https://doi.org/10.31995/rjpsss.2025v51i02.44

Determinants of Crude Oil Prices in India and its Impact on Indian Economy After Globalisation

Dr. Seema Goutam
Assistant Professor, Department of Economics
Rajkiya Mahila Mahavidyalaya
Kharkhauda, Meerut.
Email: seemanet.04@gmail.com

Abstract

Crude oil is an essential energy source for practically every country and its people because of its impact on global development and daily life. Crude oil is vital to many parts of the economy, including those dealing with energy, manufacturing, transportation, and household goods. In June 2016, oil continued to be the most used fuel on Earth, making up 32.9% of total energy use, according to the BP statistical assessment of global energy. Crude oil's complicated market structure and unpredictable price swings are results of its meteoric rise to global commodity status since its commercial beginnings in the 1860s. There are a lot of things that go into deciding how much oil costs. These include supply and demand, government actions and decisions, MNCs, geopolitical conflicts, economic events, and groups like OPEC.

Reference to this paper should be made as follows:
Received: 24/11/25
Approved: 14/12/25

Dr. Seema Goutam

Determinants of Crude Oil Prices in India and its Impact on Indian Economy After Globalisation

RJPSSs 2025, Vol. LI, No. 2, pg. 379-388
Article No. 44

Similarity Check: 2%

Online available at:
https://anubooks.com/journal-volume/rjpsss-vol-li-no2-dec-2025

DOI: *https://doi.org/10.31995/rjpsss.2025v51i02.44*

1.1 Introduction

The oil market is comprised of a diverse array of industries that carry out a broad range of tasks within the petroleum industry, beginning upstream and continuing downstream. The majority of the world's crude oil is located in underground reservoirs, which are both inaccessible and highly prized. After the proper petroleum arrangements have been made, either a national company or a private business will extract the crude oil. Separation of crude oil from other byproducts, including water, natural gas, and potentially dangerous gases, organo metallic compounds, and basic sediment and water (BSW), occurs following extraction. It is thereafter sold and sent to refineries all around the globe via oil pipelines, tanker ships, and the like. Atmospheric distillation, hydro cracking, and blending are a few of the physical and chemical processes that refineries employ to turn crude oil into products that consumers and industrial customers can purchase. Gasoline, diesel, asphalt for new road building, power, plastics, petrochemicals, and countless other goods are the final stages of oil's journey to the consumer.

1.2 DETERMINANT OF THE CRUDE OIL PRICING SYSTEM

Oil reservoirs, which are most commonly found in sedimentary rocks, contain crude oil, which is an unprocessed, combustible liquid that occurs naturally and is mainly constituted of hydrocarbons. This resource, often called fossil fuel, is finite and nonrenewable, meaning it cannot be replenished by natural means once used up.

Commodity Pricing

The American Petroleum Institute (API) uses a 42-gallon barrel, often called a stock tank barrel (stb), and an atmospheric pressure of 60 degrees Celsius as its unit of international crude oil trading. Because of the wide variety of formation circumstances, crude oil exhibits a wide range of physical characteristics and quality standards.

Factors that Account for Crude Oil Price

Supply and Demand

The oil price is influenced by the fundamental law of demand and supply. The rule of thumb is that prices should rise as demand rises and fall when supply falls. The market forces of supply and demand from a specific period are reflected in the prices of oil and gas reserves. Crude oil product prices fluctuate in response to changes in supply and demand, with the goal of balancing present and future production.

Production

The "Seven Sisters" were a group of seven western oil companies that controlled the market until the 1970s. They were responsible for major advancements in the oil field and had operations all over the globe. Anglo-Persian Oil, Gulf Oil,

https://doi.org/10.31995/rjpsss.2025v51i02.44

Texaco, Standard Oil of California, Royal Dutch Shell, Standard Oil of New Jersey, and Standard Oil of New York were the seven sisters that made up the Seven Sisters.

Consumption

Refined oil products are what generate the demand for crude oil. Consumption rates vary greatly among regions, with rich OECD nations like the UK, Germany, Luxembourg, and Denmark accounting for almost half of global demand. Crude oil is in high demand from a variety of industries; nevertheless, the transportation and industrial sectors account for over 85% of the world's total, with the remaining 15% coming from residential, commercial, electric power generation, and heating.

Organization of Petroleum Exporting Countries (OPEC)

At the Baghdad Conference on September 10–14, 1960, Venezuela, Iran, Iraq, and Kuwait formed the Organization of the Petroleum Exporting Countries (OPEC), a permanent intergovernmental organization. As of 2015, thirteen member nations have joined the original five, including Nigeria in 1971 and Libya in 1962. An efficient, economical, and consistent supply of petroleum to nations that use it; a reasonable return on investment for individuals who put money into the business; and fair prices for petroleum producers are the goals of OPEC's coordinated and unified petroleum policies.

