

# THE RELATIONSHIP BETWEEN GOLD, USDINR, CRUDE OIL AND FOREIGN EXCHANGE RESERVES IN INDIA FOR THE DECADE 2011-2020

Vinod G. Nair<sup>1</sup> and Vaishali J. Patil<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Management Studies, SIES (Nerul) College of Arts, Science and Commerce, Navi Mumbai

<sup>2</sup>Assistant Professor, Department of Commerce, Mulund College of Commerce, Mumbai

## ABSTRACT

Gold, Crude oil and exchange rates are determined by the market forces of demand and supply. In case of India, the imports of the two commodities viz. crude oil and gold are critical for the country and also a foreign currency guzzler. To identify the relationship of these during the period 2011-2020, we have used linear regression to test the hypotheses. In the testing it was observed that all the three independent variables i.e. crude oil, gold and exchange rate of USDINR have significant relationship with respect to level of foreign exchange reserves in India. The study however limits itself to recognising this relationship. The study also further revisits the fact that India's dependence on the foreign crude oil and gold supplies leads to vulnerability of price fluctuations on the currency reserves.

**Keywords:** Gold, Crude Oil, USDINR, Forex.

## INTRODUCTION

Crude Oil is an important resource for developing economy like India. Any change in crude oil prices in the global market amongst OPEC (Organization of the Petroleum Exporting Countries) or Non-OPEC countries does influence different facets of the economy. Since the turn of the millennium, crude oil has been volatile in its pricing. The Indian economy being dependent majorly on imports of crude oil, the impact on the economy and the oil marketing companies have been quite prominent. In multiple ways, the crude oil prices have adversely and favourably impacted our lives in different time periods. The rise in crude oil prices, over the years and the dollar payments for the same have also impacted the exchange rate scenario in the country. In fact, the government of India statistics often state the crude oil and non-crude oil imports separately to enable a deeper understanding of the composition of our country's imports data.

In addition to this, India is also one of the largest consumers of Gold in the world, with almost entire requirement imported by the country; which also leads to foreign exchange flowing out of the economy. The foreign exchange reserves held by the Reserve Bank of India in the form of foreign currency assets, gold reserves, reserve tranche position and special drawing rights are an important measure of any country's resilience in times of emergency. The source of these reserves comes from the foreign investments, foreign currency borrowings, export proceeds etc. and goes out in the form of import payments, overseas investments etc. In this instance, the researcher has tried to assess the relationship between these important factors from the Indian economy.

## REVIEW OF LITERATURE

In order to understand the subject matter of research, the following research work was reviewed:

A threshold value does exist, according to the statistical test for the presence of a threshold effect. Using monthly data for the US, Canada, and Japan from 1970 to 2002, we draw the following conclusions: (i) the ideal threshold level appears to depend on how dependent an economy is on imported oil and how willingly people are willing to adopt energy-saving technology; (ii) an oil price change or its volatility has a limited impact on the economies if the change is below the threshold levels; and (iii) if the change is above threshold levels, it appears that the change in oil price betters the economy. (B.N. Huang et al., 2005)

And then we set the fluctuant patterns as nodes and the transformation between patterns as edges; in this way, the transmission complex network is constructed. The results show that different major fluctuant patterns with different probabilities appear in different scales. The fluctuant patterns transferred into each other conveniently. And the transmission medium can help to identify the transitional periods in the process of the transmission. The contribution of this study to the energy policy decision-making is that the formulations of related policies under different period lengths require different reference standards.(Gao Xiangyun et al., 2014)

The purpose of research in this article is to investigate the relationship among gold prices, Bombay Stock Exchange's Sensex, National Stock Exchange's Standard and Poor's (S&P) Financial Services LLC CNX NIFTY1 (S&P CNX NIFTY) and US dollar/Indian rupee (USD/INR) exchange rate for the period January 1998–April 2014. The relationship among these variables has been studied by applying vector error correction model (VECM) in order to check the long-run and short-run causality. Johansen cointegration test has been applied to find out the long-term cointegration among variables in the study. In further analysis, Wald's coefficient diagnosis and residual analysis revealed that gold prices, SENSEX, USD/INR and S&P CNX NIFTY are in equilibrium in the short run and long run. Granger causality test finally confirms the presence of unidirectional causality that runs from gold prices to S&P CNX NIFTY and also from gold prices to USD/INR exchange rate at current prices.(Shiva & Sethi, 2015)

The inverse relationship between the value of U.S. dollar and that of gold is one of the most talked about relationships in currency markets. The present study is an attempt to understand the impact of recession of 2008 on relationship between exchange rate of US dollar in INR and gold prices in India. The study uses Johansen Co- Integration test to check the long-term association between exchange rate of US dollar in INR and gold prices in India and it further uses the Granger Causality Test to check the lead lag relationship between the variables. A separate pre, during and post- recession analysis of the variables is done to understand the impact of recession on this relationship. The study highlights how this relationship has changed since the global turmoil.(Nair et al., 2015)

