

# Crude Oil Price Volatility and Its Reflection on Auto and Energy Index

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ABSTRACT - A study has been conducted to analyze the effects of crude oil price and energy index to check the real implications beyond the normal way of thinking like when the crude prices increases it will adversely affect the stock prices of oil marketing companies. The study also looks into the aspects of crude price changes and it its reflection on auto index. Most of the media used to analyses the share price movements along with the crude price movements. Some daily based analysis looks like the price of crude and the prices of stocks in the oil and gas and auto sector moves in the opposite direction. A study has conducted to evaluate the correlation between the crude price movements and it its impact on energy index and auto index in the last five years. It is evident from the study that the negative correlation between the crude price and energy index doesn't exist and showing a positive correlation between the crude price and energy index. The next aspects of the study explains that there is negative correlation exists between crude price and auto index.

Keywords: auto index, crude oil price, energy index, oil and gas index, Oil and gas sector, Stock market

# I. INTRODUCTION

India consumes approximately 126 billion USD worth goods from global market in which 58% accounted for crude. India is meeting nearly 86% of crude requirement through imports. Crude has a weight of 2.4% while calculating Consumer Price Index and it has considerably a n Englishing low impact on the consumer price based inflation. However, crude is a raw material for producing many products and that will make significant impact in the cost structure of these companies. There is direct impact on current account deficit while increasing the price of crude and it lead to rupee depreciation. Evaluating the fluctuations of stock market return is a vital issue from the perspective of investors who want to see the outlook of economy well in advance either to pocket the return from the growth or to stay away from decline. It is crucial to identify the factors that trigger the stock price movements. The objective of this paper to investigates the fluctuations of crude prices and its impact on energy (oil and gas) index and auto index. The paper tries to figure out the correlation between the change in the crude oil prices and its impact on oil marketing companies share prices and the auto stocks. The study has done by measuring the impact of crude on energy and auto index for a period of five years. The auto index and energy index fluctuate due to many factors, but

the researcher tries to find out how much is the correlation between the price fluctuations in crude and these two indices. The results of the study show that the changes in crude prices have an impact on energy and auto index. Therefore, policy makers have to take the movement of the crudes prices while framing the policies that affect the economy at large and stock market in particular. This study will help the investors those who wish to invest in oil and gas indices, stocks and derivatives. The study also explains the correlation between the auto index and crude price movements. Investors those who like to take exposure in auto stocks, indices or derivatives can consider the price fluctuations due to crude while investing.

Increased level of crude prices leads to fiscal and current account deficit. High level of deficits will cause higher inflation and tightening the monetary policy. When an economy faces inflation then the central bank of the country come with measure to reduce the liquidity in the system by increasing the policy rates. The increased policy rates makes loan costlier and their by hitting the automobile demand. In order to establish the strength in this argument, the researcher tries to figure out the level of correlation between auto index and the crude oil price movements. Even though there will be some lag in the change in the crude price and the impact on inflation, that change in crude price normally brings some changes to the inflation level in



the economy. Inflation and crude price moves in the same direction with a lag. The higher level of inflation will cause more tight monetary policy to control the inflation. The central bank of the country may increase the policy rates to bring down the excess liquidity in the system. That makes loan costlier and leads to lowering the demand. This scenario directly hit the automobile sector because the larger portions of auto sales are financed through banks. It is important to check the correlation between auto index and crude oil prices and to get a clear indication about how these stocks will perform when the global outlook on crude. There are exemptions to these rules when we talk about ONGC and Oil India because they extract crude in India. But the stories are different for refineries like HPCL, BPCL and IOCL.

Energy stocks have 12.5 percent weight in the Nifty and 15.2 percent in the Sensex. Hence, the Nifty and the Sensex are sensitive to oil price movements. Auto stocks have 9.3 percent weight in the Nifty and Sensex.

In this study the secondary data have been used. The variables of the study are energy index, auto index, Brent crude from 5<sup>th</sup> March 2014 to 25<sup>th</sup> May 2019. Regression analysis carried out to identify the correlation between Brent crude and Energy index to find out the strength of correlation between crude movement and Energy index movement. The study also tried to build a model to predict the Energy index based on the crude movement. Same analysis has done between crude and Auto index to see the strength of correlation between the strength of correlation betwe

# II. LITERATURE REVIEW

Elyasiani (2011)<sup>8</sup> analyzed the impact of changes in the oil returns and oil return volatility on excess stock returns and return volatilities of thirteen U.S. industries. The researcher found strong evidence in support of the view that oil price fluctuations constitute a systematic asset price risk at the industry level as nine of the thirteen sectors analyzed show statistically significant relationships between oil-futures return distribution and industry excess return.

