

# Lag-lead relationship between the volume of trade and share price movements of selected oil and gas companies in India: An econometric overview

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## ABSTRACT

Growing economy and population growth are the main drivers for oil & gas demand, increasing every year in India. Import content in oil & gas sector is in the range of 15% for refinery to 67% for upstream. In the country, the oil and gas sector is highly liberalized to attract private investment and to increase domestic production. A number of policy reforms have been taken by the Government to remove obstacles to investment and incentivize oil and gas sector on the lines of ease of doing business, minimum government maximum governance and promote Make in India initiative. Oil and gas prices fluctuate on a minute by minute basis, taking a look at the historical price range is the first place you should look. This study is an empirical attempt made to analyse the relationship between the volume of trade with the corresponding share price movements in the selected oil and gas companies in India applying the Granger Causality Test.

## 1. Introduction

Investment in oil companies share price is considered by the investors as a way to hedge the risk during the time of global recession. Investing in oil companies share price automatically exposes the investor to crude oil price and companies share price. Rational investors, regulators, brokers and dealers have expressed concern over the level of crude oil market volatility in different markets. The source of disparity between oil companies share prices and its local traded securities are the co-movements between the stocks and the markets they are traded rather than where the company is established. The fall in the crude oil prices tend to adversely affect refining margins on inventory losses, which may affect Indian refiners, the impact will be on corporate earnings. Oil marketers such as Bharat Petroleum Corporation Ltd, Hindustan Petroleum Corporation Ltd and Indian Oil Corporation Ltd are expected to benefit from falling crude oil prices as their overall losses from selling fuel below cost diminish. Stocks of these three oil marketing companies have outperformed in the BSE Sensex index since the beginning of 2015 itself helped by a decline in under-recoveries, better refining margins and expansion of marketing margins.

A firm faces all types of risk including pure risk like insurable hazards, operational and strategic risks. Further a firm may be involved in a broad range of investing activities in crude oil prices. Firms which are expanding their investment into the oil companies may have a higher degree of operational and strategic risks. These firms want to evaluate the effect of new investment projects on overall firm risk. Being able to measure the total risk involved by the firms, will result in a better understanding to handle new initiatives. The focus of this research is on measuring and managing crude oil price in oil companies share price. Risk-return analysis suggests that the amount of gain expected from investing is positively related to the level of risk taken by the investors. Based on this concept of hedging, the more risk a hedger is willing to incur, the more gain

from favorable market conditions for the hedger and it reduces the expected hedging cost. Although hedging reduces risk it also can eliminate some of the opportunity to take advantage of favorable market conditions.

To be honest, in oil industry, demand typically does not fluctuate too much (except in the case of recession), but supply shocks can occur for a number of reasons. Day-to-day fluctuations should not influence your investment decision in a particular energy company, but long-term trends should be followed more closely. The oil industry is easily influenced by economic and political conditions. If a country is in a recession, fewer products are being manufactured, not as many people drive to work, take vacations, etc. All of these variables factor into less energy use. The best time to invest in an oil company is when the economy is firing on all cylinders and oil companies are making so much money that using excessive amounts of energy themselves has little effect on their bottom line.

## 2. Review of earlier studies

Zhu, H. M., Li, R., & Li, S. (2014)<sup>1</sup> investigated the dynamic dependence between crude oil prices and stock markets in ten countries across the Asia-Pacific region during the period from January 4, 2000 to March 30, 2012 by using unconditional and conditional copula models. The model is implemented using an AR (p)-GARCH (1, 1)-t model for the marginal distributions and constant and time-varying copulas for the joint distribution. The results show 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, except in Hong Kong, and that it increased significantly in the aftermath of the crisis. The lower tail dependence between oil prices and Asia-Pacific stock markets exceeds that of the upper tail dependence, except in Japan and Singapore in the

<sup>1</sup>Zhu, H. M., Li, R., & Li, S. (2014)<sup>1</sup> Modelling dynamic dependence between crude oil prices and Asia-Pacific stock market returns. *International Review of Economics & Finance*, 29, 208-223.

post-crisis period. Moreover, we show that time-varying copulas best capture the tail dependence and that taking the tail correlation into account leads to improved accuracy of VaR estimates. These findings have important implications for investors interested in Asia-Pacific markets for portfolio diversification, risk management, and international asset allocation.

**NathSahu, T., Bandopadhyay, K., & Mondal, D. (2014)<sup>2</sup>** aimed to investigate the dynamic relationships between oil price shocks and Indian stock market. The study used daily data for the period starting from January 2001 to March 2013. In this study, Johansen's cointegration test, vector error correction model (VECM), Granger causality test, impulse response functions (IRFs) and variance decompositions (VDCs) test have been applied to exhibit the long-run and short-run relationship between them.

### 3. Statement of the problem

Growing economy and population growth are the main drivers for oil & gas demand, increasing every year in India. Import content in oil & gas sector is in the range of 15% for refinery to 67% for upstream. In the country, the oil and gas sector is highly liberalized to attract private investment and to increase domestic production. A number of policy reforms have been taken by the Government to remove obstacles to investment and incentivize oil and gas sector on the lines of ease of doing business, minimum government maximum governance and promote Make in India initiative.

India's consumption of oil products will accelerate in 2018 after unusually slow growth in 2017; according to a new report by ESAI Energy. The report explains that, due to a faltering economy, demand growth slowed for almost every fuel in 2017, with kerosene, naphtha, and fuel oil use all declining. Petroleum coke demand was stagnant this year after booming in 2016. Consumption of all petroleum products, except kerosene, will return to faster growth in 2018. After total oil demand growth slowed to just 60,000 b/d in 2017; consumption should accelerate to 200,000 b/d in 2018 as the economy recovers from multiple disruptions this year. After growing by 140,000 b/d in 2016, petcoke consumption stayed flat this year due to higher prices and a sharp decline in cement manufacturing. Next year, petcoke demand should return to growth of 40,000 b/d.