Governments impose taxes and levies to manage the effect of gold and crude oil imports on the exchange rate. These in return have relations with the economy of the country, best reflected in the stock market index. This study aims to explore the relation between global prices of gold, crude oil, the USD-INR exchange rate, and the stock market in India. The dynamic contemporaneous linkages have been analyzed using DCC-GARCH (standard, exponential and threshold) models and the lead lag linkages have been examined using symmetric and asymmetric Non-Linear Causality tests. Empirical analyses indicate fall in gold prices and crude oil prices cause fall in the value of the Indian Rupee and the benchmark stock index i.e. Sensex. The findings of this study also support the emergence of gold as an investment asset class among the investors. More importantly, this study highlights the need for dynamic policy making in India to contain exchange rate fluctuations and stock market volatility using gold price and oil price as instruments.(Jain & Biswal, 2016)

Gold prices in the Indian market may be influenced by a multitude of factors such as the value of gold in investment decisions, as an inflation hedge, and in consumption motives. We develop a model to explain and forecast gold prices in India, using a vector error correction model. We identify investment decision and inflation hedge as prime movers of the data. We also present out-of-sample forecasts of our model and the related properties.(Gangopadhyay et al., 2016)

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India is the largest importer of gold in the world and it is India's second largest import. Gold is treated as a valuable safe haven commodity by investors in India, indicating the extent of its financialization. This investment demand for gold drives its imports and hence linkages to the exchange rate and

equity markets. Movements in the price of gold drives investor interest for the same, which this study aims to capture through Google Search Trends. This study examines the time varying correlation and nonlinear causality amongst Google Search Trends for gold, gold spot price in India, the Indian stock market index Nifty and the USDINR exchange rate. We find presence of bidirectional causality between gold search trends and gold spot price, along with effects on the equity and exchange rate markets. From these results, this study derives important recommendations for both the central bank (Reserve Bank of India) and investors.(Jain & Biswal, 2019)

Crude oil is considered as a major resource of any developing country it may be either Oil importing or exporting countries. The present study examines the relationship between the Exchange rate, Crude oil and Stock market returns. The study analyze the monthly observations from April 1, 2003 to March 31, 2019 with the help of Co integration, Granger causality, Variance Decomposition. The overall findings of the study indicate a significant effect of Crude oil on USD/INR Exchange rate. Theoretically, an oil price shock may be transmitted as the collapse in Crude prices pushes down the domestic price of non-traded products and hence the real Exchange rate and returns from Stock Market.(Raju et al., 2021)

### RESEARCH METHODOLOGY

The research on these variables has been done quite a lot number of times in different combination of variables. Also, the studies have spanned various geographical jurisdictions. In this study we aim to look at the nuances of the Gold and Crude oil, USDINR and its impact on the on the Foreign Exchange reserves.

### SIGNIFICANCE OF STUDY

India imports about 85% of its annual requirements of Gold and Crude oil, both of which are a strain on the Current Account of the country as also consequently on the foreign exchange reserves. Also, the prices of these commodities often impact the exchange rates due to the increased requirements of the Foreign Exchange in times of price rise and decreased requirements during the lean periods. It is therefore, important to study the impact of the prices of Gold and Crude oil along with the exchange rate with respect to the foreign exchange reserves.

### STATEMENT OF PROBLEM

The relationship between crude oil and the foreign exchange reserves has a significant impact on the foreign exchange reserves as the payments for the imports are required to be made in foreign exchange only. Also, the gold being imported requires settlement of dues with the foreign supplier requiring payment in foreign exchange. This invigorates the need of foreign exchange being held with Reserve Bank of India for securing the payment for imports.

### OBJECTIVES

- To identify the relationship between crude oil and foreign exchange reserves held by the Reserve Bank of India
- To identify the relationship between gold and foreign exchange reserves held by the Reserve Bank of India
- To identify the relationship between exchange rate and foreign exchange reserves held by the Reserve Bank of India

### HYPOTHESIS

#### Hypothesis 01:

$H_0$ : There exists no relationship between crude oil and foreign exchange reserves held by the Reserve Bank of India

$H_1$ : There exists relationship between crude oil and foreign exchange reserves held by the Reserve Bank of India

#### Hypothesis 02:

$H_0$ : There exists no relationship between gold and foreign exchange reserves held by the Reserve Bank of India

$H_1$ : There exists relationship between gold and foreign exchange reserves held by the Reserve Bank of India

### Hypothesis 03:

$H_0$ : There exists no relationship between exchange rate and foreign exchange reserves held by the Reserve Bank of India

$H_1$ : There exists relationship between exchange rate and foreign exchange reserves held by the Reserve Bank of India

### SCOPE OF STUDY

The study encompasses the period from 2011-2020. A decade long data has been obtained from various secondary sources to analyse the relationship of the three components viz. Crude oil, Gold and Exchange rate with respect to the foreign exchange reserves.

