



A STUDY ON RELATIONSHIP BETWEEN CRUDE OIL PRICE AND ECONOMIC GROWTH

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Abstract :

Crude oil price is an important parameter for refining industries, which has a bearing on economy, because it is vital input for productivity. There is a vast gap in demand and production of crude oil in India. National oil companies are able to produce 23-24% of India's total requirements of crude oil. The production of crude oil from public sector enterprises in India has been decreasing due to old and the maturity of the fields. India is not self-reliant on crude oil production; therefore, it is necessary and inevitable to import the crude oil to bridge the gap between demand and supply. The increase in international crude oil prices will make import costly and raise the Indian crude basket price. Therefore, both international crude oil price rise and import dependency on crude oil are the problematic area that may damage the Indian economy. This paper focused on a study of relationship between crude oil prices and economic growth and also focused on the impact of crude oil prices on some economic variables i.e. exchange rate, inflation, and financial markets. To analyze the data statistical tools like Regression Analysis, correlation etc. are used. The result shows there is a significant impact of changes in crude oil prices on economic variables.

Key words: *Crude-oil, Inflation, Sensex, Imports, Exchange rate, GDP(gross domestic product), Market Volatility.*

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Introduction :

Energy and oil are vital sources of economic growth and help in moving the economy further. Crude oil reserves are not distributed around the world uniformly. The global oil industry has a lot of characteristics starting from exploration and production, gathering, refining and manufacturing of intermediate products and converting into various products, refined product distribution, storage and other facilities like pipelines and various terminals, other marketing and retail operations, etc. There are countries around the world with huge reserves of oil like the United States, Canada, Russia, Venezuela, and all the Middle East countries like Iran, Iraq, Kuwait, Saudi Arabia, UAE, etc. The world consumption for oil in 2018 alone was \$2.18 trillion tonnes. In gallons this is equivalent to 1.134 trillion which is equal to half the water in Lake Michigan. Total world production for oil is estimated to be 101.06 million barrels per



day and total world consumption is assumed to 100.82 million barrels per day. According to EIA, the global liquid consumption of oil will increase by 0.9 million barrels per day which is down from the year over year growth of 1.3 million barrels per day. EIA estimates the demand to rise to 1.4 million barrels per day in 2025. Crude oil stood first as the world's second most exported product in 2021, after medicine and medical supplies, then came petroleum and the third was cars as the most valuable commodity. Oil prices are difficult to determine due to several factors such as the high uncertainty relating to the development of the resource and investment required, the nature of the resource, the scarcity of the resource, high pressure by the resource producers and refineries due to their monopolies, the inelastic demand of oil as it is needed to fuel economic growth, etc. however there are three major factors determining oil prices i.e. the oil supply especially from OPEC and other alternative fuel supplies like Shale gas, etc., the access to future supply that is the reserves available in various exporting countries and the third factor is the demand from various countries.

The major oil exports came from Asia of 49.5%, Europe supplied overall 16.9%, smaller percentages came from Latin America, etc. The Middle Eastern countries (OPEC) account for the highest exports in the world 42.9% or \$486.1 billion of globally exported crude oil. Other major exporters are the US, Canada, Russia, etc. The major oil importing are China at 20.2%, United States at 13.8%, India at 9.7%, Japan at 6.8%, etc. other importers also include south Korea, Netherlands, United Kingdom, Germany, Spain, Italy, etc. Oil prices thus fluctuate highly throughout the period. Oil prices were decided by OPEC in the form of long term contracts. However, now with the growth of the spot market as well as the future commodity market these long term contracts have reduced and the price is influenced by global demand and supply. OPEC being a large producer still has an influence on this price. For example, in 2012 the oil prices rose to an all-time high of \$108.54 when Iran threatened the straits of Hormuz. Also in 2016 the prices for oil fell sharply due to the excess supply from US in the form of SHALE gas and other alternative fuels. The oil prices were at a low of \$26.66/barrel. However to combat this problem the OPEC cut supply of oil and restored prices at normal levels \$47.50/ barrel in 2018.

