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CRUDE OIL PRICE BEHAVIOUR AND ITS IMPACT ON INDIAN ECONOMY: A STUDY

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Abstract: *Crude oil price play a significant role on the economy of any nation as it determine price among all the commodities and services. Increasing oil prices not only influence products and services, it also influence the overall society. The present study is analytical in nature and completely based on secondary data. In this paper, an attempt has been made to study the crude oil price behaviour and impact of crude oil price on the Indian economy by considering the main short-term macroeconomic indicators, i.e. Wholesale Price Index (WIP) and Index of Industrial Production (IIP) as the relevant variables.*

Keywords: *Indian Economy, Crude Oil Price, Wholesale Price Index (WIP), Index of Industrial Production (IIP)*

I. INTRODUCTION

Crude oil is one of the most necessitated commodities in the world and plays a vital role in the economy of any nation. After coal it is a major source of energy demand in India. However, there are only 0.50 per cent of the world's total mineral reserves in India. At present, 75% of India's crude oil needs are met through imports. In 2016, India imported 213.93 MMT which is near about 70 per cent of the total crude oil requirements and spent huge foreign exchange on crude oil. Although the price of oil in the international market is steadily fluctuating, there is a political obligation to keep oil prices stable in the domestic market. As a result the economy of the country is about to become disconcerting due to huge burden in the form of subsidy. In addition to importing the crude oils in the international market, there are risks and uncertainties to survive in competition with other economically strong and sound oil importing countries. As crude oil prices are rising globally, the increasing quantum of petroleum products has a significant impact on the economy because it directly or indirectly affects prices of all products and services which use these products as inputs. In this view an attempt has been made in this study to explore the relationship between volatility in crude oil prices and its impact on Indian economy.

II. LITERATURE REVIEW

Aparna, A., (2013), in her study 'Impact of Oil Prices on the Indian Economy' analysed the impact of crude oil price on the Indian economy by considering Gross domestic Product, Index of Industrial Production and Wholesale Price Index as relevant variables.

Swadimath, U. C. et al., (2013), in their study 'Rise and Impact of Crude Oil price in India, depicts the causes for rise in crude oil prices and the factors that influence it and shows the change in price of crude oil and its effect on the environment of business.

Negi, P., (2015), in his study examine the impacts of oil price on GDP of the four largest fast growing emerging economics Brazil, Russia, India and China using sample observations from 1987 to 2014. And found that overall the oil price has a positive relationship with GDP. This study also shows that in India and China increase in oil price has a negative relationship with GDP and on the other side in Russia and Brazil positive impact of increased oil price on GDP.

Ganguly, A. and Das, K., (2016), in their study 'Impacts of falling crude oil prices and reduction of energy subsidies on the Indian economy: A CGE Modelling Approach' analyzes the impacts of international crude oil fluctuations and energy subsidy removals on Indian economy. They found that fluctuating of international crude oil price has a greater effect in determining gross domestic product and exchange rate as compared to the effect of energy subsidy removal.

Soundarapandiyan, K. and Ganesh, M., (2017), in their research paper addresses the impact of crude oil price on the Indian economy by considering the relevant inputs like Gross Domestic Product (GDP), Consumer Price Index (CPI) and Crude Oil Price for the period of 15 years i.e. 2001-2015 and found that there was significant difference between crude oil price and GDP and no significant difference between CPI and GDP.

III. OBJECTIVES OF THE STUDY

The main objectives of the study are

1. To examine the crude oil price behaviour
2. To explore the impact of Crude Oil Prices on Indian economy.

IV. RESEARCH METHODOLOGY

Data Collection: The data has been collected from secondary source which includes RBI Database, Indiastat database, Petroleum Planning and Analysis Cell (PPAC), various journals and research paper.
Study Period: The present study has been covered Monthly data from September 2015 to May 2018.
Tools and Techniques: The data are analyzed by different accounting and statistical tools and conceptual understanding.

V. CRUDE OIL PRICE BEHAVIOUR

The prices of petrol and diesel have been changing every day based on international crude oil prices and foreign exchange rate. In India petrol and diesel prices are set on fortnightly i.e. 1st and 16th day of every month on the basis of average international crude oil price in the preceding fortnight and foreign exchange rate with effect from June 16, 2017. As a result the retail price of the petrol and diesel proportionally reflects changes in crude oil prices.

Production and Consumption of Petroleum Products in India
India is highly dependent on import of crude oil. However, in the year 2012 India produced 37862000 MT crude petroleum and get 25th position in the world. India's rank in crude oil production among the countries was given below.

Figure 1: India's rank in crude oil production among the countries

In the year 2012 India's Rank	Among SAARC Countries	Among BRICS Countries	Among Commonwealth Countries	Among G-20 Countries
	1st	4th	4th	10th

Source: indiastat.com
From the Table 1 it is cleared that the production and consumption of petroleum products in India has an increasing trend from 2010-11 to 2017-18. India produced 243.55 MMT of petroleum products in 2016-17, recording the growth of 5.01% over the previous year. India accounted for 0.92% of world oil production in 2016-17 and 4.81% of total world oil consumption in 2016-17.