### RESEARCH GAP

The studies conducted relate to shorter periods of time. Also, the variables used differ in different studies conducted by various researchers; a few of which have been stated in the review of literature.

### NATURE AND SOURCE OF DATA COLLECTION

The entire study is based on the secondary data collected from the following databases available in the public domain i.e. Reserve bank of India website for exchange rate and foreign exchange reserves, OPEC data for crude oil, and London Bullion market data for gold. In addition to this, the figures in foreign currency for crude oil and gold were converted into Indian rupees for brevity based on the Reserve bank of India exchange rate for that day.

### LIMITATION

The study is limited to the data of only one decade i.e. 2011-2020 and comprises of data published by select entities viz. Reserve bank of India for exchange rate and foreign exchange reserves, OPEC data for crude oil, and London Bullion market data for gold. In addition to this, the figures in foreign currency were converted into Indian rupees for brevity based on the Reserve bank of India exchange rate for that day. The figures may vary based on the conversion rate used, price difference in various markets for the same commodity etc. Also, in this study, we have only used regression analysis, which only shows whether there is any relationship between the variables. In addition to this, only one currency pair i.e. USDINR has been considered for conversion and calculation. Usage of different currency pair may lead to difference in the observed results.

### DATA ANALYSIS AND INTERPRETATION

The secondary data taken from various secondary sources for the period 2011-2020 were analysed using Linear Regression and the results of the same is discussed as below:

#### LINEAR REGRESSION

Table 01: Model Fit Measures

					Overall Model Test			
Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	AIC	F	df1	df2	p
1	0.960	0.922	0.922	139919	9219	3	2348	< .001

R-value is used to represent the correlation between the dependent and independent variables. A value more than 0.4 is taken further for deeper analysis. In this case, the value is 0.96, which is good.

R-square represents the total variation for the dependent variable that could be explained using the independent variables. A value greater than 0.5 indicates that the model is effective to determine the relationship. In this case, the value is 0.922, which is good.

Adjusted R-square represents the generalization of the results (i.e. the variation of the sample results from the population in multiple regression.) A minimum difference between R-square and Adjusted R-square is considered good. In this case, the value is 0.922, which is same as  $R^2$ , so it is good.

**Table 02: ANOVA Test**

	Sum of Squares	df	Mean Square	F	p
USD_INR	1.92e+28	1	1.92e+28	4797	< .001
CRUDE	2.69e+27	1	2.69e+27	672	< .001
GOLD	1.40e+28	1	1.40e+28	3509	< .001
Residuals	9.40e+27	2348	4.00e+24		

Note. Type 3 sum of squares

A 5% level of the significance level has been chosen for the study. The p-value in such a case should be less than 0.05. In the above table, for all the three independent variables, it is <.001. Which indicates the results are significant. The value of F being greater than 1 for F-ratio provides an efficient model. In the above table, the value for all the three independent variables is more than 1, which is good.

Table 03:			95% Confidence Interval			
Predictor	Estimate	SE	Lower	Upper	t	p
Intercept	-1.86e-13	4.74e+11	-1.95e-13	-1.76e-13	-39.2	< .001
USD_INR	4.88e+11	7.05e+09	4.75e+11	5.02e+11	69.3	< .001
CRUDE	-9.29e0-8	3.58e0+7	-9.99e0-8	-8.59e0-8	-25.9	< .001
GOLD	1.74e0+8	2.94e0+6	1.68e0+8	1.80e0+8	59.2	< .001

At 95% confidence interval, the p value for null hypothesis being rejected must be less than 0.05. In the above table, the p-values are all less than 0.05, which indicates that in all the cases, the null hypotheses stand rejected.

### FINDINGS AND CONCLUSION

This study provides the evidence that, there exists relationship between foreign exchange reserves and the independent variables of Crude oil, Gold and Exchange rate. It is therefore, important for the government to manage the foreign exchange reserves along with maintaining the exchange rate at acceptable levels. The higher depreciation of the exchange rate will also have a huge impact on the inflation within the economy due to the imports being made at a higher cost. Foreign exchange reserves also acts as a cushion from any uncertainties about payments during higher commodity prices. The Indian foreign exchange reserves have grown at a healthy rate over the years. However, to reduce the pressure on the reserves, the government must arrive at solutions to find alternatives to these commodities i.e. crude oil and gold.



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