Oil and gas prices fluctuate on a minute by minute basis, taking a look at the historical price range is the first place you should look. Oil and gas industry is such an industry which gets impacted heavily by macro factors. Due to uncertainty and volatility this is not one of the go to sector for us. Many factors determine the price of oil, but it really all comes down to supply and demand.

Hedging is a risk management technique, primarily done to protect the crude oil price exposures against the volatility of oil companies share price, by using derivatives like crude oil futures and oil company's futures. The treasury manager should completely understand the firm's crude oil price policy before

applying hedging techniques. Minimum hedge ratio may be calculated to minimize risk in case of oil companies. This ratio allows the hedger to determine the number of contracts that must be employed in order to minimize risk of the combined crude oil futures. In hedging, to strike a balance between uncertainty and risk opportunity loss is a challenge. Hedging itself is a risk and disastrous if it is applied incorrectly and with the intent of doing speculation. In this situation an empirical research was done to find out the method of predicting the oil companies share prices through Indian BSE prices.

### 4. Objectives of the study

The primary objective of the study is

1. To examine the causal relationship between the trading volume of crude oil and the share price of oil and gas industry.

### Hypotheses for the study

**H<sub>01</sub>:** No lead-lag relationship exists between BSE daily closing share price and number of contracts traded

### 5. Research Methodology

#### Collection of Data

The study is analytical and is based on secondary data. The data relevant to the analysis were share prices of selected companies of oil and gas industry crude oil rates, which were collected respectively from BSE and MCXINDIA. Along with crude oil prices, closing price, number of trade, number of shares and total turnover were collected from different sources such as [www.bseindia.com](http://www.bseindia.com), [www.moneycontrol.com](http://www.moneycontrol.com) and [www.mcxindia.com](http://www.mcxindia.com).

#### Period of study

The period of study is the period of prices of shares of the selected companies, which were of 1st April 2012 to 31st March 2017. The active trading days summed to 1232 days.

#### Tools to be applied

The econometric tool namely the granger causality test can be used to test the hypothesis.

### 6. Analysis and Discussion

<sup>2</sup>NathSahu, T., Bandopadhyay, K., & Mondal, D. (2014)<sup>2</sup> An empirical study on the dynamic relationship between oil prices and Indian stock market. *Managerial Finance*, 40(2), 200-215.

**Table 1: Granger Causality test**

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:06

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
MRPL_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1235	1.49048	0.2257
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause MRPL_SHARES		1.15131	0.3166

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:08

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
NAGAROIL_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1237	1.79088	0.1672
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause NAGAROIL_SHARES		0.35000	0.7048

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:09

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
ONGC_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1237	0.22997	0.7946
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause ONGC_SHARES		1.39086	0.2493

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:10

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
AEGISLOGISTICS_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1237	1.04621	0.3516
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause AEGISLOGISTICS_SHARES		0.16287	0.8497

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:10

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
BPCL_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1236	2.08321	0.1250
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause BPCL_SHARES		3.14527	0.0434

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:11

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CALSREFINERIES_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1237	0.11954	0.8873
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause CALSREFINERIES_SHARES		0.35631	0.7003

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:11

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GAIL_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1236	1.22160	0.2951
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause GAIL_SHARES		0.54584	0.5795

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:12

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
HINDPETROEXP_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1236	1.16114	0.3135
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause HINDPETROEXP_SHARES		0.23216	0.7929

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:13

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
HPCL_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1237	0.24987	0.7789
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause HPCL_SHARES		0.06907	0.9333

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:14

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
IGL_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1236	0.09191	0.9122
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause IGL_SHARES		0.04176	0.9591

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:14

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
IOC_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1237	1.15094	0.3167
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause IOC_SHARES		2.85700	0.0578

## Pairwise Granger Causality Tests

Date: 10/10/17 Time: 11:15

Sample: 1 20780

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
JINDALDRILLING_SHARES does not Granger Cause TOTAL_VALUE__IN_LAKHS_	1235	1.49048	0.2257
TOTAL_VALUE__IN_LAKHS_ does not Granger Cause JINDALDRILLING_SHARES		1.15131	0.3166

The table 4.1 features the causality analysis between the share prices and the quantity of contracts traded of the oil and gas companies during the specified period of time. It can be inferred from the table that the probability values of all the observations except in case of BPCL are insignificant, having obtained the values higher than 5 per cent level of significance. Hence it can be conferred that those observations rejects the

null hypothesis and accepts the alternative hypothesis claiming that there is a lag-lead relationship between the quantity of trade and the share prices of respective oil and gas companies. It is the BPCL, which has one of the observations less than 5 per cent probability claiming that the quantity of trade do not cause changes in share price of the company.

## 7. Conclusion

Global trading has rapidly increased as the crude oil price has provided a new and more market place for individuals and entities alike to conduct international business and trading activities. A company that involved in transnational trade is exposed to fluctuations in crude oil price. Significant changes in the global trading and oil companies share price have led to uncertainty regarding the direction of crude oil price. This

uncertainty leads to volatility and the need for an effective vehicle to hedge crude oil price and oil companies share price changes while at the same time effectively ensuring a future financial position. Adverse movements can wipe out the investors profit while positive changes can increase the price of its products in the global market. Equally the company could benefit from windfall profits as a result of crude oil rate fluctuations.

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