Futures Market

We may thank the oil futures market for determining the current price of oil. Oil futures contracts are legally binding agreements that grant the right to buy barrels of oil at a future date and price. Clients buy futures to protect themselves from the negative effects of crude price fluctuations on profitability. Oil producers may decide to hold off on selling their oil until later in the hopes of making a bigger profit if futures prices are higher than spot prices, which leads to higher expectations of future pricing.

Speculators and Brokers

Oil price movements are influenced by market speculators and brokers. Someone who bets on the future of a product's price without planning to purchase it is considered a speculator. Since less than 3% of futures contracts really lead to the buyer actually owning the commodity, most futures trading is done by speculators.

Exchange Value of the Dollar

People around the world use their local currencies to purchase petroleum products, while traders use US dollars to transact crude oil. As the value of the dollar falls against other currencies, oil becomes more affordable for countries whose currencies do not appreciate against the dollar, while countries whose currency are

pegged to the dollar end up paying more for the same amount of oil. There will be repercussions for global oil consumption as a result of dollar fluctuations.

Government in Consumer and Producer Countries

The availability, production, and use of oil are heavily influenced by political actions, as governments hold around 94% of the world's proved reserves.

Political Tensions

War, terrorism, and guerilla actions stemming from political unrest or conflict deplete the world's oil reserves. Oil output and pricing have been greatly affected by political instability in countries, particularly in oil-producing zones like the Middle East. The resurgence of long-suppressed animosity between nations and indigenous communities, rifts in religious beliefs, and struggles for access to scarce resources

Economic Factors

Oil prices are very sensitive to changes in the economies of the countries involved, as are the pricing of many other commodities. Oil consumption and demand across all industries rises in tandem with rising economies, industries, and populations, and falls in tandem with recessions.

Natural Factors

Oil demand follows the ebb and flow of weather patterns, like that of most commodities. In the winter, heating oil consumption is higher, and in the summer, gasoline consumption is higher due to increased driving. Seasonal fluctuations in oil prices occur annually, despite the fact that markets are aware of when to anticipate these spikes in demand. In areas rich in oil reserves, natural disasters like hurricanes, tsunamis, and thunderstorms pose a particular threat to production facilities and infrastructure.

Other Energy Sources

Whether the price of crude oil will have an effect on renewable energy and other energy industries is an open question. Legislative requirements, competing alternatives, and different regional effects are all factors that need to be thought about.

Refinery Capacity

The world's refineries can process a maximum of crude oil per year, divided by the total number of days in that year. This is called the global refinery capacity or utilization. How much refined oil is available for consumption is directly related to how productive and efficient refineries are. Refinery outages and disruptions can temporarily reduce the availability of petroleum products.

https://doi.org/10.31995/rjpsss.2025v51i02.44

1.3 Determinant of Crude Oil Prices in India Using the Vector Auto Regressive Model (VAR)

This section has empirically estimated the determinant of crude oil prices in India using the Vector Auto Regressive Model (VAR). The analytical process starts with the formulation of theoretical assumptions and analytical equations that characterize the underlying theoretical connection. To ensure that the time series variables are not non-stationary, a pre-requisite for co-integration is to assess their presence of a unit root using the Augmented Dickey-Fuller (ADF) test.

1.3.1 Econometric Model: Crude Oil Prices Model

COP= f (GDP, SC, DC, IC, ER, I, CAD/BOP)

COP(Crude oil prices), GDP(Gross domestic product), SC(Supply of crude oil), DC(Demand for crude oil), IC(Import of crude oil), ER(Exchange rate), I(Inflation) and BOP(Balance of payment)/CAD(Current account deficit)

$COPt = \alpha0 + \alpha1\ GDPt + \alpha2SCt + \alpha3\ DCt + \alpha4\ ICt + \alpha5\ ERt + \alpha6\ It + \alpha7\ BOPt + \mu t$

First, we determined the primary variables that affect crude oil prices by calculating the correlation coefficient and P value.

There are a number of factors that affect the price of crude oil, but the most important ones are the GDP and inflation rate. The crude oil price is positively connected with all factors except BOP (-0.78001), which is negatively correlated. Additionally, there is a strong correlation between Indian crude oil prices and the following variables: 0.97436 for worldwide crude oil prices, 0.94419 for India's crude oil imports, 0.93726 for GDP at constant price, and 0.9203 for India's crude oil consumption.

