

Dynamic Relationship between Stock Index and Asset Prices: A Long-run Analysis

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Abstract

There are many asset prices which are interlinked and have a bearing on the stock market index. Studies have shown that the interrelationship among these asset prices vary and are inconsistent. The ultimate aim of this study is to examine the dynamic relationship between gold price, oil price, exchange rate and stock index. Monthly time series data has been utilized by the researcher to examine the interrelationship between four variables. The relationship among stock exchange rate index, oil price and gold price have been undertaken using regression and granger causality test. The results indicate that the exchange rate and oil price have an indirect influence on NIFTY; whereas gold price had a direct impact on NIFTY. It is evident from the results that volatility in the price of gold is mainly dependent on the exchange rate and vice versa. All the variables affect NIFTY in some way or the other. However, gold has a direct and vital relationship. From the study findings, it can be concluded that macroeconomic variables like commodity prices and foreign exchange rate, gold and oil, have a strong relationship on the return on securities at the national stock exchange of India.

Keywords: Asset Prices, Stock Index, Regression Analysis, Granger Causality Test, India

JEL Classification: G10, G12, G13, G15, G18

1. Introduction

In the long run, markets always seem to reflect the general status of the economy. It is widely believed that strategic information disclosure will strengthen the supervision of firms (Kong et al., 2020). The country factors and industry are the factors helping in determining the returns in the stock market are the risk-return characteristics derived from the shares (Bai & Green, 2020).

However, in today's age of technological development and inter-connectedness of various sectors, information travels very fast. The impact of information is assimilated immediately, and its effect is evident instantly. In this context, certain macroeconomic variables tend to exert more influence on the financial sector, especially the stock market. Market operations reflect asset prices and macroeconomic indicators (Caruso, 2019). The financial structure in any country consists of institutions, markets and instruments dealing with finance. The financial institutions range short-term high-cost credit to long-term, low-cost credit, insurance companies, brokerage houses, banks, pension funds, instrument trusts and stock exchanges (Sankar & Yoganandham, 2016). With the advent of financials derivatives, there are numerous financial instruments used for investment or selling of financial assets. The credit risk market is supported by the pricing behavior and the measure of credit risk (Sharma et al., 2019).

In the financial market a lot of new assets are being created or transferred, which is very different from the real transactions that involve the exchange of money for goods or services. Generally the financial markets are based on four pillars namely, forex market, commodities market, capital market and the money market (Kidwell et al., 2016).

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A money market is a place wherein businesses raise money for the short-run period of money financing, whereas the capital market is a place wherein money raised for the long-run period of money financing. The forex market is the place where currencies are traded and is a closely linked well-established market. Lastly, the capital market or the stock market provides capital for businesses and acts as a source of investment for large and small investors. However, among the financial market, the stock market or the capital market is regarded as a significant element to gauge the stability and health of a country's economy.

The share market is considered as an indicator of the performance of the business scenario in any country. Moreover, it is a place where investors put their money to get higher returns. There are many asset prices, such as exchange rate, gold price, and international oil price, which are interlinked and have a bearing on the stock market index. During the market crash gold is the safest asset in the investment portfolio, great interest for the risk managers and investors in the reduction of risk (Nguyen et al., 2016). Studies have shown that the interrelationship among these asset prices vary and are inconsistent. Sometimes the changes in asset prices can drive up the stock market and create speculative bubbles; therefore, a periodical review of this relationship is vital to identify any significant build of a speculative bubble in the financial system. This study can further help in understanding short term speculative bubbles. So, it is essential to have periodical investigation about the link between the critical asset prices such as oil and gold and stock market index along with the exchange rate to make better financial investments.

The changes in the stock market index are always of interest, given their effect on the strategies used by the investors and market stability. In recent years due to the slide in oil prices, increase in gold prices and almost stable exchange rate, investors are finding it difficult to maximize their returns consistently. In this relation, the objective of this paper is to focus on those variables, which can provide investors with accurate information to maximize their returns while identifying short term speculative bubbles. Therefore, the current research aims to identify the causal relationship among stock index, asset prices (i.e. exchange rate, oil price and gold price) and other macroeconomic indicators.

