SPILL OVER OF CRUDE OIL DURING RUSSIA-UKRINE WAR IN INDIA

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Short Abstract

There is a crumbling effect on crude oil prices across different countries due to the Russian-Ukraine war. The present study aims to determine whether oil prices in global markets have spillover effects on Indian prices The first stage of our study examines the price momentum of Indian oil companies' shares on the BSE during the Russian-Ukraine war In the second stage we examine the relationship between global crude oil prices and Indian crude oil prices. According to the results, there is spillover of 2.4%.

Key words: Spill over, Crude oil pricing. Pricing Strategy

Introduction

Crude oil, gas, and metal prices have been affected by the Russia-Ukraine conflict. As a result of tensions between Russia and Ukraine, oil prices have risen in the first quarter of 2022.. Brent crude prices breached the $100 barrel. Oil trade between India and Russia is not governed by a government-to-government agreement (G2G). Indian Oil Corporation has purchased most crude oil from Russia for India. According to the Indian budget calculations, crude oil will cost between $70 and $75 per barrel in the financial year 2022-23. Crude oil prices have soared to near $140 a barrel during the announcement of the Russian-Ukrine war.. As a result of the ongoing Russia-Ukraine war, the price of Brent crude oil has also increased by $60 billion. During the ongoing Russia-Ukraine war, prices have also increased for gas, edible oils, fertilisers, and coal. The result could be a $35 billion increase in India's import bills. Approximately 1% inflation is expected as a result of the high import expenditures for crude oil and other goods. The Reserve Bank of India (RBI) published a Mint Street memo in January 2019 stating that if the government absorbs the entire shock of oil prices, an increase of $10 per barrel will increase inflation by 49 basis points (bps) or the fiscal deficit by 43 basis points (as a percentage of GDP).

Knowledge Gap

Lebovic (1994) studied the momentum of crude oil price during the Gulf war and conclude that the momentum was long-term nature. Collier, P. (1999) studied the economic consequences during the civil war and conclude that the impact is short term. Amihudet all (2004) studied the relationship between crude oil prices and political turmoil during the Iraq war and conclude that there is a positive relationship. Kollias' (2013) research on oil price and stock index found that there is significant relationship between FTSE100 and oil returns. Öztürk's (2019) research on US-China Trade War found that money supply and inflation rate has a positive impact on stock index. Carvalho (2019) contented that trade War between US and China affected the stock price movements in both countries. Tosun's (2022) research on

Russia-Ukraine conflict found that there exists significant impact on crude oil prices if global level. The present research examine the impact of crude oil prices during the war time.

Aim

We examine the price momentum of Indian oil companies' shares on the BSE during the Russian-Ukraine war in order to determine whether oil prices in global markets have spillover effects on Indian prices. Second, we examine how global oil prices relate to Indian oil prices.

Methodology

We organise the research in two stages. First stage, we study the price momentum of the market value of Indian oil companies' share prices in Bombay stock exchange during the Russian-Ukraine war period. In the second stage, we study the relationship between the global crude oil prices and the Indian crude oil prices from 1st January, 2022 to 1st May, 2022. The research stages and design are depicted in the table-1

Table I Research Design

Stages	Purpose	Input	Process	Output	Justification
1	Intra-day Price momentum: To find out the intra-day price momentum to check the market efficiency.	Intra-day Sensex moment of the February, 24, 2022. (Beginning of the war). The news podcast about the war.	Text analysis of news podcast is compared with the intra-day Sensex moments.	There exists market efficiency, as the Sensex moved based on the war news.	The market efficiency hypothesis is tested during the war time.
2	Phenomenon of the impact of war on oil companies/ market value. To find out the share price momentum of oil companies during Russia – Ukraine war.	Five Oil companies, share prices from 1/1/2022 to 31/04/2022 from BSE	Trend analysis and Granger Causality between Sensex and Oil companies prices.	Standard deviation among the prices increased. There are only short-term jumps. There is no granger causality between Sensex and share prices	The phenomenon has been identified.

				of Oil companies. Hence the impact is less.	
3	Reason for short-term implications To find out the spill over of Crude oil prices in Global market and Indian Market	Global Crude oil prices from 1stJanuary 2022 to 1st May, 2022. Source: FOREX USOIL Indian Crude Oil prices. Source: MCX	VECM Modelling	If the crude oil price increase by 1%, the Indian crude oil prices increased by 2.4%.	The reason for the short-term fluctuation has been proved.
4	Solution to the Phenomenon. To identify the global sourcing pattern of crude oil of Indian Oil Companies.	Supply Chain network of Indian companies.	Literature review	The global sourcing of crude oil by the Indian Companies enables to overcome the market fluctuations.	The managerial efficacy of solving the issues has been identified.