Tiwari, A. K. (2015)<sup>22</sup> investigates the static and dynamic causal relationship among income, crude oil production and imports for the Indian economy. The static-short-run Granger causality shows that income and crude oil imports Granger-cause domestic crude oil production. This implies that gross domestic product (GDP) and oil imports contain important information in predicting the production of crude oil not the vice versa. The dynamic analysis reveals that the most exogenous variable is crude oil production as it is mostly dependent on itself, and relatively less is accounted by other two variables; GDP is a relatively less exogenous variable, and crude oil exports fairly good proportion of

forecast error. The study found that the most endogenous variable is crude oil imports which are mostly dependent on crude oil production.

Lis, B., Nessler, C., & Retzmann, J. (2012)<sup>12</sup> tested in their paper that whether the impact of oil prices is different on the overall market and automotive companies. The study looked into the impact of crude oil on the indices and afterwards estimated the impact on the auto stocks. The study conclude that in general the car companies' stocks do not react more adversely as the overall market to crude oil price increases, while Japanese companies do not show any excess sensitivity at all. German companies tend to be sensitive, and US and German companies are together more sensitive in the more recent time periods.

Huang (2015)<sup>11</sup> there is strong evidence showing that there are bidirectional Granger causality relationships between most of the sector stock indices and the crude oil price in the short, medium and long terms, except for those in the health, utility and consumption sectors. In fact, the impacts of the crude oil price shocks vary for different sectors over different time horizons. More precisely, the energy, information, material and telecommunication sector stock indices respond to crude oil price shocks negatively in the short run and positively in the medium and long runs, terms whereas the finance sector responds positively over all three time horizons. Moreover, the Brent oil price shocks have a stronger influence on the stock indices of sectors other than the health, optional and utility sectors in the medium and long terms than in the short term.

Mallick (2018)<sup>14</sup> this study attempts to examine the impact of the international price of crude oil on private investment in India by endogenizing public sector investment, real interest rate, financial sector development, economic growth and economic globalization as other additional key determinants in a private investment model. This framework also serves as additional objective of verifying whether public sector investment crowds out or crowds in private investment in India and whether real interest rate as a monetary policy channel variable is effective in influencing the private investment. The study's empirical estimation observed that crude oil price, public investment, and real interest rate have detrimental effects on the growth of domestic private investment, whereas financial sector development, economic growth, and globalization help to boost up private investment. From a policy perspective, the study suggests that India should intensively shift its focus towards both the production and consumption of renewable energies and tap other alternative potential sources of energy in order to offset the risks arising on account of India's heavy reliance on imports of crude oil from other oil exporting countries. This study further urges that the role of international crude oil price, public sector investment, and real interest rate can't be under-emphasized while designing a comprehensive growth-oriented energy policy strategy for



India in order to achieve a sustainable economic

development of the economy.

# III. CRUDE OIL AND ENERGY INDEX

Crude Oil, NIFTY Energy index (Oil and gas) and P/E.



Above figure shows the movement of crude oil and (energy) oil and gas indices. It is evident that the movement was in the same direction from 2014 to 2018. In the recent years the crude price started increasing and the indices started correcting which is evident from decreasing trend in the valuation line (Price Earnings Ratio). The opposite correlation with crude price and the prices of oil marketing companies as theory says is not proven in recent period. P/E multiple indicates the valuation of these stocks. The oil and gas index's P/E has been moving according to the movement of indices. This means the valuation is constant. But in the beginning of 2018 the crude price has been increasing and indices show a medium term correction. But the valuation came in the lower side. This happened mainly on account of lower crude price and improvements in the margins. The fundamentals look good in those times and valuation came down due to muted global growth and bullish crude outlook.

Descriptive Statistics	Descriptive	Statistics
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	Mean	Std. Deviation	Ν
Oil and Gas index	10892.9026	2524.81983	1246
Crude	62.9273	19.96677	1246

Correlations							
		Oil and Gas index	Crude				
Pearson Correlation	Oil and Gas index	1.000	.153				
	Crude	.153	1.000				
Sig. (1-tailed)	Oil and Gas index		.000				
	Crude	.000					
Ν	Oil and Gas index	1246	1246				
	Crude	1246	1246				

Normally the daily fluctuations and it direct impact on prices of oil marketing companies are not sustained while analyzing five year data. The correlation between crude price and oil and gas index is showing 0.153 which means the correlation is positive and not strong.