Oil prices are not only dependent on the demand and supply but also the location of the production and refinery. Oil produced close to major markets has more demand as it requires less transportation and thus this oil will demand a premium. Other minor factors also include the type of oil and the type of content in the oil for example sulphure content, density and the gravity, etc. However, the three major factors that affect price are demand, supply and the reserves and any other global economic events. India imports 70 to 80 % of its oil demand. It is predicted that the nation's oil needs will rise by 40% in 2025. Volatile oil prices are a threat to the economy as India consumes high amount of oil which is not produced domestically. Oil prices for India also depend on the exchange rate. Higher the exchange rate more is the pressure on the economy. Oil prices depend on the various regulations also that are present in India especially the various import duty applicable to various countries. Iraq and Saudi Arabia is India's largest supplier of oil. India has stopped importing oil from Iran post the US sanctions. Kuwait is also one of the major suppliers of oil to India. Oil can be used to make several products like gasoline or motor spirit, distillate fuel



oils like diesel and kerosene and heating oil, hydrocarbon gas fluids like propane, jet fuel which is a very important product used across the world and highly impacts the airline sector, lubricants, asphalt, petrochemical feedstock, coke, aviation gasoline, waxes, etc. Oil is used in various forms in India and for various purposes. Oil is used as motor spirit that is petroleum which is used as fuel for passenger cars, trucks, two and three wheelers, etc. Oil is also available in the form of ATF (automatic transmission fuel) which is used by airlines, oil is used as SKO (superior Kerosene oil) used for cooking and lighting, HSD (high speed diesel) fuel for transport sector (Railways/Road), agriculture (tractors pump sets, threshers, etc.) and captive power generation, LDO (Liquefied diesel oil) which is used in small pumps, agriculture, etc. Oil is used to make lubes, other minor products like coke, Paraffin Wax, etc. Major players in India in the oil sector are the ONGC, Indian Oil, GAIL, Great Eastern Energy Corporation limited, Essar oil, RIL, GSPCL, etc. Each player has a good amount of share in the market and caters to different needs of the market. These players are highly impacted due to declining or rising oil prices.

India allows 100% FDI under the automatic route in exploration activities and 49% FDI in refining. Thus oil has several end uses and thus has a major impact on the economy. A simple example could be a rise a price of oil would lead to higher inflation. This is because all goods are dependent on transport which is dependent on petroleum which originates from oil. Thus everything is interlinked and goes back to oil. The oil industry is a highly important industry as India is highly dependent on oil imports. There are estimates that oil demand has risen to 84% for India. India is an emerging economy with a Gross Domestic Products (GDP) growth of 5-10% per annum. Moreover, the recent business reforms, initiated by Indian government may bring in changes in the Indian Economy. Business reforms further indicate the possibility of energy consumption. Crude oil is the second highest source of India's energy consumption with 23% of the share after Coal. The recent scenario of Indian crude oil segment is not appreciable. On one hand where crude oil consumption is increasing, on the other hand, the production is declining. It results in more import expenses. In this context, the major difference with the developed countries is crude oil dependency. This is an alarming situation and India should start taking initiatives towards alternative energy sources.

It is estimated that the import dependence of India associated with crude oil is expected to 94% by the end of 2030. Therefore, the trouble water in Indian crude oil demand and supply management is the rise in international crude oil prices followed with the extent of the increase in crude oil requirement with respect to feasible higher GDP growth 8% to 9%. The import dependence of India associated with crude oil is from 77% in 2020-21 to 80% by the end of 2023. As crude oil prices are rising globally and imports will be expensive, it is necessary to understand the consequences of crude oil price rise on the economy.

