

Factors Affecting Crude Oil Prices

Rilwan Anjorin¹ and Eseosa Omorogiwa²

¹Research Student, The Institute of Engineering Technology, and Innovation Management (METI), University of Port Harcourt, Rivers State, Nigeria

²Head, Department of Electrical/Electronic Engineering, Faculty of Engineering University of Port Harcourt, Rivers State, Nigeria

Corresponding Author: Rilwan Anjorin

Submitted: 01-08-2022

Revised: 07-08-2022

Accepted: 10-08-2022

ABSTRACT

The factors analysed in this paper would help improve our understanding of how the different elements of the oil market function. The ever-increasing demand and importance of energy in the fast-growing modern world led to the complexity of the oil market, which further results in the volatile nature of the oil prices amidst the threats of alternative sources, geopolitical interference, and government policies among others. Therefore, this paper highlights identified factors that play a significant role in determining the price, clearly understanding the interplay between these factors and how they dictate the demand and supply that ultimately govern the pricing system. When crude oil production began on a commercial scale, demand and supply were the primary factors that dictated the price. In recent times, OPEC oil production quotas and the independent non-OPEC member countries' decisions as well as the global economy, socio-economic interests in the diversification to alternative renewable energy sources microscopically affect either demand or supply, which in turn determine the oil price.

Any attempt to use just one factor to predict oil prices or project oil market conditions would undoubtedly result in errors. It is not only that these factors cannot adequately incorporate the various shocks that can influence the oil market. Nevertheless, the projections are highly sensitive to the other underlying conditions.

KEYWORDS: Crude Oil, OPEC, Demand, Supply, Energy, Oil Prices, OECD, Renewable Energy, Spot Market, Future Market.

I. INTRODUCTION

Different approaches have been used to forecast oil prices, global demand and supply for a period (short or term) term horizon. Stakeholders in the industry at various levels of influence ranging from governments, central banks, and exploration

and production companies rely on these projections for strategic planning, indicators for formulating energy policy, assess critical investment decisions, simulate scenarios to generate inputs to analyse the impact of various supply and demand fluctuations in the crude oil market (Fattouh, 2007).

In recent times, the crude oil market has changed from a rigid, long-term commercial arrangements to efficient and flexible approach between buyers and sellers to meet their individual needs (Grant et al., 2006). With the consistent use of crude oil products as a source of energy and the global growth of industrialization, crude oil has become a valuable commodity contributing to the revenue and earnings of many nations.

The increasing value of crude oil has made the market structure more complex (Huntington et al., 2014), with several entities interested in different aspects of the production, from the upstream to the downstream sectors. Across the globe, the ever-increasing need for energy has necessitated government intervention in implementing policies to regulate operations and guarantee favourable living standards for citizens, ranging from implementing subsidies on refined petroleum products to reducing environmental concerns. Government policies, geopolitical conflicts, economic activities, OPEC, non-OPEC members, alternative energy sources, and market speculation have been identified as significant players in determining crude oil prices. With these developments, the price of crude oil has become an essential variable in determining or predicting the profitability of production operations and the sustainability of some countries' energy security. Therefore, studying the factors that affect crude oil price has become essential, as crude oil is categorized as a non-renewable energy.

This paper then discusses these factors and review their effect on the price of crude oil.

II. A BRIEF CHRONOLOGY OF CRUDE OIL PRICE FLUCTUATIONS

Over the decades, crude oil prices have fluctuated considerably during global crises and economic developments as shown in Figure 1. The price of crude oil contributes to the global economic status due to the essential need for

refined products and other derivatives for transportation and industrialization.

Crude oil prices have served as geopolitical metrics and economic benchmarks for decades (Huntington et al., 2014). Conventionally, the unit of measurement for crude is the barrel, and its use is dated back to the nineteenth century.

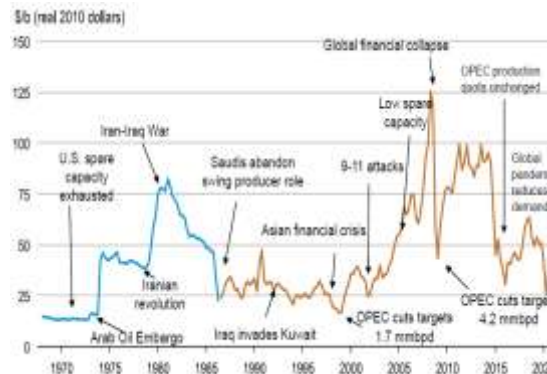


Figure 1: Crude Oil Prices 1970-2020 (Sources: U.S. Energy Information Administration, Refinitiv)

Predominantly, the global market's benchmark is Brent, and West Texas Intermediate (WTI), also referred to as marker crude oils. Other blends have also developed as a benchmark. These oils are each governed by their laws of supply and demand, meaning their prices may evolve differently and mostly influenced by the spot market, future market, and the freight cost.