**Model Summary** 

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.153 <sup>a</sup>	.023	.023	2496.00589

a. Predictors: (Constant), Crude

b. Dependent Variable: Oil and Gas index

The 'R' value is 0.153 and it means 15% of fluctuations to oil and gas index is explained by the crude price changes. It is evident that the stock prices of oil marketing companies are significantly influenced by other factors of market.

	ANOVA							
Model		Sum of Squares	df	Mean Square	F	Sig.		
1	Regression	186343943.664	1	186343943.664	29.911	.000 <sup>b</sup>		
	Residual	7750176455.968	1244	6230045.383				
	Total	7936520399.632	1245					

a. Dependent Variable: Oil and Gas index

b. Predictors: (Constant), Crude

Coefficients"								
	Unstandardized Coefficients		Standardized Coefficients			95.0% Confider	nce Interval for B	
Model	В	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	
1 (Constant)	9673.621	233.887		41.360	.000	9214.764	10132.478	
Crude	19.376	3.543	.153	5.469	.000	12.425	26.327	

a. Dependent Variable: Oil and Gas index

Here is the regression model which shows the predictability of Oil and gas index while applying a given change to crude oil prices. The global tensions, consensus of oil producing countries to restrict the crude production and issues in Lybia has been triggering a further hike in crude price in near future. This model will help to forecast the level of oil and gas index based on the outlook of crude.

IV. CRUDE OIL AND NIFTY AUTO INDEX

#### Crude Oil, NIFTY Auto index and P/E valuation



![](_page_4_Picture_0.jpeg)

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Above figure shows the movement of crude and the auto indices. It is evident that the movement was in the opposite direction from 2014 to 2018. The opposite correlation with crude price and the stock prices of auto companies as theory says is proven. P/E multiple indicates the valuation of these stocks. The auto index P/E has been moving according to the movement of indices. This means the valuation is constant. In the beginning of 2018 the crude price has been increasing and indices show a medium term correction is also evident. But the valuation is slightly on the higher side.

Descriptive Statistics					
	Mean	Std. Deviation	Ν		
Auto	9140.7249	1500.86240	1246		
Crude	62.9273	19.96677	1246		

	Correlations		
		Auto	Crude
Pearson Correlation	Auto	1.000	295
	Crude	295	1.000
Sig. (1-tailed)	Auto		.000
	Crude	.000	
Ν	Auto	1246	1246
	Crude	1246	1246

Variables Entered/Removed <sup>a</sup>								
Model	Variables Entered	Variables Removed	Method					
1	Crude <sup>b</sup>		Enter					

a. Dependent Variable: Auto

b. All requested variables entered.

The daily fluctuations and it direct impact on prices of auto companies are moving in the opposite direction while analyzing five year data. The correlation between crude price and auto index is showing -0.295 which means the correlation is negative and not strong.

	Model Summary								
					Change Statistics				
Mode		R	Adjusted R	Std. Error of the	R Square	F	df		Sig. F
1	R	Square	Square	Estimate	Change	Change	1	df2	Change
1	.295 <sup>a</sup>	.087	.086	1434.79948	.087	118.287	1	1244	.000

a. Predictors: (Constant), Crude

The 'R' value is 0.295 and it means 29% of fluctuations to auto index is explained by the crude price changes. It is evident that the stock prices of oil marketing companies are significantly influenced by other factors of market like auto demand outlook, credit growth and liquidity.

	ANOVA <sup>a</sup>							
Model		Sum of Squares	df	Mean Square	F	Sig.		
1	Regression	243511967.749	1	243511967.749	118.287	.000 <sup>b</sup>		
	Residual	2560960021.850	1244	2058649.535				
	Total	2804471989.599	1245					

a. Dependent Variable: Auto

b. Predictors: (Constant), Crude

		Coefficients <sup>a</sup>			
Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B

International Journal for Research in Engineering Application & Management (IJREAM) ISSN : 2454-9150 Vol-05, Issue-01, April 2019 В Std. Error Beta Lower Bound Upper Bound 10534.544 134.447 10270.776 10798.313 (Constant) 78.354 .000 -.295 -26.145 2.037 -10.876 .000 Crude -22.150-18.154

a. Dependent Variable: Auto

Here is the regression model which shows the predictability of auto index while applying a given change to crude oil prices. The global tensions, consensus of oil producing countries to restrict the crude production and issues in Lybia has been triggering a further hike in crude price in near future. This model will help to forecast the level of auto index based on the outlook of crude.