Literature Review :

Narendra Punati, Raghavender Raju. G (2017) This study gives an insight to the present condition of crude oil prices, and their imports in India. The data used for this study is monthly time series data from April 1994 to December 2015. This study has made an attempt to find out the major determinants of crude oil prices, for this purpose, we have employed the econometric technique i.e. ordinary least squares method. The study finally concluded



that the determinants of crude oil prices (Brent crude oil prices, index of industrial production, exchange rate, and inflation) are found to significant.

Bidisha Sarkar, Jain Mathew (2018) This study intends to explore the causes and consequences of international crude oil price changes of Indian basket. Assessing this cause and effect relationship requires a long term historical data set. Hence, the time frame of the research work has been considered from the financial year 2000-2001 to 2016-2017. Monthly data frequency has been employed for this research work. Oil Spreadsheet Model has been referred to understand the supply-demand mechanism which can be considered as the base for identifying the global factors, influencing Indian basket crude oil price changes. Econometric techniques (Granger Causality Test Model) have been adopted to understand the cause and effect relationship of this price fluctuation. It has been found that Organization of the Petroleum Exporting Countries (OPEC) and Brent crude oil prices have a bi-directional effect on an International crude oil price of Indian basket. On the other hand, the Indian basket crude oil price granger causes Gross Domestic Product (GDP).

A. Aparna (2013) In this paper, an attempt has been made to study the impact of crude oil price on the Indian economy by considering Gross Domestic Product (GDP), Index of Industrial Production (IIP) and Wholesale Price Index (WPI) as the relevant variables. Vector Auto Regression (VAR) has been used to analyse the objective since a direct causal relationship could not be established.

Zulkharnine Sultana (2019) The study tells about, the effect of oil price which changes the global economy. The relative effect of oil price is low versus high. Oil dependency, such as exchange rate, cost in production mainly, domestic output. Oil productions countries increases the price of crude oil, the advice state, the same country should invest in their own country to develop the infrastructure. The margin is to be invested in underdeveloped and developing countries, it can say, positive effect to global economy.

Arundhati Sarkar Bose (2017) This paper investigates how, the influence of crude price changes in determining diesel prices in India using an ARDL framework and the severity of impact of international crude oil price changes on the macro economy of India using a SVAR framework. Based on monthly data between 2004 April and 2017 February, we find that in the post deregulation phase diesel prices are influenced by crude oil prices much more than before; the intensity of impact of crude oil price changes on inflation has increased; the response of monetary policy to crude oil price changes have become statistically insignificant. We also find that the impact of crude price changes on output has always been insignificant.

Objectives :

- To study the impact of Crude oil prices on Indian Economy
- To identify the relation between change in crude oil prices and inflation, exchange rate GDP and financial markets



Hypothesis :

Following hypothesis have been formulated for the study:

H1: The changes in oil prices have a significant impact on GDP

H0: The changes in oil prices have no significant impact on GDP

Research Methodology :

Research Design: This is descriptive research which uses quantitative and analytical approach. This work establishes a conceptual framework to find the casual relationship among the factors. Factors such crude oil prices, inflation, exchange rate, GDP, financial markets and other factors are identified based on the literature review for which secondary data is collected.

Data: Secondary data have been collected using various sources. Extreme care to be taken that Information collected from Secondary data sources should be authentic and verified sources is to included. For the purpose government portals and trusted sources such as Central Statistical Organization (CSO) data of Indian Economy, RBI reports, Indian Economic survey reports, etc. are quoted for the reference of data. Also Verified and published reports, journals and websites are considered for references of data.

Data Analysis Tools The principal statistical tools considered for data analysis are Regression Analysis, Correlation, Two Tail T- Test.

Research Variables: Variables studied in the research work are GDP (% growth), Oil prices (\$/Barrel), Import of crude oil (Barrels/year), Sensex (as per S&P BSE index), Exchange rate (Moving Average). These data have been studied for over a period of 2008-2021.

Data Analysis and Interpretation :

Correlation Analysis :

Correlation analysis has been done to find out the relation of changes in crude oil price and economic variables i.e. exchange rate, inflation, stock market and GDP.