Price movements, especially equity prices, are influenced by oil or gold market and the currency market. It is essential to see how quickly the price movements in equity spillover to commodity prices or exchange rate. The testing of the relationship between exchange rates and stock index returns are essential for policymakers to adjust their monetary and fiscal policy as spillover effects can have cross-market influences. The study will be of immense help to the business community in managing their exchange rate risk. Moreover, this study will also helpful to investors by identifying any

buildup of speculative bubbles. Investors will get some information through the study to the future outlook, to make informed investment decisions and make appropriate adjustments to their investments. Awareness about such a relationship between the various asset prices could make investors and policymakers take preventive actions before the bust of any speculative bubble.

2. Literature Review

Stock returns are always inclining to be positive in the long run. Studies show that various factors influence the stock market returns. There may be an influence on the stock returns directly or indirectly. A study on the factors affecting the interest rate, exchange rate and money supply on the share market returns using the Capital Asset Price Model (CAPM), and Arbitrage Pricing Theory (APT) was undertaken for ten years (2003–2013). Other than all the types, the factor models explain the effects of the return of index funds and the Capital Asset Pricing Model (CAPM) have better command over the alpha dispersion (Sha & Gao, 2019). Capital Asset Pricing Model (CAPM) beta of forecasting the risk established the economic importance of various approaches in an investment project (Cenesizoglu et al., 2017). The study was undertaken using monthly data obtained from Kenya. The research indicates that there is no significant relationship with stock returns, but stock returns have a significant influence of interest rate, exchange rate and money supplies. Meanwhile, there is no stock returns and rate of interest in the short-run period (Ouma et al., 2014). There is a high impact on the positive shocks that adverse shocks confirm the asymmetric impact on exchange rates, oil prices and share prices (Kumar, 2019).

The relation between the National Association of Securities (NAS) index and macroeconomic variables consider that there is no connection between share market returns and (91 days) treasury bills. Also pointed out that there should be continuous monitoring of macroeconomic variable that has a substantial impact on the Kenyan stock return index (Elly & Oriwo, 2012). In the behavior of the macroeconomic factors on the Amman Stock Exchange (ASE) index utilized the variables like time deposit, gross domestic product, weighted interest rates and consumer price index. The results expressed that the macroeconomic variables and share market returns index have a robust long-run period connection but slow influence. The study divulges that other than macroeconomic factors, time deposits and interest have a prominent influence on the stock index (Al-Majali and Al-Assaf, 2014). In the study using the segment, models revealed that the relation between the short-run period and long-run period movements in industrial production and stock market volatility. It was noticed that in the long run, there was a strong evidence effect on macroeconomic

factors on share market returns index. Therefore, several models, in the long run, will suggest the stock return must include macroeconomic factors in the model (Engle et al., 2013). There is an extreme and asymmetry volatility for the components of short-term volatility (Wang et al., 2020).

Similarly, there is an asymmetric effect of currency exchange rates on international trade. Also, there is a positive and negative effect on the volume of trade (Sharma & Pal, 2018). The effect of oil price using variables such as world oil production and world oil price on share returns in twelve countries in Europe. For the oil-importing countries, there is a reflection in the stock index based on both positive and negative changes in the oil price (Salisu & Isah, 2017). Oil price will impact on the share market returns will happen on several unknown reasons (Le & Tran, 2021). Another observation was the negative influence of oil price changes on share market returns in the European stock exchanges. However, it is found that oil production had a positive influence on the share return (Cunado & Perez de Gracia, 2014). The oil supply shocks need to be carefully included in any economic model involving predictability of stock return. Another study of the price of shares and currency exchange rates found a causal relationship, and it is unidirectional from the currency exchange rates and price of shares. Using the Granger Causality Test, the study found the relationship in both the short-run period and long-run period (Huy, 2016). The study of variables for months using the Vector Auto Regression (VAR) model unveiled that there is a relationship between stock index, oil price, inflation rate and exchange rates. Also, strongly equipped evidence of significant relation between stock index except for oil and all variables (Samane, S & Amir, 2014). Meanwhile, another study examined the relationship between the stock index and oil price using the Vector Error Correction (VEC) model (Parsva & Hooi Lean, 2017). Also, witnessed the existence of a long-run relationship between stock market growth, exchange rate and oil price (Akinlo, 2014; Pojanavatee, 2020). However, it was proved that GCC markets are getting affected less likely because of various co-movements across several GCC stocks (Fenech & Vosgha, 2019).