Table 1 below summarises events that shaped the crude oil prices from 1860 to date. The signature reveals a roller coaster wave.

The Energy Agencies believe that the demand for crude oil will rise until there is visible evidence of alternative energy sources and their sustainability.

Table 1: Oil Prices and Major Events

Period	Prices	Major Events
1860-1940	Increase	World War I
	Decrease	Global Depression
1948-1970	Relatively Stable	
1971	Oil Crises	Monetary system of Bretton Woods International was abandoned
1973	Oil Crises	Yom Kippur War
1978	Increase	Iran revolution
1980	Increase	War between Iran and Iraq
2003	Increase	Demand increases from India, Brazil, China, and other emerging economies
Early 2008	Increase	
Late 2008	Decrease	Global recession
2009	Increase	Supply decreased
2010-2013	Increase	Arab Spring uprising

2014-2015	Decrease	Excess supply due to shale oil production contribution
2016	Increase	Countries agree to freeze production but affects developmental investment
2020	Decrease	COVID-19 pandemic and global gross domestic product decrease
2022	Increase	Post pandemic recovery and Russia-Ukraine War.

III. MATERIALS AND METHODS

This work obtained data from past and present studies, government and private bodies and existing literature. The study relies on secondary data obtained from Agencies Reports, Academic Research Programme, Industry Views, Published materials, Books, Conferences, Seminar Papers, Journals and the internet. The obtained data would be analyzed, and the descriptive method would be used to logical present and interpret the results.

- **DEMAND**

The demand and supply is the most widely used approach to projecting the oil market (Fattouh, 2007). The price of crude oil, like every other commodity, is determined by demand and, by extension, supply (or an alternative source). According to the law of demand and supply, when the market for a commodity increases, the commodity's price ascends without a steady supply. When there is an excess supply, the price declines. Conversely, the commodity price will remain at equilibrium when demand and supply increase or decrease simultaneously. Microscopically, the demand for crude oil is affected by other factors like industrialization that lead to an increase in demand for energy (Grant et al., 2006). Crude oil remains the world's leading energy source. The drive for alternative energy sources negatively affects the demand for crude oil, affecting the price. In 2020, the major importers of crude oil were the United States, China, and India (World Energy Review, 2021). Therefore, inherent changes in local policies within these states can lead to an increased or reduced demand for crude oil and, consequently, increased or reduced prices. EU member countries and the UK are trying to promote alternative renewable energy sources over the coming years, which could threaten the demand for crude oil worldwide. All these factors and more contribute mainly to the demand for crude oil

worldwide and are partly responsible for the volatile nature of the oil price (Grant et al., 2006).

- **SUPPLY**

Since the demand for crude oil is global, generally speaking, the price of crude oil is affected by supply as an increase in supply without effective demand infuse complexity into crude oil prices, and on the other hand, a decrease in supply with constant or increasing demand will result in crude oil price hikes (Grant et al., 2006). OPEC as an organisation strives to regulate the supply of crude oil to maintain a suitably high or favourable oil price for member nations (Huntington et al., 2014). Nonetheless, non-OPEC member nations that produce oil seek favourable policies, making regulation difficult over the years. Supply is therefore defined by the amount of crude oil produced by all oil-producing nations. Factors like improvements in oil exploration and production techniques that make unconventional reservoirs previously considered inaccessible now producible would generally lead to an increase in oil supply.

Conversely, the internal policies within these states still play a role as some of these techniques can be banned. For example, in July 2011, France enacted a ban on reservoir fracking (Weile, 2014). Therefore, the excess supply is impacted by the ban. As of 2005, the hydraulic fracturing process was employed in about 90% of all oil and natural gas wells drilled in the U.S. (Brady, 2014), and by the year 2010; shale gas production contributed to 23% of natural gas produced in the U.S. (Bellelli, J. and Troszczynska-Van Genderen, 2013). During that period, the amount of crude oil supplied was more than demand, and the oil price fell drastically.

- **GEOPOLITICS**

About 94% of the world's proven oil reserves are state-owned (Gyagri M, 2017). Therefore, the influence of multinational

companies on the pace of oil exploration and production is affected by government participation, policies, and strategic plans. Every government allocates funds to different economic sectors, and most oil-producing countries that depend on oil as the main source of income aim to diversify the economy from total dependence on oil. A paradigm shift that result in a reduced allocation of resources for exploration and production of new reserves for expansion (Fattouh, 2007).