Table 1: Production and Consumption of Petroleum Products in India

Years	Production (MMT)	Growth Rate (%)	Consumption (MMT)	Growth Rate (%)
2010-11	194.821	5.53	141.040	2.35
2011-12	203.202	4.30	148.132	5.03
2012-13	217.736	7.15	157.057	6.02
2013-14	220.756	1.39	158.407	0.86
2014-15	221.136	0.17	165.520	4.49
2015-16	231.924	4.88	184.674	11.57
2016-17	243.55	5.01	194.60	5.37
2017-18	243.58*	0.01	201.90**	3.75
*: Target **: Estimated (Prorated based on Apr-Nov 2017 figure)				

Source: Ministry of Petroleum and Natural Gas, GOI, New Delhi

Import of Crude Oil and Average Crude Oil Price
Table 2 shows that the Import of Crude Oil (MMT) in India has an increasing trend during 2010-11 to 2017-18. India had imported 213.93 MMT of crude oil in 2016-17 for 70.196 billion US$ or ₹4.7 lakh crore. For 2017-18, the imports of crude oil are stabilized at 219.15 MMT for 87.725 US$ or ₹5.65 lakh crore. However, since 2015-16 the average price of crude oil is upward in nature.

Table 2: Import of Crude Oil and Average Crude Oil Price (Indian Basket)

Years	Import of Crude Oil (MMT)	Growth Rate (%)	Average Crude Oil Price (US$/bbl)	Growth Rate (%)
2010-11	163.595	2.72	85.090	21.98
2011-12	171.729	4.97	111.890	31.50
2012-13	184.795	7.61	107.970	-3.50
2013-14	189.238	2.40	105.520	-2.27
2014-15	189.435	0.10	84.160	-20.24
2015-16	202.850	7.08	46.166	-45.15
2016-17	213.93	5.46	47.56	3.02
2017-18	217.08*	1.47	53.59^	12.68
*: Estimated ^: Average Apr-Dec.2017 figure				

Source: Ministry of Petroleum and Natural Gas, GOI, New Delhi

Price Structure of Petrol and Diesel

In India crude oil is purchased by Oil Marketing Companies (OMCs) such as three PSUs namely Bharat Petroleum Corporation Limited (BPCL), Indian Oil Corporation Limited (IOCL) and Hindustan Private Corporate Limited (HPCL) which control around 95% of this sector and two private sectors namely Reliance Industries and Essar control the remaining market. These OMCs pays all the cost like entry tax, refinery transfer price to convert into petrol and diesel, freight charges and central excise in addition to crude oil per barrel (about 159 litres). This refined oil, in form of petrol or diesel sold by the OMCs to the dealers on the basis of cost plus profit. Dealers sold this to the final consumers on petrol pumps after making some margin along with state VAT, pollution cess and surcharge. Table 3 shows the breakdown of various taxes and commission on petrol and diesel prices.

Table 3: Central Excise, Customs Tariff and Dealers Commission on Petrol & Diesel

Particulars	Customs			Central Excise			Dealers Commission
	Basic Custom Duty	Additional Custom Duty (CVD)	Additional Custom Duty	Basic Excise Duty	Special Additional Excise Duty	Additional Excise Duty (Road & infrastructure cess)	
w.e.f.	02.02.2018						01.08.2017
Crude Petroleum	NIL+₹50 /MT as NCCD	NIL	-	NIL+Cess @20%+₹50/MT as NCCD	-	-	-
Petrol	2.50%	₹4.48/ltr.+ ₹7/ltr.SAD	₹8/ltr.	₹4.8/ltr	₹7/ltr	₹8/ltr	₹2.67/ltr.+0.859% of product billable price
Petrol (branded)	2.50%	₹5.56/ltr.+ ₹7/ltr.SAD	₹8/ltr.	₹5.66/ltr	₹7/ltr	₹8/ltr	
High Speed Diesel	2.50%	₹6.33/ltr.+ ₹1/ltr.	₹8/ltr.	₹6.33/ltr	₹1/ltr	₹8/ltr	₹2.03/ltr.+0.257% of product billable price
High Speed Diesel (branded)	2.50%	₹8.69/ltr.+ ₹1/ltr.	₹8/ltr.	₹8.69/ltr	₹1/ltr	₹8/ltr	
Sales Tax/VAT: State wise rates are applicable							

Source: Petroleum Planning and Analysis Cell

Figure 2: Pricing Structure of Crude Oil

Crude Oil	
OMCs	Refinery Transfer Price + Entry tax + Fright + OMC Margin + Central Excise Duty
Dealers	Dealers Commission + State VAT + Pollution Cess + Surcharge
Consumers	Bear Finalised Retail Price

VI. IMPACT OF CRUDE OIL PRICE ON INDIAN ECONOMY

To analyze the impact of crude oil price on the Indian economy in terms of Wholesale Price Index (WPI) and Index of Industrial Production (IIP) a linear Multiple Regression Model has been used. For analysis, we have taken Crude Oil Price as independent variables. On the other hand, impact on economy in terms of the main short-term macroeconomic indicators such as Wholesale Price Index (WPI) and Index of Industrial Production (IIP) are taken as dependent variables.