Moreover, it was found that there is a significant improvement in the volatility forecast, and the improvements are comparatively small with an economic point of view (Audrino et al., 2020). The study on the association with the oil prices, inflation and Philippine Stock Exchange (PSE) index was analyzed using the Vector Auto Regression (VAR) model identified there is a low level of a significant relationship between inflation and Philippine Stock Exchange (PSE) index (Sheevun, 2015). The study utilized DCC-AGARCH model and VARMA-AGARCH in order to find the association between commodity prices and share prices by clearly analyzing conditional correlations and volatilities. The results showed that there is a reverse relationship

between oil price and share price and there is a conditional volatility or variance. There is a presence of correlations between oil price and share price, copper price and wheat price. This correlation among the variables has been found to be more significant post-2008. The study concluded that oil is the cheapest way to hedge one's risk, while copper was the riskiest commodity to hedge one's risk (Sadorsky, 2014). There is varied consumption growth because of cross-sectional impact and random effects of heterogeneity in the rate of risk (Hunter & Wu, 2014). Credit risk is the associated risk which is not possible in the traditional asset pricing models; it supports rational pricing and behavioral pricing (Nedumparambil & Bhandari, 2020).

The empirical analysis of volatility and co-volatility of crude oil and gold specify the benefits of accommodating the spillover effect of geopolitical risks and negative returns (Woraphon & Kedwadee, 2021). In examining the association between international gold price, exchange rate, crude oil price and share market index in India through the DCC-GARCH model (Asai et al., 2020). In examining the lag and lead linkages, the symmetric and asymmetric causality (non-linear) tests were utilized. The study highlighted the importance of analyzing the relationship by stating the linkages between Governments taxes and levies on crude oil and gold imports. There is an influence and relationship among international gold price, currency exchange rate and crude oil price, which is reflected in the stock market index. The study reflected that there is a possible positive connection among the stock market index, international gold price, crude oil price, and currency exchange rate in Indian Rupees (INR). It accurately reflects that if there is a fall in the stock market index and currency exchange rate, then there is a fall in the international gold price and the crude oil price. The findings will help the investors in guiding them to prefer gold as a powerful asset to invest. Therefore, the study concluded that there is a need for the policymakers in managing the volatility in the stock market and exchange rates. Also, a powerful tool in managing the volatility can be the gold price and the oil price (Jain & Biswal, 2016).

The data in the degree of accuracy of the crude oil price will reflect in the short horizons (Snudden, 2018). The study attempts to examine the relationship between the stock market index, oil price and gold price. Non-linear causality test was utilized to test variables in the implied volatility indices. The study indicates that the future expectations volatility in oil price and gold may lead to the changes in the stock market; it is significant in examining the co-integration between the variables. It was found that there is a healthy volatility existence of crude oil price, and the international gold price will positively affect the volatility in the stock market index (Lu & Gao, 2016). Moreover, there is the presence of inverse bi-directional causality (Bouri et al., 2017). To redeem the stock market, there

is enough gold to support, and the incurring cost may be comparatively smaller (Cutsinger, 2020). The conditional volatility will predict the delivery gain in asset allocation and stock returns, there is a link between economic fundamentals and stock market (Chen et al., 2017). There is a diminishing relationship between the trade price and price clustering by National Stock exchange (NSE). However, there is a requirement for consistent control for market capitalization and trade frequency (Mishra & Tripathy, 2018). There are marginal improvements in shocks returns based on the addition of volatility risk factors will support the professionally managed portfolios (Pati et al., 2019).