Crude oil Prices and Exchange Rate

Pearson's correlation Co.	Exchange Rate	Crude oil prices
Exchange Rate	1	-0.627341
Crude oil prices	-0.627341	1

Exchange Rates and Crude Oil Prices (\$/Barrel) are used from 2008 to 2021 as our study's two variables. Correlation test is used to see how the exchange rate affected crude oil prices, and found a negative correlation of -0.627 between the two. A negative correlation shows that the two variables have an adverse relationship. This is due to



India's present budget deficit. When a country has a large deficit, it must buy dollars by selling its rupees, lowering the value of the INR. As a result, a drop in oil prices is beneficial to the rupee.

Crude Oil Prices and Inflation

Pearson's correlation Co.	Exchange Rate	Inflation
Exchange Rate	1	0.698261
Inflation	0.698261	1

Findings :

From 2008 to 2021, inflation and crude oil prices (\$/barrel) are used as our study variables. Correlation test is used to see if there was a link between inflation and crude oil prices, and found a positive correlation of 0.698. Oil is a vital commodity that is required on a daily basis for both domestic and industrial purposes. Oil is a basic raw element used in a variety of industries. As a result, any increase in oil prices would feed inflation in all areas, from manufacture to delivery and transportation, which will eventually be passed on to end customers, making items costly. Because of its usage in transportation, oil is a necessary commodity (of goods, services and people). When the price of oil rises, so do the prices of all goods and services. As the price of petrol and diesel rises, it has a direct impact on individuals. Inflation rises as a result. Inflation is harmful to a country's economy. As a result, the drop in global crude prices is a beneficiary to India.

Crude Oil Prices and Inflation

Pearson's correlation Co.	Crude Oil Prices	Sensex (S&P)
Crude Oil Prices	1	-0.5645
Sensex (S&P)	-0.5645	1

Findings :

To investigate the relationship between the Indian stock market and crude oil prices, S&P BSE SENSEX and Crude Oil Prices (\$/Barrel) from 2008 to 2020 is used. Correlation test is used to determine the relationship between the stock market and crude oil prices, which revealed a negative correlation of -0.564. The fundamental reason for this is investors' fear that as oil prices rise, corporations' profit margins will shrink. Because an increase in the price of oil immediately affects the companies' operational costs, fuel costs, and transportation costs, it's only inevitable that their profit margins will shrink. As a result, purchasers are concerned about the future prospects of companies that are heavily reliant on oil. As a result of the uncertainty, buyers are hesitant to invest in these companies,



and stock prices decline, which has a negative impact on the overall market environment. Energy equities account for around 14.7% of the Sensex. As a result, stock market movements are influenced by changes in oil prices. Companies in the tyre, footwear, lubricants, paints, and aviation industries all suffer from higher crude prices.

Crude Oil Prices and Stock Market

Pearson's correlation Co.	Crude Oil Prices	Oil	GDP
Crude Oil Prices	1		-0.68902
GDP	-0.68902		1

Findings :

GDP Rate (according to the World Bank) and Crude Oil Prices (\$/Barrel) from 2008 to 2021 are used as two variables in our study to examine the relationship between GDP (percent) and crude oil prices. Correlation test is used to see if there was a link between GDP and crude oil prices, and found a negative correlation of -0.68. Inflation, a drop in tax revenues, a rise in the budget deficit, and an increase in interest rates are all consequences of high oil prices. All of these factors have the potential to raise unemployment, at least in the short term. The rise in oil prices has a negative impact on the trade balance and the exchange rate. Inflation-containing monetary and fiscal policies might exacerbate the recession and its consequences. On the other hand, expansionary monetary and fiscal policies can simply delay the decrease in national income while exacerbating the impact of rising oil prices in the long run. On the other side, a drop in oil prices will result in an increase in the economy's GDP rate.