Analysis

We investigate the daily price discovery process of Crude oil by exploring the stochastic trend between Crude oil price per barrelper dollar in Global market (INX – MCX) and the crude oil price in India. The collinearity variation between these markets is studied. The Foreign exchange rate is included as heteroscedasticity variables to identify the volatility mechanism between these markets. A Vector Error Correction Model (VECM) can lead to a better understanding of the nature of any non-stationarity among the different component series and can also improve longer-term forecasting over an unconstrained model. Vector error correction model (TVECM) is used to identify the bidirectional causality. The following model is used.

$$\Delta Y_t = a_y z_{t-1} + \sum_{t=i}^{p} b_{yi}\, \Delta Y_{t-i} + \sum_{t=i}^{p} c_{yi}\, \Delta X_{t-i} + \varepsilon_{y,t} \quad \dots (1)$$

$$\Delta X_t = a_x z_{t-1} + \sum_{i=1}^{p} b_{xi}\,\Delta Y_{t-i} + \sum_{i=1}^{p} c_{xi}\,\Delta X_{t-i} + \varepsilon_{x,t} \quad \dots (2)$$

Where as ΔX_t, is the output series of the GlobalCrude oil prices in terms of US dollar (Source: FOREX USOIL) market and ΔY_t , is the output series of the prices of crude oil in India (Source: MCX). b_{yi} ,c_{yi}, b_{xi} and c_{xi} represents the short-run coefficients. $\varepsilon_{y,t}$ and $\varepsilon_{x,t}$ are residuals. The speed of adjustment in long-run equilibrium due to market information is determined by the coefficients a_x and a_y . Table-3 shows the Granger test results.

TABLE 3: GRANGER CASUALTY TEST

Null Hypothesis:	Obs	F-Statistic	Prob.
Global Crude oil price does not Granger Cause Indian Crude oil price	369	6.71042	0.0001
Indian Crude Oil does not Granger Cause Global crude oil Price		2.53900	0.0378

The error correction is significant in both equations, suggesting a bidirectional error correction. However, the error correction in the first equation (Dependent – Crude oil price in India) is greater in absolute term than that of the second equation. This indicates that if the co-integrated series is in disequilibrium in the short run, it is the Global crude oil price - that makes the greater adjustment to re-establish the equilibrium. Hence, it may be concluded that the Global Crude oil price leads the Indian crude oil price in the price discovery process. The estimated values are tested with the 'F' statistic. The F-statistics is also significant. Hence there was a significant causality from the Global crude oil price and Indian crude oil price, but a very much more significant causality from Indian crude oil price to global crude oil price. Even though there is a bidirectional causality, Global crude oil prices are the better predictors of the crude oil price in India. The significant relationship between the crude oil prices Indian market and in Global market is studied with the two-stage regression equation. The summated regression is tested with t- statistic. The results are summated in the Table 4

Table -4: REGRESSION VALUES OF PRICES.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Global Crude oil price	1.645	0.030646	35.10108	0.0000
C	-7234.418	1404.397	-4.71	0.0000
R-squared	0.956292	Mean dependent var		35514.90
Adjusted R-squared	0.956145	S.D. dependent var		28428.71
S.E. of regression	5953.437	Sum squared residual		1.05E+10
Long-run variance	1.61E+08			

Since the R-square value is greater than 0.9, the estimation of crude oil price in India by the global price of crude oil stands well with the instrumental variable- exchange price. The

calculated value is higher than the table value of 't' statistic. The estimated values are also significant at 99% confidence level for all scrips in the sample.

Using the multivariate GARCH model, the pattern of information flow between the crude oilprice of India and global crude oil price is examined. The multivariate GARCH can be expressed as follows:

$$\begin{pmatrix} H_{11,t} & H_{12,t} \\ H_{21,t} & H_{22,t} \end{pmatrix} = C'C + \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}' \begin{pmatrix} \varepsilon^2_{1,t-1} & \varepsilon_{1,t-1}\varepsilon_{2,t-1} \\ \varepsilon_{2,t-1}\varepsilon_{1,t-1} & \varepsilon^2_{2,t-1} \end{pmatrix} \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} + \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix}' \begin{pmatrix} H_{11,t-1} & H_{12,t-1} \\ H_{21,t-1} & H_{22,t-1} \end{pmatrix} \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix}$$

Where as $H_{11,t}$ and $H_{22,t}$, are the conditional variances of the first and second serial orders. $H_{12,t}$ and $H_{21,t}$ are the conditional covariance between the two series. The C_{ij} are elements of a 2x2 symmetric matrix of constants C. The elements a_{ij} of the symmetric 2x2 matrix a_i measure the degree of innovation from market i to market j. The elements of b_{ij} of the symmetric 2x2 matrix b_i indicate the persistence of conditional volatility between gold prices of India and Thailand. The values of b_{11}, b_{22}, b_{12} and b_{21} are listed in table-5.