1.3.2 Empirical Analysis Using Johansen Cointegration and Vector Auto Regressive Model (VAR MODEL)

We followed a three-step process to identify time series variables. To start, check if the variables are stationary using the Augmented Dickey Fuller (ADF) test. If they are, then figure out what order to integrate them. Second, the Johansen method of co-integration can be used to detect long-term relationships if the variables are integrated in the same order, for example, I (1). At last, we have the VAR model.

Unit Root Test

The majority of economic time series display non-stationary or trending behavior. Finding the best data fluctuation form is a significant econometric task. In order to do additional analyses and statistical tests for co-integration, it is necessary to model the data series and convert them to stationary form. Some sort of trend elimination is necessary if the data are showing fluctuations. Initial differencing is

a common method for de-trending or removing trends from data. To find the initial differences and make the data stable, one can utilize unit root tests. Likewise, the co-integration equation requires that all time series integrate in the same direction.

Augmented Dickey-Fuller Test

The study tested the order of integration using an ADF t-test. A time series sample can be tested for the unit root using the enhanced dickey fuller test. For a more extensive and intricate set of time series models, it is an enhanced variant of the dickey fuller test.

Data series at levels show a steady trend as well as a linear one across time. So, here is how the ADF test is formulated:

$$\Delta z_t = \alpha_0 + \theta z_{t-1} + \gamma_\tau + \alpha_1 \Delta z_{t-1} + \alpha_2 \Delta z_{t-2} + \ldots\ldots + \alpha_p \Delta z_{t-p} + a_t$$

Our initial observation was that there is only a constant, and no discernible trend. Therefore, the following is its ADF model:

$$\Delta z_t = \alpha_0 + \theta z_{t-1} + \alpha_1 \Delta z_{t-1} + \alpha_2 \Delta z_{t-2} + \ldots\ldots + \alpha_p \Delta z_{t-p} + a_t$$

where, Δ is the first difference operator, zt is the variable being considered, α_0 is the intercept constant, t is the time trend, θ is the coefficient presenting process root, i.e. the focus of testing, γ coefficient on the time trend), at (random error term), p (lag- length) which was determined by using Schwarz Bayesian Information Criterion (SBIC).

Verifying the determinant GDP constant's stationary

One can check for stationary in various ways. This research made use of the Augmented Dickey-Fuller test. All of the remaining factors have been subjected to this evaluation.

Stationary Check

Table 1.1 Augmented Dickey-Fuller Test

Type 1: no drift no trend

Type 1: no drift no trend			
	Lag	ADF	p. value
	[1]	0 20.46	0.99
	[2]	1 4.38	0.99
	[3]	2 4.11	0.99
	[4]	3 3.02	0.99

https://doi.org/10.31995/rjpsss.2025v51i02.44

Type 2: with drift no trend			
	Lag	ADF	p. value
	[1]	0 10.90	0.99
	[2]	1 4.14	0.99
	[3]	2 4.32	0.99
	[4]	3 3.30	0.99
Type 3: with drift and trend			
	Lag	ADF	p. value
	[1]	0 2.47	0.99
	[2]	1 1.85	0.99
	[3]	2 2.04	0.99
	[4]	3 1.83	0.99

Take note: really, p .value = 0.01 signifies that p .value <= 0.01.

According to the p-value in the results, the data was not stationary for the determinant "GDP_CONSTANT" and for all of the other determinants as well.

Phase 2 (Variation to Check for Stationary)

To ensure that the data was stationary, we utilized first-level differentiation for all determinants and refrained from doing log transformations.

The crude oil price curve for day 1 is equal to the difference between the crude oil price and day 1. A1=diff(GDP Constant) is the GDP constant. The output is the difference between the current GDP and GDP Current. The output is the difference between the exchange rate and the d1 rate. Difference between BOP and BOP_d1Ensuring Stationary Following Initial Level Differentiation.

Table 1.2 Augmented Dickey-Fuller Test

Type 1: no drift no trend			
	Lag	ADF	p. value
	[1]	0 -5.12	0.0100
	[2]	1 -2.94	0.0100
	[3]	2 -3.44	0.0100
	[4]	3 -2.18	0.0313
Type 2: with drift no trend			
	Lag	ADF	p. value
	[1]	0 -5.04	0.0100
	[2]	1 -2.87	0.0667
	[3]	2 -3.54	0.0170
	[4]	3 -2.28	0.2289

Type 3: with drift and trend			
	Lag	ADF	p. value
	[1]	0 -4.94	0.0100
	[2]	1 -2.78	0.2667
	[3]	2 -3.83	0.0322
	[4]	3 -2.57	0.3433

Take note: really, p .value = 0.01 signifies that p .value <= 0.01.