More importantly, the situation of oil-producing regions concerning peace or conflict affects the demand and supply of oil (Ederington et al., 2011), as little as oil workers going on industrial action, to a more complex situation such as threats of war. When an oil-producing region experiences unrest or conflict, the oil producers may feel threatened, as such, suspend production. In more critical cases of unrest and insecurity, oil production may be impossible and operations suspended. These interplays, which mostly have political undertones, affect the price of oil. For example, when there was speculation of war or unrest in the Middle East, oil prices go up with an assumption that there will be a shortfall in oil supply. During the Gulf War of 1991, oil production dropped, subsequently triggering a rise in oil prices (Jaden, 2018). Also, in 2003, oil prices rose again after the U.S. invasion of Iraq (Jaden, 2018). In 2018, when the U.S. pulled out of the Iran nuclear deal and restored sanctions on Iranian oil exports, crude oil prices increased to the highest in three and a half years (Jaden, 2018). Oil price volatility is, therefore, a function of political and economic tussles within and among states.

- **OPEC**

Over time divergent opinions exist over the pricing power of OPEC. The claim ranges from those who believe OPEC plays a limited role in pricing to those who see OPEC as the price setter (Fattouh, 2007). In 1998, some observers concluded that OPEC had lost relevance and would go into extinction when the Dubai oil price rose to almost \$10 per barrel. However, this view was short-lived due to price collapse induced by cooperation among OPEC members..

The organization of oil exporting countries has 14 member countries. This body regulates oil supply to maintain favourable crude oil prices, protect member countries' reserves and meet the world energy demand because crude oil is a finite resource. Without strategic programming by OPEC to member countries, production output can lead to oversupply, a crash in price, and rapid depletion of countries' reserves (ig.com, 2018).

Every action targeted at regulating crude supply will lead to a shift in the oil prices. In essence, OPEC regulates oil prices by allocating oil production quotas to member countries, thereby ensuring that member nations get a competitive price for their oil even if it means producing less in a short time. During the boom in crude oil production experienced in the U.S modern fracking in the mid-2000s (Koplos et al., 2014), the development threatened control of the supply of crude oil by OPEC. Nevertheless, OPEC currently accounts for an estimated 42 % of global oil production and 73 % of the world's "proven" oil reserves. The statistics available give OPEC a significant influence on global oil prices (Gyagri M, 2017).

- **NON-OPEC MEMBERS**

Many other countries are oil producers outside the organization of oil exporting countries (OPEC). They include the USA, China, Canada and Russia and are among the biggest oil-producing countries outside OPEC. The independent decisions of these countries on the production of crude oil will affect the crude supply. Where oil supply exceeds demand, the price of oil falls. Some of these countries economies are not dependent on oil. Therefore, even a reduced oil price may not be of much importance, such as to make them reduced production. These interplays make it difficult for OPEC to regulate oil supply easily to improve prices. Nevertheless, in recent years, some non-OPEC member oil-producing countries have collaborated with OPEC to improve oil economics. Russia, for instance, has agreed at different times to reduce oil supply by cutting back production.

The following is the summary of the 9th (special) OPEC and non-OPEC Ministerial Meeting:

1. Uphold the Framework of Cooperation, signed on December 10, 2016, and reaffirmed at later meetings, and the Charter of Cooperation, signed on July 2, 2019.
2. Cut back crude oil production by 10.0 mb/d, starting on May 1, 2020, for two (2) months. For the next six (6) months, from July 1, 2020, to December 31, 2020, the total adjustment agreed upon will be 8.0 mb/d. It will be followed by a 6.0 mb/d adjustment for another Sixteen (16) months, starting from January 1, 2021, until April 30, 2022. Crude oil production from October 2018 is the basis for calculating the adjustments, except for Russia and Saudi Arabia, which both had a comparable baseline level of 11.0 mb/d. The agreement is effective until April 30, 2022.

However, in December 2021, the agreement's extension will be reconsidered.

3. Reachout to all major producers to support the efforts to stabilise the market.
4. Reiterate and expand the endorsement of the Joint Ministerial Monitoring Committee and its membership to closely review global market conditions, oil production trend, and the compliance level of conformity with the Declaration of Cooperation.
5. Maintain the Declaration of Cooperation conformity by tracking crude oil production, using information from secondary sources, and adopting the methodology applied to OPEC member countries.
6. Convene a meeting on June 10, 2020, to determine further actions required to balance the market.

The meeting outcome summary above presents an overview of the relationship between OPEC and non-OPEC member countries.

- **OECD**

The Organization for Economic Cooperation and Development (**OECD, 2021**) is an international organization aimed at building better policies for better lives with a specific goal to shape policies that foster prosperity, equality, opportunity and well-being for all.

