Vegueta. Anuario de la Facultad de Geografía e Historia
22 (11), 2022
eISSN: 2341-1112
DOI: 10.5281/zenodo.7392874

A STUDY ON EFFECTS OF MACRO ECONOMIC INDICATORS ON CRUDE OIL PRICES – PHASE TOWARDS BUILDING STRONG MODEL FOR CRUDE OIL PRICE PREDICTION.

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Abstract:
Energy is the lifeblood of every economy and a crucial component in its overall success. The economic viability of a project hinges on the fuel supply being reliable, easily available, and environmentally friendly for at least the foreseeable future. For monetary new development import, compelling exploitation of resources and long-stretch acceptance in its utilisation is of paramount significance. Financial indicators allow us to track the health of a country's economy; here, we look at how a rise in the price of crude oil in India's bins as a result of higher prices for crude oil around the world affects other financial metrics, such as the country's Consumer Price Index (CPI) and the value of the Indian rupee. Predictions for the price of crude oil using a univariate analysis approach are also a primary area of interest.
Key words: monetary pointers, crude oil, economic Indicators, Univariate analysis

Introduction:

Energy is the driving force behind economic growth and is crucial to the sustenance of a modern economy. Sustaining economic viability over the long term requires a steady supply of fuel from sources that are affordable, readily accessible, and climate-friendly. Utilizing assets efficiently and being able to sustain such use over the long term is crucial for financial outcomes. To the tune of 82%, India imports all of its energy needs.

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Natural petroleum, in its crude form, is a mixture of muck and by natural material that is rich in hydrogen and carbon and is found in certain stone configurations in the soil. If you dig deep enough into the soil, you'll find

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a layer of naturally rich mud that has been hidden for millions of years, along with a humid temperature that rises as you go deeper. Raw petroleum undergoes transformations as a result of the effects of rising temperature and stress on the natural mixture. Unrefined petroleum is second only to coal as India's most important source of commercial energy. When it comes to importing oil, India is among the most dependent countries in the world. As a consumer country, India relies on OPEC members Saudi Arabia, Kuwait, the United Arab Emirates, Iran, and Iraq to provide its need for crude oil. The rising price of oil has a dampening effect on economic growth. Despite its decline, it continues to play a significant role in shaping economies throughout the globe. It is essential to the growth of the global economy, since crude oil is the primary source of energy for most countries. The nations that cannot produce enough on their own and must rely on other countries for crude oil drive up the price of raw petroleum on the market. Whether the price of crude oil goes up or down, it will have an immediate and noticeable impact on a wide range of goods and services as well as on the economy as a whole. A rapidly growing demand for raw petroleum has left India, the third-largest shipper and user of crude petroleum, reliant on imports. The price of crude oil plays a pivotal impact in every nation's economic growth.

In fact, India requires importing of almost 84% of its crude oil needs. There are many ways to describe oil. So, the actuality of the transformation of crude petroleum into usable forms is not normalised. Petra means rock in Latin, and oleum means oil, therefore rock oil is another name for unrefined petroleum. An extremely broad range of compounds may be included inside this nebulous word. Hydrocarbons consist of a combination of carbon and hydrogen atoms. India imports oil from countries that produce it, and it exports finished goods rather than raw materials. Most of India's crude oil and combustible gas come from the Middle East and, more recently, the United States. Since unrefined petroleum is the natural ingredient for treatment facility, its price is a big barrier for oil bringing in countries like India. Only 24-26% of the country's total interest in raw petroleum is produced domestically; the remainder must be supplied via imports. Because of its utter dependence on imported crude oil, India has no defence against fluctuations in the international oil market.

Review Of Literature

Mr. Habeeb Ur Rahiman; Prof. Dr. Rashmi Kodikal (2019) Mangalore refinery petrochemical limited, an Indian oil refinery, was the site of the research (MRPL). Stock market (BSE SENSEX, nifty 50), exchange rate, inflation, and GDP are treated as dependent variables in this article, with crude oil prices serving as the independent variable x. Starting in January 2008 and ending in January 2018, a full decade's worth of data is considered here. An analysis of variance (ANOVA) with regression is used to test hypotheses, and the f-test is used to analyse the results. Crude oil prices were found to affect the BSC SENSEX nifty 50 and inflation, but to have no impact on the country's currency rate or GDP.

Firdous A Wani, Mudasir M Kirmani, Syed Mohsin Saif (2015) The current condition of crude oil imports has been outlined, and an effort has been made to explain why cutting down on these imports is so crucial to raising the quality of life for the average person.

Micha Gisser and Thomas Goodwin (1986) equations incorporating real GDP, CPI, unemployment, and investment, all approximated They performed a series of regressions, one for each variable, on the high employment federal spending measure of fiscal policy, the nominal price of crude oil, and the m1 money supply, both in the present and at four lags.

