil cost in Pakistan on yield development. In this paper, the State Bank is seeking after the expansion target actualizing the money related approach so as to keep up the development of yield and value dependability working alongside the capacity of fiscal strategy on the estimation (Sharif E., 2005).

Worldwide oil costs subsequent to 2003 shows about stable ascent, as it was twofold in April 2006 than cost in January 2004 (Becon, 2005). Request, supply, theoretical considers and rise their interrelationships crude oil value all prompts a consistent ascent in oil costs.

In the most recent couple of years, worldwide interest for oil has developed in light of the solid financial execution in the improvement in Asia particularly China and India. World interest has developed at a rate of 1.3%, while (blend) for People Republic China and India at a rate of 7% in 2003 from 1990, and around 40% of development popular (Hamilton J., 2008).

Another component that adds to the solid interest is a low level of stocks and their reproduction in industrialized nations in the instability of the time of supply. What's more, a portion of the Asian nations have started to construct their very own store (Koranchelian, 2005).

Likewise, this area will express a few perspectives on the likelihood of high oil costs impact on large scale economy level of Pakistan. Progressed of any inconsistencies in the supply and relies on upon the cost of the oil creating nations, huge numbers of the case this have an expansive influence of economy and imports crude oil keeping in mind the end goal to meet the powerless business. After a sudden surge in crude oil costs subsequent to 2003, as a special case creating nations depend vigorously on oil imports confronting the risk of expanded unsteadiness of the full scale economy (Arif & Khalid, 2015).

This short note with world's crude oil costs saw the value patterns of local heater and rapid diesel oil as an outline since perception of 2002, and that need to concentrate on heater oil and fast diesel oil value patterns constitute the aggregate creation, breaking down the commitment to the generation, heater oil 29.4% and diesel 31% with top offer emerging from the reality in Pakistan (Hamilton & Herrera, 2002).

Pakistan's securities exchange in spite of its little size is a developing stock exchange, with the

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potential significance for financial specialists of the world. In any case, Pakistan relies on upon oil imports keeping in mind the end goal to run the monetary machine as an aftereffect of crude oil value stun, which may have the impact of destabilizing the residential money related markets. An adjustment in the cost of crude oil implies that you influence the instability of money markets return (Amir, 2008).

This study considers the non-straight relationship between crude oil costs and yield. In the event that the non-direct relationship exists than what is limit level after it gets to be negative. As indicated by the arrangement of this paper, first (I) portion explains about introduction, second (II) about literature review, area III will depict the methodology; Section IV clarifies the experimental discoveries. At long last, Section V will finish up the study with results and recommendations.

#### a) Objectives of the research

The objective of the research is to get accurate answers of research questions mentioned above in specific contexts of Pakistan. Is oil prices and stock price related? This is the first question that will confirm the relationship; there may be positive or negative relationship, if relationship exists than it will be yes to answer the question. The second objective of the research is to find out the answer of this question if oil prices declines what will be the impact on stock price? There may be decline in oil prices and it may increase the stock prices, its one possibility on the other hand there may be decrease in stock price with decrease in oil prices.

#### b) Gap statement

In different countries of the world, a ton of exploration has been finished with the study of stock market index. Considering this examination there is no work done in this term of office of day and age by any scientist on Pakistan, India and China (from 1995 to 2015), when contrasted with the crude oil cost.

## II. LITERATURE REVIEW

This segment clarifies the strategies and systems utilized by various specialists while considering the same theme or point moreover. This segment gives the exact thought regarding diverse sorts of techniques and results. This segment gives the thought regarding:

- Objective of research (Purpose of researcher and which area he/she try to focus),
- Time Frame (Which year the research held etc)
- Location (Countries), Method used for research
- The usage of different techniques and tools for research methodology and
- Findings

Alou and Amaze (2009) astounded to explore the relationship of crude oil stun and stock market index from December 1987 to January 2007, at long last, two-

administration utilizing the Markov-exchanging EGARCH model (Alou & Amaze, 2009). They concentrated on two noteworthy crude oil markets like WTI and Brent, and three propelled securities exchange: France, the United Kingdom and Japan. The outcomes, expands the variable net oil costs have demonstrated that assumes an imperative part in deciding both the move probabilities between the genuine return unpredictability and administration (Alou & Amaze, 2009).

