

Changing Pattern of falling Crude Oil Prices in India

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*Abstract: The increased price of imported oil forces the businesses to devote more of their production to exports, as opposed to satisfying domestic demand for goods and services, therefore cause inflation, even if there is no change in the quantity of foreign oil consumed Oil or Petroleum is defined in a variety of ways by geologists, chemists, refiners, engineers and lawyers. There is, therefore, no uniformity or full agreement. Since, it is a natural product forming a part of rocks, geological definition finds more general acceptance. The word petroleum is derived from two Latin words *petra* means rock and *oleum* means oil. Petroleum is loosely called „rock oil“ or „crude oil“. It is a generic term covering a wide range of substances comprising hydrocarbons, which are naturally occurring molecules of carbon and hydrogen.*

Keywords: Gross Domestic Product (GDP), Consumer Price Index (CPI), Transportation .

1.1 Introduction

The global primary energy consumption at the end of 2011 is equivalent to 12274.6 Million tonnes oil equivalent. The share of oil is the largest at 4059.1 Million tones oil equivalent; i.e. oil: 33.06%; followed by coal: 30.34 %, natural gas: 23.67%; hydroelectricity: 6.45%; nuclear energy: 4.88%; renewable: 1.59% respectively. The demand for natural gas in future will increase as industrialized countries take strong action to cut CO₂ emissions. World primary energy consumption is projected to grow by 1.6% p.a. over the period 2010 to 2030, adding 39% to global consumption by 2030. The growth rate has declined from 2.5% p.a. over the past decade, to 2.0% p.a. over the next decade, and 1.3% p.a. from 2020 to 2030. Almost all (96%) of the growth is in non-OECD countries. By 2030 non-OECD energy consumption is 69% above the 2010 level, with growth averaging 2.7% p.a. (or 1.6% p.a. per capita), and it accounts for 65% of world consumption (compared to 54% in 2010). OECD energy consumption in 2030 is just 4% higher than in 2010, with growth averaging 0.2% p.a. to 2030. OECD energy consumption per capita is on a declining trend (-0.2% p.a. 2010-30). The International Energy Agency (IEA) defines energy security primarily in terms of stable supplies of oil and natural gas. A broader definition of energy resource portfolio and supply of energy services for the desired level of services that will sustain economic growth and poverty reduction. Energy security covers many concerns linking energy, economic growth, environment and geopolitics.

1.1.1 Impact of falling oil prices in India

Oil is one of the most important commodities in recent times. Much of the economy depends on oil. This is why prices of oil matter to almost every economy. Global crude oil prices are down nearly 40% this year to \$60 per barrel-levels from \$110/barrel at the start of the year. This has caused a crisis in countries like Russia, which depends on oil exports.

1.12 Current account balance

India is one of the largest importers of oil in the world. It imports nearly 80% of its total oil needs. This accounts for one third of its total imports. For this reason, the price of oil affects India a lot. A fall

in price would drive down the value of its imports. This helps narrow India's current account deficit - the amount India owes to the world in foreign currency. A fall in oil prices by \$10 per barrel helps reduce the current account deficit by \$9.2 billion, according to a report by Livemint. This amounts to nearly 0.43% of the Gross Domestic Product - a measure of the size of the economy.

1.1.3 Inflation

Oil price affects the entire economy, especially because of its use in transportation of goods and services. A rise in oil price leads to an increase in prices of all goods and services. It also affects us all directly as petrol and diesel prices rise. As a result, inflation rises. A high inflation is bad for an economy. It also affects companies - directly because of a rise in input costs and indirectly through a fall in consumer demand. This is why the fall in global crude prices comes as a boon to India. Every \$10 per barrel fall in crude oil price helps reduce retail inflation by 0.2% and wholesale price inflation by 0.5%, according to a Money control report.

1.1.4 Oil subsidy and fiscal deficit

The government fixes the price of fuel at a subsidized rate. It then compensates companies for any loss from selling fuel products at lower rates. These losses are called under-recoveries. This adds to the government's total expenditure and leads to a rise in fiscal deficit - the amount it borrows from the markets. A fall in oil prices reduces companies' losses, oil subsidies and thus helps narrow fiscal deficit. However, since diesel was recently deregulated, the fall in oil prices will likely have less effect on the government's fiscal deficit. Moreover, the government still has to pay for previous under-recoveries. Any benefit from the fall will be offset by payments for the past under-recoveries.

1.1.5 Rupee exchange rate

The value of a free currency like Rupee depends on its demand in the currency market. This is why it depends to a great extent on the current account deficit. A high deficit means the country has to sell rupees and buy dollars to pay its bills. This reduces the value of the rupee. A fall in oil prices is, thus, good for the rupee. However, the downside is that the dollar strengthens every time the value of oil falls. This negates any benefits from a fall in current account deficit.