The asymmetric factors impact the price of gold, price of oil and their fluctuations were analyzed using monthly data from the emerging economies stock markets. The asymmetric impacts were examined by applying the non-linear ARDL approach. The empirical results suggest that there is a strong presence of favorable impact of share market price on gold price on big and growing economies; there is an opposite impact of share market price on oil price on significantly growing economies. The study revealed the results of the opposite impact of oil price and gold price volatilities on the share price. Thus, it emphasized the need for emerging economies to be careful when dealing with bad news or events especially in a dynamic economic scenario (Raza et al., 2016). There is no contradiction between the key economic variables and gold to shares. The gold is not a robust and safe-haven investment in all the period, especially during the period of high volatility (Yunus, 2020). Volatility in stock markets can affect investments and thus impede the growth of developing countries. Therefore, a study using econometric tools viz, Vector Auto Regression (VAR), Augmented Dickey-Fuller (ADF) and Granger Causality Tests (GCT) analyzed the volatility in the currency exchange rate, international gold price and crude oil price, which can affect the behavior of the share market. The result specifies the existence of a strong relationship among the factors caused due to volatility (Gopal & Munusamy, 2016).

Diagrammatically the model can be specified as Figure 1.

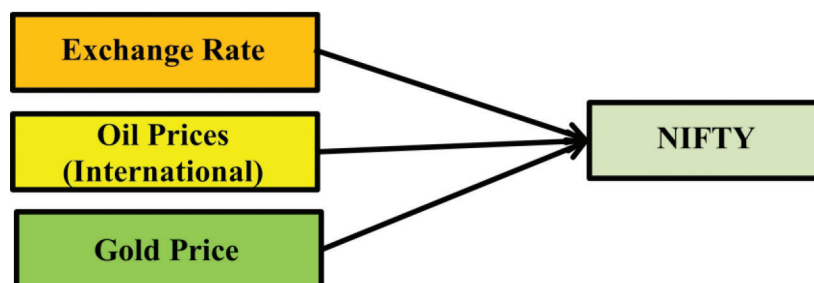


Figure 1: Conceptual Model

3. Research Methods

3.1. Data

The variables that have been used in this study are the monthly average of gold price in dollars terms, monthly oil prices (International), an average monthly exchange rate (rupee/dollar) and monthly average closing price of National Index Fifty (NIFTY) the stock index of the National Stock Exchange (NSE) in India. The monthly data is collected for a period ranging from January 2014 until December 2016, having 36 observations. The Granger Causality Test (GCT) was utilized to test for unidirectional causality. The presence of stationary in the time series data tested using Unit Root Test (URT). The Augmented Dickey-Fuller (ADF) test was utilized to find out if there is the presence of a unit root in the data, in other words, to find out whether it is stationary data or non-stationary data. Furthermore, this study utilized a multiple regression model to examine the impact of macroeconomic variables on the stock index as the variable are stationary at level.

The importance of selecting the above variables stems from the following reasons. The government of India opened its economy to the world slowly, but steadily successive Indian government's policies have undertaken liberalization and globalization to various sectors in the economy which increased the massive inflows of forex into the country (Raju & Pandit, 2016). The gradual easing of exchange rate controls has also opened more investment avenues for foreign investments. The Indian rupee has been hovering steadily around the same level for more than three years (Tiwari & Albulescu, 2016). During the financial crisis, gold prices did not crash, and it becomes a more substantial investment (Junttila et al., 2017). Gold is a piece of jewel for someone, but for others it a source of investment and many others, it is a way to make money on the commodity markets. Gold offers the conditional diversification benefit to the equity investments (Hussain Shahzad et al., 2020). Price changes lead to an increase in the savings of developing counties that depend on the imports of crude oil (Khan et al., 2017).