Sharif et al. (2005) inspected the connection between the stock returns and oil costs of oil and gas part of the United Kingdom. They relationship between two variables was set up altogether positive (Sharif, Khan, & Javed, 2005).

Ciner (2001) indicated proof of non-direct causal impact of crude oil cost in the universal securities exchange (Ciner, 2001).

Chang and Alder (2010) utilized the confirmation of most ward restrictive connection examination between the major money related markets that indicated crude oil market and the FTSE100, NYSE, S&P 500 including the Dow Jones record (Chang & Alder, 2010).

As far as the Petroleum, Exporting Countries Bjorn (2008) analyzed the dynamic relationship between six GCC markets. An expansion of 10% of the crude oil cost before the effect of oil costs cease to exist step by step shows that at first has made return of 2.5% Norwegian stock. They investigated week after week time frame from 1997-2000, utilizing the VEC model, they discovered solid confirmation of association and between these business sectors (Bjorn, 2008).

Jacobsen and Matt (2008) tried whether the yearly change in the cost of crude oil would have the capacity to foresee the arrival of the worldwide securities exchange. Utilize the information from the eighteen created and thirty developing markets, they find huge consistency in 12 out of 18 created nations. Developing markets demonstrated same impact with lesser significance (Jacobsen & Matt, 2008).

With a specific end goal to examine the response of stock market index of the GCC nations, Agoura Le Diana and Delilah (2010) led their study on oil value stun. This exploration utilized the direct and non-straight models. Their discoveries demonstrated that securities exchange returns responded essentially to change the cost of crude oil in UAE, Qatar, Oman, Saudi Arabia and Bahrain. Change in crude oil cost for Kuwait found that it doesn't influence stock market index return (Diana & Delillah, 2010).

Ravichandran and Alkathlan (2010) utilizing day by day information amid the time of March 2008 to April 2010 upon crude oil cost and securities exchange to check that it impact the adjustments in the crude oil cost concerning stock market index cost in Gulf Cooperation Council for long haul returns (Ravichandran & Alkathlan, 2010).

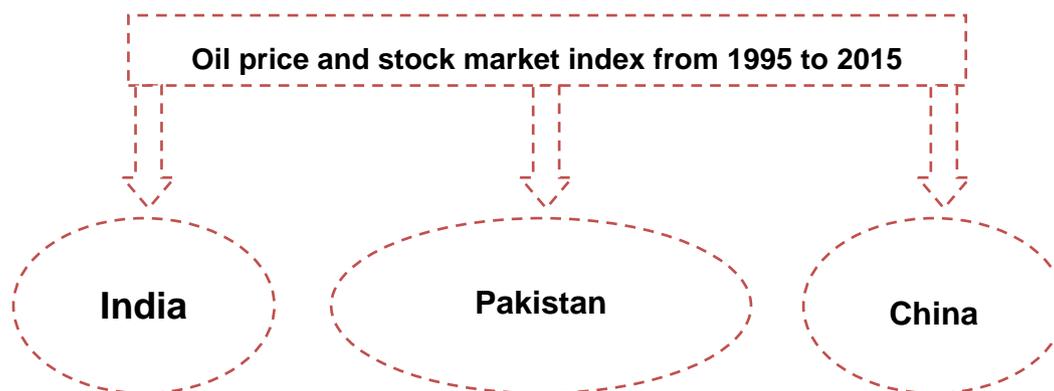
Iwayemi (2011) utilizing the quarterly information of 1985-2007, which demonstrated that the stun of oil costs don't significantly affect the greater part of the macroeconomic variables like oil fares and effect of oil value stun in Nigeria. Granger-causality test, motivation reaction capacity and difference decay investigation the greater part of the outcomes demonstrated that the diverse measures of direct and positive oil stun yield, government spending, not the reason for expansion, and the genuine cost of raw petroleum. It has a vast negative oil stun, following found that cause the real crude oil costs and yield (Iwayemi, 2011).