Hamilton (1983) looked at how it might affect the US economy His data emphasises the cost-push inflationary

consequences of rising crude oil prices, and they show a significant correlation with the U.S. economic cycle.
S Ghosh energy policy, 2009 Using an autoregressive distributed lag (ARDL) bounds testing technique to cointegration, this work determines a long-run equilibrium connection between the amount of crude oil imported, income, and the price of imported crude in India during 1970–1971. The empirical evidence indicates that there is a unidirectional long-run causation between GDP growth and crude oil import in India, with the import elasticity of income being 1.97.
R Bhar, B Nikolova The world economy, 2009 This article examines the time-varying conditional connection between BRIC equities returns and oil price returns, and assesses the extent to which global oil price returns impact stock returns and volatility in the BRIC equity markets in 2009. The results of the research indicate that the degree to which oil price returns affect stock returns and volatility in the BRIC nations varies according to whether or not these countries are net importers or net exporters of oil.

Statement of the problem:

The purpose of the research is to learn how the rise in the Indian basket price of crude as a result of the rise in international crude oil prices affects economic indicators like the indices, the price of gold, the exchange rate for the United States dollar, and the consumer price index in order to ensure the long-term viability of the Indian economy. Univariate analysis for predicting the price of crude oil is also the subject of this research.

Objective of the study:

1. To study the impact of oil price fluctuation on Indian economy.
2. To study and formulate the impact of crude oil prices on various macroeconomic indicators of Indian economy.
3. To predict Crude oil prices and analyze the results.

Hypothesis:

H0: There is no impact of Crude oil Prices on Economic Indicators
Ha1: There is an impact of Crude oil prices on CPI
Ha2: There is an impact of Crude oil prices on gold rates
Ha3: There is an impact of Crude oil prices on Stock market indices
Ha4: There is an impact of Crude oil prices on Forex (US $)

When the Linear regression is performed on the data it has shown multicollinearity problem hence in this case the study has adopted Quantile Regression. Quantile regression equation is as follows:

$$MSE = \frac{1}{n}\sum_{i=1}^{n}\left(y_i - (\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip})\right)^2$$

Quantile Regression, using observations 2000:10-2019:08 (T = 227)

Dependent variable: Crude_Oil
tau = 0.5

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Gold_Price	0.153154	0.00605563	25.29	<0.0001	***

USD_INR	12.8540	2.35594	5.456	<0.0001	***

Median depend. var	3303.550	S.D. dependent var	1578.097	
Sum absolute resid	200228.4	Sum squared resid	3.08e+08	
Log-likelihood	−1923.918	Akaike criterion	3851.837	
Schwarz criterion	3858.687	Hannan-Quinn	3854.601	

In this case Gold price and US Dollar is considered as Independent variable and Crude oil as Dependent variable. After looking at the p-value which is less than 0.05 study understands that there is a significant impact of Gold price and USD on Crude oil prices.

Further data analysis on Crude oil prediction has been done using Sensex, Interest rate and CPI also has been done and significant result has also been derived.

Quantile regression, using observations 2000:10-2019:08 (T = 227)
Dependent variable: Crude_Oil
tau = 0.5

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Interest_Rate	229.533	52.6084	4.363	<0.0001	***
CPI	25.3354	4.80453	5.273	<0.0001	***

Median depend. var	3303.550	S.D. dependent var	1578.097	
Sum absolute resid	225662.0	Sum squared resid	3.16e+08	
Log-likelihood	−1951.063	Akaike criterion	3906.126	
Schwarz criterion	3912.976	Hannan-Quinn	3908.890	

At the 0.05 level of significance, the research adopts the alternative hypothesis, which states that there is a substantial influence of the Sensex on the forecast of the price of crude oil and rejects the null hypothesis that there is no effect.

Quantile regression, using observations 2000:10-2019:08 (T = 227)
Dependent variable: Crude_Oil
tau = 0.5

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Sensex	0.186046	0.00426052	43.67	<0.0001	***

Median depend. var	3303.550	S.D. dependent var	1578.097	
Sum absolute resid	293593.6	Sum squared residual	5.61e+08	
Log-likelihood	−2010.800	Akaike criterion	4023.600	
Schwarz criterion	4027.025	Hannan-Quinn	4024.982	

The following table uses the Sensex as the independent variable and the price of crude oil as the dependent variable. The research adopts the alternative hypothesis, which states that the Sensex has a substantial influence on predicting the price of crude oil at the 0.05 level of significance.

Conclusion:

We conclude from this analysis that the price of gold, the value of the US dollar, the Sensex, the risk-free interest rate, and the consumer price index all have a significant impact on crude oil prices, as demonstrated by Quantile Regression; and that Univariate, Multivariate, and Deep Learning techniques can be used to effectively forecast the price of crude oil; this can be useful for reducing the financial risk associated with uncertainty.

To circumvent the Multicollinearity issue, Quantile Regression has been broken down into its three component pieces. Since there was no evidence of multicollinearity, significance has been proven. This model is robust enough to demonstrate its relevance and provide future crude oil price predictions.

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