The organization partners with governments through policy-makers and citizens to develop solutions to social, economic and environmental challenges ranging from fostering education and fighting international tax evasion to providing a unique forum and knowledge hub for data and analysis to exchange of experiences; sharing best-practice to advise on public policies and setting international standards. Currently, the OECD comprise the United States and most European countries. In terms of oil consumption, the OECD countries have had more than other non-OECD states. Nevertheless, the oil consumption growth rate has been reducing over the years, considering two main factors:

1. The OECD countries are mainly market-based economies. Therefore, they have a more mature transportation scheme, and despite their high energy demand, policies that foster alternative energy sources are in place. Therefore, these countries have a growing alternative energy sector and reducing reliance on crude oil.
2. Most OECD countries do not subsidize the price of finished petroleum products. When oil prices go up, consumers directly feel the

impact. They, therefore, show some sensitivity to the overall effect of reduced demand.

The combined effect of these two factors affects the demand for crude oil within these major consumer nations, which, over recent years, has not been on the increase and has impacted the price of crude.

- **Global Economic Performance**

Crude oil being an energy source, the demand for crude oil relates directly to the demand for energy (except with the recent development of renewable energy sources). An indicator used to measure an economy's strength is its industrialisation level. Therefore, a growing economy with a growing industry would have a higher demand for crude oil. On the other hand, when industrial performance declines, the demand for crude oil will follow suit. The increasing population will increase crude oil demand depending on each state's economic structure and condition. In the face of these possible increases in demand, oil-producing countries are likely to benefit from a hike in price. If crude oil prices remain high, economic development in consumer nations may slow, simultaneously causing a decline in the demand for crude oil. While in producing countries, high prices will lead to an increase in petroleum investments leading to more exploration and production of oil reserves (**Gyagri M, 2017**).

- **ALTERNATIVE ENERGY SOURCES**

The influence of other forms of energy on the price of crude oil is indefinite as the existence of another form of energy does not necessarily make it a suitable alternative. Crude oil, as well as other energy sources, is used to satisfy different parts of global energy requirements, with crude oil primarily used to produce transportation fuels. So far, most renewable energies are for power generation. For transportation fuel, biodiesel, bio-jet, and bio-ethanol have come up as substitutes for crude oil products. Technological advances have also enabled alternative fuels to power the same equipment in a substitutive manner. An increase in the price of any of the alternatives would favour the use of the other.

The advancement of alternative forms of renewable energy thrives on the wings of government policies. Recently, Countries have placed concerted efforts to reduce dependence on crude oil, favouring the production of electric or hybrid vehicles (**Gyagri M, 2017**). For instance, the UK plans to ban the use of automobile vehicles in some years to come. These kinds of future speculation would affect the readiness of

multinational companies, governments and individuals to invest in oil exploration and production. Legislative mandates and varying regional objectives contribute to determining the price of crude oil.

• MARKET SPECULATIONS

“spot” and “futures” markets are relatively new transactions in the oil industry, though for a very long time it has been the market practice for several other commodities. Spot market, futures markets, hedging and SWAPs are the current global oil market means to receive a competitively determined market outlook that informs players in the industry on current and future supply and demand conditions (Grant et al., 2006).

When the price of oil is favourably and suspected to increase in the near future, buyers and producers often enter into an oil futures contract which is a binding agreement that gives a buyer the right to purchase oil in the future at the present oil price. Also, when oil prices are speculated to go up, producers often hoard their oil to reduce supply and preserve their oil till the supposed time of price hike when they can make more profit. This can in itself affect oil price as well. Also, Brokers and speculators can substantially affect the price of oil as they basically simply guess the direction of the oil price in the future and trade accordingly. In this situation, the purchasers rarely take possession of the commodity, so the trading is simply in terms of possession as an asset for the sake of profit. Nevertheless, the speculated or built-up oil price may not be adequately supported by the physical demand or available supply as the case may apply and the price of oil realistically crashes below the speculated price.

IV. CONCLUSION

Understanding oil price trends have drawn attention to the global scene amidst the rapid rise in oil price and its volatility. Analysts argue that high oil prices can slow economic growth, leading to inflation and causing global imbalances. Volatility in crude oil prices can also increase uncertainty and discourage new investments. High oil prices and tight market conditions have instituted fears about its availability with looming forecast of scarcity and concerns about energy security in many oil-importing countries.

Several factors that can independently affect crude oil prices have been identified and discussed in this paper. Nevertheless, it is worthy of note that any single one of the factors does not dictate the price of oil, but a combination of these

factors can at any time influence the price of crude oil as a commodity.

Generally, the factors described here (except demand and supply) microscopically dictate the demand, supply, or both. Therefore, demand and the available supply then dynamically dictate the price of crude oil. In simpler terms, the price of crude oil is primarily governed by the law of demand and supply, while the other factors directly affect one of demand or supply or both resulting in price changes. The geopolitical scenario in both producer and consumer nations in combination with OPEC oil production contribution, the independent non-OPEC member country supply, as well as nations socio economic interests play a role in the determination of crude oil price.

Finally, the interactions between traders on spot markets, futures markets, freight, hedging and SWAPs are among other factors influence the global price of crude to properly reflect its market value at any given time.

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