### III. RESEARCH METHODOLOGY

In chapter 2 have discussed literature review from different articles to find out the results of our study regarding the relationship between crude oil prices and stock prices of Shanghai Stock Exchange 100 index (SSE-100), Bombay Stock Exchange 100 index (BSE-100) and Karachi Stock Exchange 100 index (KSE-100). This chapter will discuss the empirical finding and results of the study.

#### a) Variables of research

Two types of variables were used on these three countries like, India, China and Pakistan.



#### c) Research tools

Statistical Tools will be correlation analysis, linear regression analysis and Durbin Watson test to measure the relationship between variables. The study area of this research work is China, India and Pakistan, where companies listed under stock exchange will be studied. It is contended by Park (2008) and Bar and Nikolova (2010); Filis (2010) the SMAR or subset model auto regression method of (Lee and Butterfly 2011).

#### d) Regression

The general form of each type of regression is:

$$\text{Linear Regression: } Y = a + bX + u$$

Where:

Y= the variable that we are trying to predict (Stock market Index)

#### i. Dependent variables

Stock returns of India, Pakistan and China  
 Karachi Stock exchanges'100 index  
 Bombay Stock exchanges'100 index  
 Shangai Stock exchanges'100 index

#### ii. Independent variables

Crude oil prices in these three countries are impendent variable.

#### b) Sample of Research

Iwayemi (2011) utilizing the quarterly information of 1985-2007 and use monthly data on S&P 500 index, the sample of the research will consist of SSE 100 index of Shanghai Stock exchange, BSE 100 index Bombay Stock Exchange and KSE 100 index of Karachi Stock Exchange and crude oil prices in USD (United States Dollar Data will be taken for last 21 years to study on monthly bases as Alou and Amaze (2009) and Hammoudeh (2010) astounded to explore the relationship of crude oil stun and stock market index from December 1987 to January 2007 with monthly data. Bjorn (2008) used for the period of 1997 to 2007 weekly data on effective oil prices and stock prices. This study adopted the methods of these writers using data period from 1995 to 2015.

X= the variable that we are using to predict Y (Oil Prices)

a= the intercept

b= the slope

u= the regression residual

In multiple regressions, the separate variables are differentiated by using subscripted numbers.

*Ho*: there is NO relationship between dependent (Stock market index) and independent (Crude oil prices) variables

*H1*: there is positive correlation between dependent (Stock market index) and independent (Crude oil prices) variables

$\alpha = 5\%$

*Decision Criteria* = Reject *Ho*, if P value is less than  $\alpha$ . Or "Accept" *Ho*, if P value is greater than  $\alpha$ .

The standard for analysis will depend on 95% level of significance. In results of regression if a P values is less than  $\alpha$ . It means, if the correlation among the variables will be more than 95 than relationship will be accepted otherwise rejected.

India and Pakistan. To determine the relationship and interdependence of both types of variables, regression, Durbin Watson test and correlation analysis will tell about positive, negative, weak or strong relationship between the variables.

#### IV. ANALYSIS

##### a) Methods for Analysis

This paper is about the relationship between crude oil prices and stock market index prices in China,

##### b) Correlation results

Correlation and descriptive statistics on SSE-100 and crude oil prices

Descriptive Statistics

	Mean	Std. Deviation	N
SSE100	1916.3954	925.45021	235
Oil Prices	52.7596	34.57832	235

Correlations

		SSE100	OilPrices
Pearson Correlation	SSE100	1.000	<b>.599</b>
	Oil Prices	<b>.599</b>	1.000
Sig. (1-tailed)	SSE100		.000
	Oil Prices	.000	
N	SSE100	235	235
	Oil Prices	235	235

Variables Entered/Removed<sup>a</sup>

Model	Variables Entered	Variables Removed	Method
1	Oil Prices <sup>b</sup>		Enter

a. Dependent Variable: SSE100

b. All requested variables entered.