TABLE-5: PRICE DEPENDENCIES- VALUES OF COEFFECENT

Description	Dependent : Indian crude oil Price	Dependent : Global crude oil
ab11	0.92	
ab12	0.38	
ab21		0.72
ab22		0.90

The elements b_{ij} of the symmetric matrix b_i in the equation (3) states that all of the estimated coefficients are significant. In both the India and global markets the crude oil price volatility persistence is high (b_{11} = 0.92 and b_{22} = 0.38). The volatility spill over from Global price to India is higher than that of the crude oil price from India to global markets. The output of the analysis suggests that a 1% increases in the price of crude oil in global market leads to an increase of 2.4% in crude oil price in India.

Findings and Conclusion

Several foreign governments and companies have shunned Russian energy exports following Russia's invasion of Ukraine, resulting in a fall in the price of Russian crude oil. This has allowed Indian refiners to buy Russian crude oil at discounts as high as USD 30 per barrel. Crude oil worth $11.2 billion was purchased by India from Russia between April and July. As reported by the Commerce Department, the figure has grown eightfold since it was $1. As of March, India has imported over $12 billion from Russia, up from a little over $1 billion in 2020-21.

There is evidence that the Russian-Ukraine war has had a negative impact on Indian stock markets. However, it does not have a significant impact. As a result of the war announcement, the stock market experienced volatility. Among the crude oil price in India, there is a spill over of 2.4% as compared to global crude oil prices. The spill over, however, did not last long. There has been no impact on the retail market due to crude oil prices. It is because Russian supplies have been increased. India has benefited by 35,000 crores by purchasing Russian oil at a discounted price. With the beginning of the Russia-Ukraine war, India began purchasing Russian crude at a discount.

References

1) Amihud, Y., &Wohl, A. (2004). Political news and stock prices: The case of Saddam Hussein contracts. Journal of banking & Finance, 28(5), 1185-1200.
2) Carvalho, M., Azevedo, A., &Massuquetti, A. (2019). Emerging Countries and the Effects of the Trade War between US and China. Economies, 7(2), 45.
3) Collier, P. (1999). On the economic consequences of civil war. Oxford economic papers, 51(1), 168-183.
4) Ecnomic Times, October 5, 2022., https://economictimes.indiatimes.com/industry/energy/oil-gas/indian-refiners-scout-for-oil-deals-ahead-of-eu-ban-on-russian-crude/articleshow/94653719.cms
5) Kollias, C., Kyrtsou, C., &Papadamou, S. (2013). The effects of terrorism and war on the oil price–stock index relationship. Energy Economics, 40, 743-752.
6) Lebovic, J. H. (1994). Before the Storm: momentum and the onset of the Gulf War. International Studies Quarterly, 38(3), 447-474.
7) Öztürk, S., &AltinöZ, B. (2019). The effect of US-China trade wars on Shanghai stock exchange composite index. AfyonKocatepeÜniversitesiİktisadiveİdariBilimlerFakültesiDergisi, 21(1), 59-69.
8) Tosun, O. K., &Eshraghi, A. (2022). Corporate decisions in times of war: Evidence from the Russia-Ukraine Conflict. Finance Research Letters, 102920.

Annexure I
Descriptive Statistics

Description	BPCL	HPL	OIL INDIA	ONGC	PETRO PR	SENSEX
Price on 23rd Feb	357.2	290.05	220.3	160.7	29.45	57232.06
Price on 24th Feb	332.95	272.1	218.45	156.65	28.05	54529.91
Price decrease	24.25	17.95	1.85	4.05	1.4	2702.15
Percentage *Decrease*	6.78	6.188588174	0.83	2.52	4.74	4.72
Avg (monthly) Price before	374.05	296.8909	228.5432	167.4909	32.85909	57961.61

Avg (monthly) Price after	351.3316	276.9184	234.1579	170.5474	29.19474	55840.83
Change in price	-22.7184	-19.9725	5.6147	3.0565	-3.66435	-2120.78
Change in Percentage	-6.073626521	-6.727218652	2.456734657	1.824875262	-11.1517087	-3.658939081
Correlation before with Sensex	0.369437	-0.216302	0.443145	0.40419	0.278964	1
Correlation after with Sensex	0.813001	0.25022	-0.573427	-0.102831	-0.198263	1
Covariance before	2304.983	-1404.836	1547.171	865.1032	558.2839	485284.7
Covariance after	12327.54	2375.188	-7608.435	-1121.167	-344.8588	2104556
Cointegration before with Sensex	1	2	2	2	0	
Cointegration After with Sensex	0	0	1	0	0	