### V. CONCLUSION

The paper evaluated the correlation between the change in the crude oil prices and its impact on oil marketing companies and the auto companies share movements. The results of the study show that there is a positive correlation between changes in crude prices and energy index in the long run. It is also evident that there is a negative correlation exist between auto index and crude price movements. Therefore, policy makers have to take the movement of the crudes prices while framing the policies for the economic developments. This study will help the investors those who wish to invest in energy and auto sector can consider the price fluctuations due to crude oil price outlook while investing.

### REFERENCES

- [1] Alquist, Ron, and Olivier Gervais. "The role of financial speculation in driving the price of crude oil." The Energy Journal (2013): 35-54.
- [2] Asteriou, D., Dimitras A., & Lendewig A. (2013). The Influence of Oil Prices on Stock Market Returns: Empirical Evidence from Oil Exporting and Oil Importing Countries. International Journal of Business and Management, 8(18), 101-120.
- [3] Basher, S., & Sadorsky, P. (2006). Oil price risk and emerging stock markets. Global Finance Journal, 17, 224-251.
- [4] Bittlingmayer, George. "Oil and Stocks: Is it War Risk?." University of Kansas Working Paper Series. 2005.
- [5] Chang, Chia-Lin, Michael McAleer, and Roengchai Tansuchat. "Conditional correlations and volatility spillovers between crude oil and stock index returns." The North American Journal of Economics and Finance 25 (2013): 116-138.
- [6] Chen, Shiu-Sheng. "Forecasting crude oil price movements with oil-sensitive stocks." Economic Inquiry 52.2 (2014): 830-844.
- [7] Chittedi, K. (2011). Does oil price matter for Indian stock markets? Retrieved from Online at

http://mpra.ub.unimuenchen.de/35334/.MPRA Paper No. 35334. posted 11.December 2011 17:03 UTC.

- [8] Elyasiani, Elyas, Iqbal Mansur, and Babatunde Odusami. "Oil price shocks and industry stock returns." Energy Economics33.5 (2011): 966-974.
- [9] Ghouri, Salman Saif. "Assessment of the relationship between oil prices and US oil stocks." Energy Policy 34.17 (2006): 3327-3333.
- [10] Gupta, Eshita. "Oil vulnerability index of oil-importing countries." Energy policy 36.3 (2008): 1195-1211.
- [11] Huang, S., An, H., Gao, X., & Huang, X. (2015). Identifying the multiscale impacts of crude oil price shocks on the stock market in China at the sector level. Physica A: Statistical Mechanics and its Applications, 434, 13-24.
- [12] Lis, B., Nebler, C., & Retzmann, J. (2012). Oil and Cars: The Impact of Crude Oil Prices on the Stock Returns of Automotive Companies. International Journal of Economics and Financial Issues, 2(2), 190-200.
- [13] Lis, B., Nessler, C., & Retzmann, J. (2012). Oil and Cars: the impact of crude oil prices on the stock returns of automotive companies. International Journal of Economics and Financial Issues, 2(2), 190-200.
- [14] Mallick, Hrushikesh, Mantu Kumar Mahalik, and Manoranjan Sahoo. "Is crude oil price detrimental to domestic private investment for an emerging economy? The role of public sector investment and financial sector development in an era of globalization." Energy Economics 69 (2018): 307-324.
- [15] Masih, R., Peters, S., & De Mello, L. (2011). Oil price volatility and stock price fluctuations in an emerging market: Evidence from South Korea. Energy Economics, 33(5), 975-986.
- [16] Mork, Knut Anton. "Oil and the macroeconomy when prices go up and down: an extension of Hamilton's results." Journal of political Economy 97.3 (1989): 740-744.
- [17] Ranjan, A. (2013). PM calls for cutting oil import billby \$25 bn. Retrieved from

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http://www.indianexpress.com/news/pmcalls-forcutting-oil-import-bill-by--25-bn/1149576/

- [18] Selected major oil producing and consuming countries.Global Journal of Finance and Banking Issues Vol, 4(4).
- [19] Shaharudin, R. S., Samad F., & Bhat S. (2009). Performance and Volatility of Oil and Gas Stocks: A Comparative Study on Selected O&G Companies. International Business Research,2(4), 87-99.
- [20] Sharma, A., Singh, G., Sharma, M., & Gupta P. (2012). Impact of Crude Oil Price on Indian Economy. International Journal of Social Sciences & Interdisciplinary Research, 1(4), 95-99.
- [21] Sharma, A., Singh, G., Sharma, M., & Gupta, P. (2012). impact of Crude oil Price on Indian economy. International Journal ofSocial Sciences & Interdisciplinary Research, 1(4), 95-99.
- [22] Tiwari, Aviral Kumar. "On the dynamics of Indian GDP, crude oil production and imports." OPEC Energy Review 39.2 (2015): 162-183.

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