Moreover, crude oil is counter-cyclical; this will weaken the gain from oil asset (Pal & Mitra, 2019). The stock exchanges have different indexes, and it is differentiated by the number of component stocks, the composition of stocks, the weights and the base year. Huge upwards and downward fluctuation in the oil price affects the upward and downward changes in share price (Wang et al., 2020).

3.2. Model Description

The existing literature has examined the connections between securities exchange performance and different macroeconomic factors and the present research deliberate whether the stock market index can reflect the performance of specific variables of the macroeconomic activity in India. Outstanding to the fact of this study, a straightforward model of the impact on the variables of macroeconomic activity on the NIFTY has been proposed. Measures must be put in place by policymakers who can provide a more stable macroeconomic environment.

The first start of this contention lies in the well-known Arbitrage Pricing Theory (APT) (Ross, 1976) which comprehensively talks that some macroeconomic factors influence equity prices. This influences the choice of investment made by investors. The Arbitrage Pricing Theory (APT) insists that there are no arbitrage opportunities for the uneconomical (inefficient) financial markets. There are many factors in the assumption of the Arbitrage Pricing Theory (APT) may cause systematic deviation of expected values and share returns. Further, in preventing the arbitrage, and expected returns of assets must be a linear function of its responsiveness to many common factors (Stambaugh et al., 2015).

$$APRE(R)_j = Rf + \beta j_1 \lambda_1 + \beta j_2 \lambda_2 + \dots + \beta j_n \lambda_n \quad (1)$$

Based on the Arbitrage Pricing Theory (APT) assumptions the stock market returns were influenced by the sources of systematic risk, specifically by the returns of the stock market index, those can be acquired as the indicators of share market returns. The theory reflects that the share price influences the macroeconomic variables and also plays a vital role in the decision making of the investors in their choice of investments. Instead of the Capital Asset Pricing Model (CAPM), the study utilized the Arbitrage Pricing Theory (APT) which allows for more flexibility in using the number of macroeconomic factors. Thus this theory is used to distinguish the association of different macroeconomic factors on the stock index. It is widely accepted thought that all the macroeconomic variables in an economy are interrelated to each other. Therefore the

influence of a single variable on a stock market index is difficult to measure.

The very purpose of the study is to prove the impact of asset price and macroeconomic variables on the stock market index. This model is suitable and useful because the study relies on proving the synchronized relationship between the changes in macroeconomic variables and share market returns. Based on both theoretical and empirical literature reviewed, this study hypothesizes the model between NIFTY and four variables, namely exchange rate (EX), International Oil Price (BOIL), gold price (GOLD) (IPI) and foreign exchange rate (FEX) The hypothesized model is represented as follows:

$$NIFTY = f(EX, BOIL, GOLD) \quad (2)$$

Functionally, the model is given as:

$$NIFTY_t = \beta_0 + \beta_{11}EX + \beta_{12}BOIL + \beta_{13}GOLD + \mu_t \quad (3)$$

$$NIFTY = \alpha \pm \beta_1 EX \pm \beta_2 BOIL \pm \beta_3 GOLD + \mu$$

Where;

NIFTY = National Stock Exchange Index

EX = Exchange Rate (INR/USD)

IOIL = International Oil Price

GOLD = Gold Price

μ = randomly distributed error term

4. Empirical Results

Based on the empirical results, which has been derived from using the regression model for estimating the causal relationship among the identified variables is presented below. First, the data was analyzed with preliminary statistics. Second, the model was utilized and obtained from detailed result analysis. With the following formula, the share market returns were calculated. The estimation methods utilized the natural log returns for the variables. The log-normal returns are:

$$R_t = \text{Log} (P_t/P_{t-1}) * 100.$$

R_t = Logarithmic returns for period t ,

P_t = Value on day t ,

P_{t-1} = Value on day $t-1$;

Log = Natural Log.