1.1.6 Petroleum producers

The fall in global oil prices may be beneficial to India, but it also has its downsides. Directly, it affects the exporters of petroleum products in the country. India is the sixth largest exporter of petroleum products in the world, according to media reports. This helps it earn \$60 billion annually. Any fall in oil prices negatively impacts exports. At a time when India is running a trade deficit - high imports and low exports, any fall in exports is bad news. Moreover, a lot of India's trade partners and buyers of its exports are net oil exporters. A fall in oil price may impact their economy, and hamper demand for Indian products. This would indirectly affect India and its companies.

1.2 Literature Review

Our result is consistent with Bernanke (2016), Prabheesh et al. (2020), and Filis et al. (2011), who find positive co-movement of stock market return and oil price. This tendency for stocks to move along with world oil prices is entirely unexpected, especially in countries like Bangladesh, India, Pakistan, and Sri Lanka, net importers of oil (Kilian and Park, 2009, Silvapulle et al., 2017, Filis et al., 2011). One plausible justification of this movement in the same direction, as Bernanke (2016) explains, is that both oil prices and stock prices react to a change in a group of common underlying factors, which he refers to as the global aggregate demand. For instance, on one side, depressing aggregate demand would reduce oil demand, thereby exerting downward pressure on the oil price. On the other side, the softening in aggregate demand will also hurt corporate profit, which will cause the stock price to drop. This implies that when stock traders respond to a change in oil price, they respond to a shift in a group of common underlying factors, which has caused the oil price to change.

Following Prabheesh et al. (2020) and Bernanke (2016), we argue that the traditional demand-side explanation in justifying the co-movement between oil prices and stock price may not capture the full story. Instead, shifts in the market risk preferences may better explain the stock-oil correlation. The sudden decline of oil prices in the international market can spur a negative signal and ultimately affecting the firms' future expectations. This results in a lower return from the stock market (i.e., one-way co-movement) and a slowdown of the economic activities within the oil-importing economies. It is worth mentioning that the asymmetry in the magnitudes of the impact from the oil price shocks results from inelasticity (i.e., necessity good) of the energy products (Amin and Khan, 2020). Even though the oil price change is associated with uncertainties in the stock market, such uncertainty's multiplier effect may not be severe as the oil demand is usually inelastic and does not change immensely like other elastic goods price changes.

Table A.1. Key empirical literature on oil-stock Nexus.

Author	Countries	Methodology used	Main findings
Bani and Ramli (2019)	Malaysia	Auto Regressive Distributed Lag (ARDL)	The crude oil prices are cointegrated with both indices and the relationship is negative and significant in the long-run.
Wei et al. (2019)	China	Nonlinear threshold cointegration method	The exchange rate of Chinese currency against US dollar is the most important factor that transmits the effect of oil price on China's stock market particularly after financial crisis
Youssef and Mokni (2019)	Russia, Canada, Norway, China, United States, Japan	DCC-FIGARCH model	The response of stock market returns to oil price changes in oil-importing countries changes is more pronounced than for oil-exporting countries during periods of turmoil. Oil prices significantly drive the relationship between oil-importing and oil-exporting countries' stock markets in both high and low oil-stock correlation regimes.
Batten et al. (2019)	China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand.	International Capital Pricing Model (ICAPM)	The results identify a significant positive energy-related equity risk premium during the high integration regime. The study also demonstrates that investors can use the conditional information of our integration model to outperform passive

Author	Countries	Methodology used	Main findings
Ji et al. (2018)	BRICS countries	Time-varying copula-GARCH based coVaR approach	portfolio investment strategies in the stock and energy markets. There is a significant risk spillover from oil-specific demand shock to stock returns in all the BRICS countries
Batten et al. (2018)	Canada, France, Germany, Italy, Japan, the United Kingdom and the United States, Hong Kong, Singapore	Monthly stock and oil market integration index	The study further interpret that investors can diversify energy price risk through the purchase of stocks by assuming normal market conditions. This will provide benefit by adjusting the portfolio and hence smoothing the process of implementation of COP21.
Sharma et al. (2018)	India	Augmented Dickey–Fuller and Philips–Perron unit root tests, Cointegration tests, VAR Model	The study reveals that crude oil prices are negatively affected when a shock is given to stock indices by employing impulse response function using one standard deviation.
Park and Ratti (2008)	USA and thirteen European countries	Multivariate VAR approach	Oil price shocks play a statistically significant role in affecting real stock returns. The response is asymmetric in the US, but no such evidence of asymmetry found for the European countries.
Salisu and Isah (2017)	Exporting and importing countries	Nonlinear panel ARDL model	The response of stock prices to changes in oil price follows an asymmetric pattern and the effect is stronger for oil exporting countries
Jebran et al. (2017)	Pakistan	Cointegration Method, GARCH, Impulse Response Functions	Cointegration method: long-run association between the two variables in pre-crisis period; GARCH model: significant relationship only in the post-crisis period, Impulse Response Functions:

Author	Countries	Methodology used	Main findings
Am Shanmugasundaram (2017)	Exporting and Importing Countries	Multivariate Regression	significant relationship in both the periods. The states that when the oil price rises, foreign exchange earnings of the exporting countries rise, resulting in increased revenue and larger profit, hence giving way to higher stock prices.
Diaz et al. (2016)	Canada, France, Germany, Italy, Japan, the UK and the US	Vector Autoregressive Model	The study reveals that an increase in the oil price volatility results in the negative response to the stock market of the concerning countries suggesting that world oil price is more crucial for the stock market than the national oil price.
Kang et al. (2017)	USA	Structural VAR Estimate	An oil demand-side shock has a positive impact on the return of oil and gas company stock for the USA.
Diaz and de Gracia (2016)	USA	Granger Causality, Structural Break Analysis	The study supports a significant positive impact of oil price shocks on stock returns in the short-run. We also find that the relationship has become statistically significant during the post-1986 period.
Cunado and de Gracia (2014)	12 oil-importing countries in the European region	VAR and VECM	Supply side shock of an oil price is expected to cause a more adverse effect on stock return than a demand shock
Siddiqui (2014)	Pakistan	Regression	The results show that the oil prices, exchange rate and foreign private portfolio investment have a positive relationship with stock market performance.
Broadstock and Filis (2014)	China, USA	Time-Varying correlations	The study concludes that China's stock market is more

Author	Countries	Methodology used	Main findings
Sahu et al. (2014)	India	VECM, Granger Causality, IRFs and VDCs	robust to oil price shocks than that of the US. The results indicate that the concerned variables are integrated in the long run and the causality tests confirms a unidirectional long run causality moving from Indian stock market to oil price.
Kilian and Park (2009)	USA	Structural VAR	Demand-driven shocks to oil price are more influential in affecting the stock price than supply-driven shocks
Arouri and Fouquau (2009)	GCC countries	Local Polynomial Kernel Regression	Significant positive connection between oil price and stock market returns for Qatar, Oman, and UAE; however, no such relationship for Bahrain, Kuwait, and Saudi Arabia.
Cong et al. (2008)	China	Multivariate Vector Auto-Regression	Shows that oil price shocks do not show any significant response on the real stock returns statistically for most Chinese stock market indices.

India-Russia Bilateral Relations: Longstanding, Time-tested Partners

From the above comprehensive literature survey, we find that except Huntington (2015)’s study, hardly there exists any study, which examines the role of crude oil trade on the dynamics of current account deficits for as large as for 91 number of countries. Furthermore, to the best of our knowledge, there is no single study available in the Indian context which decomposes the current account into two broad components into oil imports, and non-oil imports and examines the relative contribution of these components into the aggregate current account balance along with examining the contribution of other key determinants. Since India’s oil imports constitute its major part of the total imports, therefore, the present study is motivated to make an empirical contribution in examining the impacts of both oil and non-oil imports on India’s current account balance by controlling other important determinants such as fiscal balance, real exchange rate, trade openness, terms of trade, financial development and age dependency in the current account model.

The study of Singhal, Choudhary, & Biswal (2019) study based on Russia suggested that oil price shock affect negatively to the stock market return but gold price cause positive shock to stock market return. Further, ARDL model findings revealed that the oil price shock negatively affects the exchange rate in long run.

The study of Sathyanarayana, Harish, & Gargasha (2018) investigation based on crude oil price

and BSE-Sensex index of Indian stock market suggested that crude oil price cause significant change in Indian stock market. Finally, investigation base GARCH model revealed that crude oil price transmit significant volatility in Indian stock market and volatility is persistent in BSE- Sensex.

1.3 Gap Analysis

When the prices of petroleum products increase, consumers use more of their income to pay for oil-derived products, and their spending on other goods and services declines. The extra amount spent on those products is basically go to foreign oil producers as India is net importer of oil. Higher oil prices cause, to varying degrees, increases 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. Crude oil prices played a critical role in substantially reducing economic growth in any economy whether it is developed or developing economy. Worldwide demand for crude oil arises from demand for the refined products that are made from crude; and changes in crude oil prices are passed on to consumers in the prices of the final petroleum products. Thus, though energy is the prime mover in an economy, the demand and supply gap of crude oil must be bridged through import to meet the country's requirement, hence, crude oil price is an important parameter in determining reserve position and trade balance and finally balance of payment. Inflation is also an important area arising with the increase of crude oil prices, with the increase of inflation, capacity to purchase is reduced and expenditure increases, saving decreases, ultimately slows down the business and economic activities thus slows down GDP growth.