Regression Analysis :

Regression analysis is used to see how much of an impact, changes in crude oil prices have on GDP. The following is the result of the regression analysis:

Regression Statistics	Coefficients
Multiple	0.63415
R Square	0.544593
Adjusted R Square	0.414814
Standard Error	1.31219
R Observations	13
Intercept	10.45789
PRICE (\$/Barrel) -	0.049301



Findings :

The R-square value shows 54.5% change in the dependent variable i.e. GDP is due to changes in oil prices. For every 1 unit change in oil prices, the GDP fell by 0.049301.

Regression Equation :

Change in GDP= 10.45789 -0.05109(Changes in oil prices)

Hypothesis Testing :

Using the two- sampled T-test we have studied whether the changed in crude oil prices have a significant impact on the GDP (taken as an indicator of the changes in the economy due to changes in oil prices). The two variables have been studied for a time span of 10 years ranging from 2008 to 2021. The null and alternate hypotheses are as follows:

H1: The changes in oil prices have a significant impact on GDP

H0: The changes in oil prices have no impact on GDP

t-Test: Two Sample statistics	Prices	GDP(in %)
Mean	77.9	6.453321
Variance	512.4509	2.35461
Observation	13	13
Df	10	
t Stat	10.6754	
P(T<=t) one-tail	5.67E-07	
T Critical one-tail	1.6712	
P(T<=t) two-tail	8.54E-07	
T Critical two-tail	2.1156	

From the above Results, the P value is less than 0.05, it is interpreted that null hypothesis is rejected i.e. there is no significant impact of crude oil prices on GDP, and alternate hypothesis i.e there is a significant impact of oil prices on GDP is accepted.

Conclusion :

The prices and supplies of Crude oil is always a concern for countries. Crude oil is the most essential component for Energy basket as it influences the costs of other fuels. Crude oil prices continue to be a significant economic determinant that causes inflation and has a significant impact on the GDP development of oil-importing countries like India. Oil prices depend on the various regulations also that are present in India especially the various import duty applicable to various countries. Oil prices for India also depend on the exchange rate. Higher the exchange rate more is the pressure on the economy.

From the analysis it can be concluded that crude oil prices and exchange rate have an inverse relation. From the analysis is data from 2008 to 2021, it could be demonstrated that the quantum of oil of imports and exchange rate have a moderate correlation hence a hike in oil prices weakens the Rupee value against US Dollar. This leads to



depreciation of Rupee value. Inflation and Oil Prices are also positively co-related. The Analysis of the data results shows a positive correlation. This is due to the fact that oil is important for almost every major industry and increase in oil prices would lead to increase in the cost of final product resulting in inflation in the economy. The study also analyses the correlation between oil prices and total market capitalization of benchmark indices like Sensex and Nifty. There exists a negative correlation between the two stated variables. This is because a rise in oil prices increases costs for the companies which in turn reduces their profits. This reduction in companies' profits dampens investors' sentiment and thus investors are more likely to turn bearish during such moments. Companies in the energy sector are most adversely affected by this and their stock prices see a huge downfall. Energy companies comprise of almost 15% at Sensex which explains a negative correlation between oil prices and market indices. It is observed statistically that the role of inflation is significant in declining GDP growth of Indian economy. The two variables of oil prices and GDP of India are negatively correlated. This can be explained by the fact that increase in oil prices lead to greater inflation, lower profits of firms, lower tax revenues for the government, higher current account deficit and dampened investor sentiment. All this factors restrict the economy from growing at its full potential.