To investigate the dependence between two or more variables at the same time, compute a correlation matrix.

Table 4: Correlation Matrix among Dependent and Independent variables

		LWIP	LIIP	LCOP
LWIP	Pearson Correlation	1.000	0.435	0.519
	Sig. (1-tailed)		0.006	0.001
	N	33	33	33
LIIP	Pearson Correlation	0.435	1.000	0.568
	Sig. (1-tailed)	0.006		0.000
	N	33	33	33
LCOP	Pearson Correlation	0.519	0.568	1.000
	Sig. (1-tailed)	0.001	0.000	
	N	33	33	33

Source: Computation through SPSS

Table 4 shows that crude oil price is positively correlated with WIP and IIP which is significant for this study.

The simple linear regression model has been sketch to investigate the impact of crude oil price on inflation of the Indian economy, which as follows:

1st Model: $Y_{LWIP} = \alpha + \beta X_{LCOP} + €$

2nd Model: $Y_{LIIP} = \alpha + \beta X_{LCOP} + €$

Where

LWIP: Log normal change in Inflation measured in terms of WPI (base year 2011-12)

LIIP: Log normal change in IIP (base year 2011-12)

LCOP: Log normal change in Crude Oil Price per barrel (in US Dollar)

α = Constant, β = Regression Coefficients and € = Error Term

Regression Analysis based on 1st Model:

To observe the significant relation between WIP and Crude Oil Price we have taken the hypothesis.

1st Hypothesis:

H_0 = There is no significance difference between WIP and Crude Oil Price

H_1 = There is significance difference between WIP and Crude Oil Price

Table 5: Regression Coefficient (Dependent variable: WPI)

Model 1	Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Collinearity Statistics
	B	Std. Error	Beta			VIF
Constant	4.035	0.171	0.519	24.138	0.000	1.000
LCOP	0.149	0.044		3.384	0.002	

Source: Computation through SPSS

From the Table 5, the double log regression model shows that the crude oil price elasticity of WPI is 0.149 and it is positively correlated. So the regression model Y_{LWIP} = 4.035 + 0.149 X_{LCOP} + €, fit the relationship between the incremental WIP and the increasing crude oil price. The estimated slope 'β', is 0.149

$$\beta = \frac{Changes\ in\ Y}{Changes\ in\ X} = \frac{\%\ Change\ in\ WPI}{\%\ Changes\ in\ Crude\ Oil\ Price} = 0.149$$

It is cleared that 1 per cent change in crude oil price was typically accompanied by a change of 0.149 per cent of WPI. When crude oil price is increased by one per cent, WPI is increase positively by 0.149 per cent that supports the economic theory because crude oil price and WPI must be positively related. The result also shows that for independent variable crude oil price, the probability of t statistic 3.384 for the b coefficient is 0.002 which is less than the significant level of 0.05. So we reject the null hypothesis that, there is no significant impact of crude oil price on economy in terms of WPI.

Regression Analysis based on 2nd Model:

To observe the significant relation between WIP and Crude Oil Price we have taken the hypothesis.

2nd Hypothesis:

H_0 = There is no significance difference between IIP and Crude Oil Price

H_1 = There is significance difference between IIP and Crude Oil Price

Table 6: Regression Coefficient (Dependent variable: IIP)

Model 2	Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Collinearity Statistics
	B	Std. Error	Beta			VIF
Constant	4.271	0.138	0.568	30.848	0.000	1.000
LCOP	0.136	0.035		3.840	0.001	

Source: Computation through SPSS

From the Table 5, the double log regression model shows that the crude oil price elasticity of IIP is 0.136 and it is positively correlated. So the regression model $Y_{LIIP} = 4.271 + 0.136\ X_{LCOP} + €$, fit the relationship between the incremental IIP and the increasing crude oil price. The estimated slope 'β', is 0.136

$$\beta = \frac{Changes\ in\ Y}{Changes\ in\ X} = \frac{\%\ Change\ in\ IIP}{\%\ Changes\ in\ Crude\ Oil\ Price} = 0.136$$

It is cleared that 1 per cent change in crude oil price was typically accompanied by a change of 0.136 per cent of IIP. When crude oil price is increased by one per cent, IIP is increase positively by 0.136 per cent. The result also shows that for independent variable crude oil price, the probability of t statistic 3.840 for the b coefficient is 0.001 which is less than the significant level of 0.05. So we reject the null hypothesis that, there is no significant impact of crude oil price on economy in terms of IIP.

VII. CONCLUSION

The effect of international crude oil price is conspicuous on the economy. Growing foreign exchange rates increases the prices of oil which increases the general price level. From this study it is clear that the retail price of oil in the domestic market has not been high as the price of crude oil in the international market. It is more than high due to impose excessive tax in various ways. The highly oil price significantly affect the economy in terms of WPI and IIP.

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