It was found that all of the variables have roots in the unit root. Their non-stationary at higher-order differences is demonstrated by the unit root, although their stationary at the first difference is evident.

Table 1.3 Empirical Analysis of Co-Integration Test for Factors Influenced by Indian Oil Price

Combinations	p-value of residuals at ADF
Indian crude oil Price & GDP –constant price	.9092
Indian crude oil Price & GDP –current price	.2212
Indian crude oil Price & BOP	.5618

Co-Integration Test

The results suggested that it would be impossible to form co-integrating connections. All of the independent variables had P-values higher than the significance level Accordingly, the co-integrating relationship's first need has been met. As for the residuals, the second condition to be co-integrated. It shows that the variables aren't integrated with one other. It suggests that there is no long-term correlation between the two sets of variables.

VAR Model: For the purpose of estimating the relationships among numerous time series, vector auto-regression—a stochastic process model—is employed. By including support for several evolving variables, models expand upon the uni-variate auto-regressive model.

1.4 FORECAST VALUES

Using the best estimations from the models, crude oil prices for next six years have been anticipated.

https://doi.org/10.31995/rjpsss.2025v51i02.44

Table 1.4 Forecast values (rs/bbl.) and confidence interval CI(90%)

Years	Forecast	Lower	Upper	CI(90%)
2016	4752.2	4214	5291	538.4
2017	-4470.0	-5618	-3322	1147.8
2018	6503.3	4992	8014	1510.9
2019	3612.3	1979	5246	1633.5
2020	-3371.7	-5084	-1659	1712.5
2021	-491.7	-2376	1393	1884.6

This research looked at the main variables that affected oil prices in India from 2016 to 2021. Johansen co-integration and Augmented Dickey-Fuller unit root tests were among the time series econometric methods employed in the research. All variables were found to be stationary in the first difference according to the ADF unit root test results.

1.5 Conclusion

The present price of crude oil is highly dependent on the past values of that price with a lag of 2 or 3 years, as well as on the exchange rate with a lag of 3 years. Historical GDP numbers, with lags of two years, have a substantial impact on the price of crude oil. The present price of crude oil is greatly influenced by GDP constant values with one and three year lags in history. Crude oil is highly sensitive to the last three years' worth of BOP values. Our investigation shows that the most significant variables, both positively and negatively, can be predicted using VAR with 95% and 90% confidence intervals, respectively. Exchange Rate d1.l3 was determined to be the most positively significant variable, whereas BOP d1.11 was determined to be the most negatively significant.

References

1. Tang W., Wu L., & Zhang Z. (2010). Oil price shocks and their short-and long-term effects on the Chinese economy. *Energy Economics*, 32(S1), S3–S14.
2. The Asian Forum, "Prospects and Limitations of Russo-Chinese Economic Relations", accessed October 9, 2019.
3. The Embassy of the Russian Federation to the United Kingdom, "The Foreign Policy Concept of the Russian Federation 2016", Accessed July 19, 2019.

4. Varghese G. (2017). Inflationary effects of oil price shocks in Indian economy. *Journal of Public Affairs*, 17(3), Pg. **1614–1612.**
5. Vikram Suhag, "China's attractiveness as a tourist destination for the Russian traveler. Inferences India should draw", Eurasian Studies, accessed October 9, 2019.
6. Vladimir Putin (30 May 2017). "Russia and India: 70 years together". Times of India Blog. Retrieved 31 May 2017.
7. Volodin, Andrei (5 September 2012). "India and APEC: Center of Mutual Gravitation". International Affairs. Archived from the original on 26 September 2012.
8. Wani, Nassir UlHaq, Jasdeep Kaur Dhami, and Neeru Sidana. "Indo-Russia Trade: An Evaluation of Symmetry, Complementarity, Intensity and Similarity." Management 3.1 (2020): Pg.**14–33**.
9. Yanagisawa A. Institute of Energy Economics; 2012. Impact of Rising on the Macro Economy; Pg. **1–7**.
10. Yoshino N.,& Alekhina V. (2016). Impact of oil price fluctuations on an energy-exporting economy: Evidence from Russia. *Journal of Administrative and Business Studies*, 2(4), Pg. **156–166**.
11. Younsi M.& Bechtini M.(2018). Economic Growth, Financial Development and Income Inequality in BRICS Countries : Evidence from Panel Granger Causality Tests, Faculty of Economics and Management, University of Sfax,Tunisia14(04).
12. Zhang X., Liu X., Hang J., & Yao D. (2018). The dynamic causality between commodity prices, inflation and output in China: A bootstrap rolling window approach. *Applied Economics*, 50(4), Pg. **407–425**.