The summary statistics for the daily returns of the variables under study are reported in Table 1. It is essential to look at the variables data at its level. This will give an indication of the trend of each variable. Here the raw forms are taken, and the variable were not differentiated.

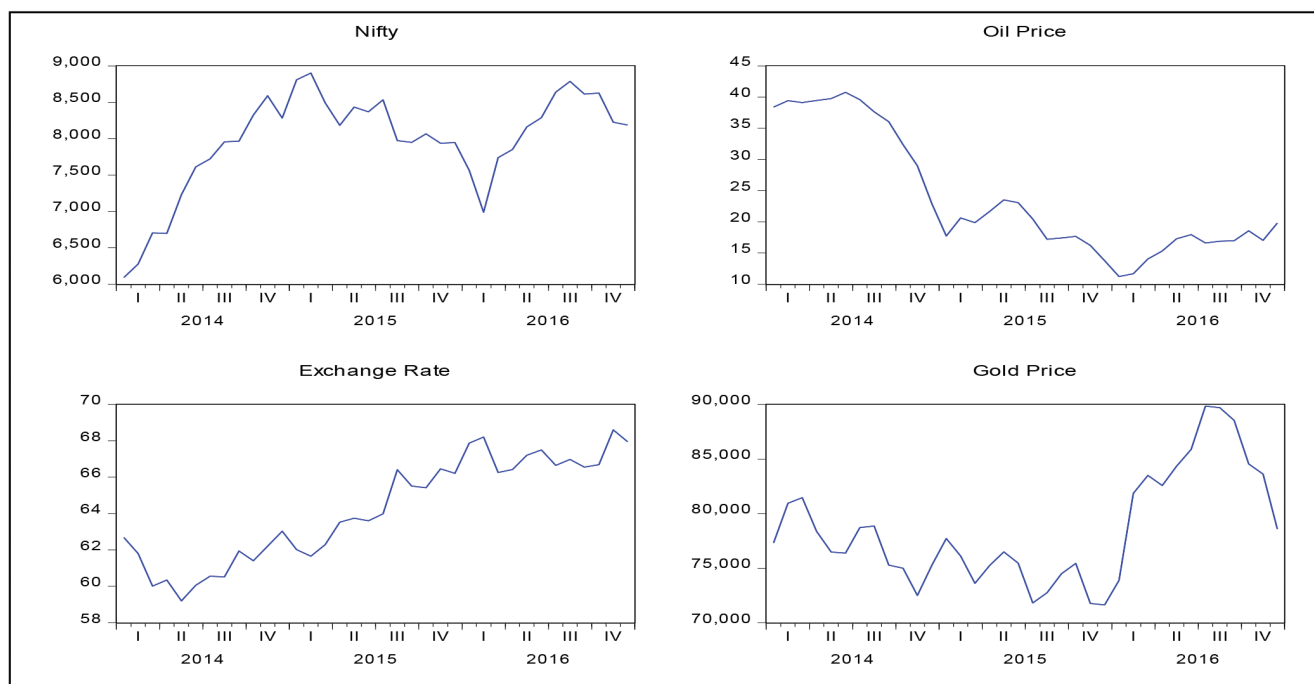


Figure 2: Raw Data of the Variables

The above figure shows how the four variables, i.e. NIFTY, gold price, International oil price and the exchange rate have fluctuated in the period of January 2014 to December 2016. Table 1 shows the descriptive statistics of the four variables. The descriptive statistics help us identify if there is kurtosis or skewness and correctness for stationarity, which is essential in testing for findings of the relationship among stock index, exchange rate and asset prices.

From the Table 1, the four variables have their mean values within the minimum and maximum and values of their series. It can be inferred from the above table that the exchange rate and gold price are typically distributed, and the nifty and oil price have skewness and kurtosis. This can be an inference from the Jarque-Bera probability.