Analyzing the correlation results, it seem that there is positive correlation among all the variables, first there is observation upon the oil prices in international market and the stock prices in Shanghai Stock Exchange, keep in mind that the stock prices are taken

SSE-100. There is positive correlation among the variable, but the results shows positive correlation, depending upon this resultant figure of 0.59 between crude oil prices and Shanghai Stock Exchange's 100-index.

Correlation and descriptive statistics on BSE-100 and crude oil prices

Descriptive Statistics

	Mean	Std. Deviation	N
BSE100	2871.8253	2068.76452	235
Oil Prices	52.7596	34.57832	235

Correlations

		BSE100	OilPrices
Pearson Correlation	BSE100	1.000	<b>.941</b>
	Oil Prices	<b>.941</b>	1.000
Sig. (1-tailed)	BSE100		.000
	Oil Prices	.000	
N	BSE100	235	235
	Oil Prices	235	235

Variables Entered/Removed<sup>a</sup>

Model	Variables Entered	Variables Removed	Method
1	Oil Prices <sup>b</sup>		Enter

a. Dependent Variable: BSE100

b. All requested variables entered.

Analyzing this value we can say that there is positive relationship to the extent of strong positive, Depending on this value one can conclude that there is relationship exists. As a result we can say that increase in oil prices increases the stock exchange index of BSE-100.

Correlation and descriptive statistics on KSE-100 and crude oil prices

Descriptive Statistics

	Mean	Std. Deviation	N
KSE100	7439.8123	6774.67537	235
Oil Price	80.2644	426.60696	235

Correlations

		KSE100	Oil Price
Pearson Correlation	KSE100	1.000	<b>.279</b>
	Oil Price	<b>.279</b>	1.000
Sig. (1-tailed)	KSE100		.000
	Oil Price	.000	
N	KSE100	235	235
	Oil Price	235	235

Variables Entered/Removed<sup>a</sup>

Model	Variables Entered	Variables Removed	Method
1	Oil Price <sup>b</sup>		Enter

a. Dependent Variable: KSE100

b. All requested variables entered.

Third and last, there is observation upon the oil prices in international market, and the stock prices in Karachi Stock Exchange. There is positive correlation among the variable, depending upon this resultant figure of approximately 0.27 between crude oil prices and Karachi Stock Exchange's 100 index.

c) Results for regression

i. R-squared & Adjusted R Square

In case of China: If the adjusted R Square value is much lower than the R Square value, it is an indication that our regression equation may be over-fitted to the sample, and of limited generalizing. The value of R

Square and Adjusted R Square are 35.90% and 35.60%, it is not good to have the values of R square less than 60%. This also tells that how much output variable's variance is explained by the input variable's variance. The adjusted R square explains the accuracy of regression equation.

In case of Pakistan, the value of R square is 0.078 means 7.8% variation is explained. Our first indicator of generalizing is the adjusted R Square value (7.43%).

In case of India (India): Here, the value of R square is 0.8855 means 88.55% variation is explained. In general, the higher the R-squared, the better the model fits your data. Our first indicator of generalizing is the adjusted R Square value (88.50%), which is adjusted for the number of variables included in the regression equation. This is used to estimate the expected shrinkage in R Square that would not generalize to the population because our solution is over-fitted to the data set by including independent variables.

After that F significance value which is approximately to zero (0.000) in all cases (Pakistan, India and China) tells that the results are not by chance, in other words there is zero probability of 'by chance' results.

#### ii. Interpretation of P-Values in Linear Regression Analysis

The p-value for each term tests the null hypothesis that the coefficient is equal to zero (no effect). Here p-value is (0.000) approximately equal to zero, A low p-value (< 0.05) indicates that you can reject the null hypothesis. In other words, a predictor that has a low p-value is likely to be a meaningful addition to your model because changes in the predictor's value are related to changes in the response variable. In all three cases, P value is 0.00 which is lower to 5%. It indicates that it is statistically significant as it is lower than 5%.

#### iii. Interpretation of Durbin-Watson

According to Durbin Watson test, there correlation between variables in all three cases like China, India and Pakistan, the values of Durbin-Watson test are near to zero that represents that there is positive relationship between variables.