1.4 Research Problem

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. 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%. 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. Therefore, there is a need to look at crude oil prices have an implication on consumer price Index(CPI) and GDP.

1.5 Objectives of the study

- To find out if the crude oil price have an impact on CPI and GDP
- To Identify the linkage between differential change rate of crude oil prices and Inflation , also between inflation vis-à-vis GDP growth of Indian economy

1.6 Hypotheses

- There is no significant difference between Crude Oil price and GDP,
- There is no significant difference between CPI and GDP,

Research Methodology

The paper is analytical in nature. The data for the study between 2001 and 2015 was retrieved from reliable secondary sources. The statistical tools such as Regression, Co linearity and inter-correlation were used to infer the data.

1.7 Results and Discussions

**Table No. 1.1
Regression Analysis**

	R	djusted R	l. Error of the	Change Statistics				
				R Square	F	df1	df2	Sig. F
1	.934(a)	.873	16105	.873	41.180	2	12	.000

Since R value .934 indicates, the model is the best model to predict the movements between GDP and CPI and Crude. The adjusted R square value for this model is 0.852. It shows that the two independent variables (Crude oil and CPI) account for 85.2% variance in the dependent variable (GDP).

Table No. 1.2
Regression with collinearity Statistics

Model		Unstandardized		Standardized		Collinearity		
		B	Std. Error	Beta	t	sig.	Tolerance	VIF
1	(Constant)	4.758	1.049		4.53	.001		
	CRUDE	.823	.148	1.014	5.57	.000	.320	3.124
	CPI	-.099	.181	-.099	- .544	.596	.320	3.124

Ordinary Least Square Equation Model is $GDP = 4.758 + .823(\text{Crude oil}) - .099(\text{CPI})$.

If all independent variables are converted into Z scores, then the standardized OLS equation will be $Z(\text{GDP}) = 1.014(\text{CRUDE OIL}) - 0.099(\text{CPI})$. As the tolerance value is greater than 0.2 for the both Crude and CPI, we conclude that there exists multicollinearity between Crude and CPI.

Table No. 1.3
Inter Correlation Matrix between CPI and CRUDE Oil Price

Mode		CPI	CRUD
1	Correlatio	CPI	1.00
		CRUD	-.825
		-.825	1.000

We infer from the above table that there is an inter correlation between CPI and Crude oil price as CPI increases Crude oil price decreases and vice versa.

1.7.1 Findings Related to Hypothesis

Since the Crude Oil price is less than 0.05, we reject the null hypothesis at 5% level of significance, we conclude that there is significant difference between Crude Oil price and GDP. Since the Crude Oil price is greater than 0.05, we accept the null hypothesis at 5% level of significance, we conclude that there is no significant difference between CPI and GDP.

1.8 Conclusion

India’s imports of oil are increasing. Our dependence has reached 80% and is likely to keep growing. At the same time 2016 saw an unprecedented rise in oil price on the world market. Oil price volatility has also increased. Through future oil prices are difficult to predict, they are generally expected to rise. India's import dependence on oil rose to 81% in 2016-21 from 78.5% in the previous year. Just last year, Prime Minister Narendra Modi had set a target of bringing this down to 67% by 2022. The government has unveiled new exploration policies for its oil and gas blocks lately, aiming to plug loopholes in its previous policies that encouraged only limited participation of resource-rich foreign oil companies and couldn't dramatically boost the domestic output. Given our increasing dependence on imports effects to the Indian economy, by the increase in the price of crude oil the inflation increases, government have to spend too much on subsidy, our exports become weaker, investment decreases and GDP is also affected. Thus, to meet the growing demand for crude oil, diesel and petrol etc. in the long run, India should take various measures for efficiency improvement in energy use such as market linked relative prices, minimizing subsidies, and targeting them well. It also needs to enhance petroleum supplies through increased domestic explorations as well as other measures, such as participation in exploration and production in foreign oil fields by Indian oil companies to avoid excessive dependence on imported crude oil. India also needs to more vigorously pursue the use of renewable energy sources like hydro, wind, solar, bio-fuels, nuclear, etc., as the Western European countries have done. India should take measures to increase exports to be

able to meet its growing future oil import requirements. Careful planning to ensure that future petroleum requirements can be met will be crucial in sustaining rapid economic growth in the future. The Outcome of the paper indicate that there is an inter correlation between CPI and crude oil price and vice versa. There is a clear indication that whenever the CPI increases there is decrease in crude oil price and vice versa. It was also found that there was significant difference between crude oil price and GDP and no significant difference between CPI and GDP.

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