Crude oil prices substantially affect the economic growth of any economy. There is an increase in overall demand for crude oil due to increase in demand for the refined products that are made from crude. The changes in crude oil prices are passed on to the consumers through the prices of the final petroleum products. If the prices of petroleum products increase, consumers spend a larger amount of their income on those products. Their expenditure on other goods and services decreases. India imports a major portion of its crude oil requirement. Thus, the extra amount spent on crude oil basically goes to foreign oil producers. Higher oil prices also cause an increase in other energy prices. Depending on the ability to substitute other energy sources for crude the price increases can be large and can cause macroeconomic effects similar to the effects of oil price increases. Though energy is the prime mover in an economy, to bridge the gap between the demand and supply of crude oil, the country has to rely on imports. Therefore, crude oil becomes an important parameter to determine reserve position and trade balance and the Balance of Payment. All of this ultimately slows down the business and economic activities and thus slows down the GDP growth rate

References :

1. Mehta Manvi, et al.; International Journal of Advance Research and Development 2019, www.IJARND.com All Rights Reserved Page 38 (Volume 4, Issue 9) Available online at: www.ijarnd.com
2. Narendra Punati, Raghavender Raju. G,(2017). Determinants of Crude Oil Prices in India. *SSRG International Journal of Economics and Management Studies* 4(10), 1-9.
3. Sarkar B., Jain M. (2018) Causes of Indian Basket Crude Oil Price Fluctuations and Its Impact on Indian Economy Volume 9, Issue 2, September 2018 <https://doi.org/10.18311/sdmimd/2018/21683>
4. Ghosh, S., and Tomar, S. (n.d.). Mint Street Memo No. 17.
5. Hall, S., Henry, B., and Herbert, R. (2019). Oil prices and the economy. *National institute economic review*, 116(116), 38–44. Retrieved from <https://www.jstor.org/stable/23875245>



6. Soni, A. (2014). The Energy and Resources Institute Global Oil Markets and India's Vulnerability to Oil Shocks, (18).
7. Swadimath, U. M. A. C., Anilkumar, K. H., and Joshi, P. B. (2013). Rise and Impact of Crude Oil Price in India. *International Journal of Marketing, Financial Services and Management Resreach*, 2(1), 82–91.
8. <http://oysterconnect.com/sites/default/files/Declining%20Oil%20Price%20Implications%20for%20Indian%20Economy%20and%20the%20World.pdf>
9. <http://www.dypatil.edu/schools/management/wp-content/uploads/2015/05/A-Study-Of-The-Impact-Of-Crude-Oil-Prices-on-Indian-Economy-Pankaj-Bhattacharjee.pdf> ISSN 2348-3156 (Print) *International Journal of Social Science and Humanities Research* ISSN 2348-3164 (online) Vol. 3, Issue 2, pp: (562-572), Month: April - June 2015, Available at: www.researchpublish.com
10. Aparna, D. A. (2014). Impact of Oil Prices on the Indian Economy. *NMIMS Management Review Double Issue Volume XXIII*.
11. Firdous A Wani, M. M. (2015). Impact of Crude Oil on Indian Economy. *International Journal of Modern Management Sciences*. <http://iosrjournals.org/iosr-jbm/papers/Conf.17016-2017/Volume%201/4.%2023-28.pdf>
12. <http://www.dypatil.edu/schools/management/wp-content/uploads/2015/05/A-Study-Of-The-Impact-Of-Crude-Oil-Prices-on-Indian-Economy-Pankaj-Bhattacharjee.pdf>
13. www.economictimes.indiatimes.com/articleshow/45832849.cms?from=mdrandutm_source=contentofinterestandutm_medium=textandutm_campaign=cppst.html
14. <https://www.cnbc.com/2018/08/28/rising-oil-prices-causing-trouble-for-indian-rupee-and-trade-deficit.html>
15. https://www.business-standard.com/article/economy-policy/what-do-higher-oil-prices-mean-for-india-117111700151_1.html
16. Which economies are most heavily reliant on oil? | World Economic Forum
17. <https://www.weforum.org/agenda/2016/05/which-economies-are-most-reliant-on-oil/>
18. <https://www.eia.gov/tools/faqs/faq.php?id=709andt=6>
19. Oil and Gas Industry in India - Investment Opportunities | Invest India

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