#### iv. Summary of the results

Summarizing the output by correlation, regression and Durbin Watson test analysis that the index points have positive correlation with crude oil prices in all three countries, taken as crude oil independent variable but the relationship is not too strong in the case of shanghai stock exchange have positive correlation only up to 0.5155. Crude oil prices have positive correlation with Indian stock exchange prices On the other hand; the case of Pakistani stock exchange is not different from Indian BSE, these both

stock exchanges have positive correlation with oil prices.

#### d) Hypothesis statement

$H_0$  =there is no interdependence between crude oil prices in international market and stock market index

$H_1$  =there is interdependence between crude oil prices in international market and stock market index

## V. CONCLUSIVE REMARKS

In case of China and Pakistan and India, we can say that decreasing oil prices would also decrease the stock return in these countries. Analyzing the results, it could be seen that the model is perfectly fitted to the regression analysis. Studying the results one could say that the regression analysis is best for the analysis. In case of Chinese stock exchange, Indian stock exchange and Karachi stock exchange, Stock markets depends on the oil prices. It means these stock markets are dependent markets, we can say increasing the oil prices in the market will increase the price index of all three stock exchanges and decreasing the oil prices would decrease the stock market index. In other words we can say that oil prices transmit to the emerging stock market, in all three cases there is positive correlation among the variables defined as oil prices and stock market return

All three statistical tools show same results as positive relationship between variables.

*Shanghai Stock Exchange:* reject null hypothesis saying that there is interdependence between crude oil prices in international market and SSE-100 index.

*Bombay Stock Exchange:* reject the null hypothesis and accept the alternate hypothesis saying that there is interdependence between crude oil prices in international market and BSE-100 index.

*Karachi Stock Exchange:* reject null hypothesis saying that there is interdependence between crude oil prices in international market and KSE-100 index. Shanghai stock exchange and Karachi stock exchange depends on the oil prices; it is recommended that other factors could be found that relates to the stock market return. It is recommended that other stock exchange must be studied to know that results same or not? While it is clear that decreasing the oil prices does not increase the stock market return.

APPENDIX

Regression analysis for China  
Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.599 <sup>a</sup>	.359	.356	742.55373	.359	130.468	1	233	.000	.080

a. Predictors: (Constant), Oil Prices

b. Dependent Variable: SSE100

ANOVA<sup>a</sup>

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	71938246.127	1	71938246.127	130.468	.000 <sup>b</sup>
Residual	128472946.786	233	551386.038		
Total	200411192.913	234			

a. Dependent Variable: SSE100

b. Predictors: (Constant), OilPrices

Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1070.397	88.499		12.095	.000	896.036	1244.757
	Oil Prices	16.035	1.404	.599	11.422	.000	13.269	18.801

a. Dependent Variable: SSE100

Regression analysis for India  
Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.941 <sup>a</sup>	.885	.885	702.19205	.885	1798.076	1	233	.000	.220

a. Predictors: (Constant), OilPrices

b. Dependent Variable: BSE100

ANOVA<sup>a</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	886583903.541	1	886583903.541	1798.076	.000 <sup>b</sup>
Residual	114886165.309	233	493073.671		
Total	1001470068.849	234			

a. Dependent Variable: BSE100

b. Predictors: (Constant), OilPrices

Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1 (Constant)	-98.129	83.689		-1.173	.242	-263.012	66.754
OilPrices	56.292	1.328	.941	42.404	.000	53.677	58.908

a. Dependent Variable: BSE100

Regression analysis for Pakistan

Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.279 <sup>a</sup>	.780	.743	6519.03564	.078	19.712	1	233	.000	.092

a. Predictors: (Constant), OilPrice

b. Dependent Variable: KSE100

ANOVA<sup>a</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	837723581.507	1	837723581.507	19.712	.000 <sup>b</sup>
Residual	9901993378.140	233	42497825.657		
Total	10739716959.647	234			

a. Dependent Variable: KSE100

b. Predictors: (Constant), Oil Price

Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1 (Constant)	7083.823	432.748		16.369	.000	6231.224	7936.422
Oil Price	4.435	.999	.279	4.440	.000	2.467	6.403

a. Dependent Variable: KSE100

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