Based on the results of the descriptive statistics, it was found that all the variables were not distributed normally. Consequently, a stationary test was executed for the variables at level, utilizing the Augmented Dickey-Fuller (ADF) Unit Root Test. The Augmented Dickey-Fuller (ADF) is an important test which demonstrates that the series were stationary or non-stationary. It was utilized to evaluate the behavior time series data and to determine how a time series data responds to unexpected shocks. Here it is assumed that

H₀: non-stationary (the data supports the presence of unit root).

H₁: stationary (the data does not support the presence of unit root).

The variables are non-stationary at levels as all the variables were reflected using the Augmented Dickey-Fuller (ADF) unit root test (see the Table 2). The unit root test reflected the variables to be non-stationary at levels a first difference level for all the variables was carried out using the ADF test. Here all the variables were found to be stationary, as seen in Table 2 to Table 5. Thus, it can be an inference that the variables are non-stationary at level but stationary at the first difference and they are of I (1) variable, meaning integrated of order 1. Though, from the literature, it is known that most I (1) series were co-integrated. However, there is still a possibility of no co-integration. This means that the results derived can be influenced by other exogenous variables. This shows there is an absence of co-integration between the four variables, i.e., NIFTY, oil price, gold price and exchange rate. This implies that variables can be used for testing in a fitting model. Therefore, granger causality tests are undertaken, and results are provided in Table 3.

Table 3 present the Granger-causality test results. There is a bidirectional causal relationship between exchange rate and gold price. Further, there is a unidirectional causal relationship between other variables.

Regression analysis is undertaken to measure the relationship between gold prices, oil price, an exchange rate (independent variable) and NIFTY (dependent variable).

The model of the regression would be in the form of

$$\text{NIFTY} = \alpha \pm \beta_1 \text{EX} \pm \beta_2 \text{BOIL} \pm \beta_3 \text{GOLD} + \mu \quad (4)$$

Table 1: Descriptive Statistics

	NIFTY	GOLD PRICE	OIL PRICE	INR/USD
Mean	7963.508	78498.62	23.78861	64.20883
Median	8112.950	76898.86	19.82500	63.86550
Maximum	8901.850	89845.99	40.75000	68.59800
Minimum	6089.500	71639.46	11.20000	59.19500
Std. Dev.	696.1162	5140.290	9.733091	2.820927
Skewness	-1.126001	0.693943	0.709261	-0.119800
Kurtosis	3.697326	2.548094	1.930889	1.636735
Jarque-Bera	8.336663	3.195672	4.732801	2.873851
Probability	0.015478	0.202334	0.093818	0.237657
Sum	286686.3	2825950	856.3900	2311.518
Sum Sq. Dev.	16960223	9.25E+08	3315.657	278.5170
Observations	36	36	36	36

Where: EX is the EXCHANGE RATE, BOIL = OIL PRICE and GOLD = GOLD PRICE. The following hypothesis is tested.

Null Hypothesis (H0) = All the independent variables have no equal influence on NIFTY.

Table 4 indicates the R squared value. The R² value for the estimated equation is 0.422, which is significant at 1 per cent level of probability. It shows that the independent variables explain 42.2 per cent of the variation in NIFTY. Moreover, the F statistic is 7.775 that are significant at the 1 per cent level. This indicates that the independent variables explain the variations in NIFTY. Table 6 shows the regression coefficients of the estimated regression model. Here the estimated model is:

$$\text{NIFTY} = 21034.2780162 + 0.0234555821886$$

* GOLD PRICE – 85.8642864326
* OIL PRICE – 200.430496412
* EXCHANGE RATE

The regression results indicate that only gold price positively influence the NIFTY. This is evident from the positive signs of the estimated coefficients of gold price. However, since the probability value for gold price is 0.2655, it is not significant statistically in current study. The variables oil price and exchange rate negatively influence NIFTY. This means that if oil price increase then NIFTY will decrease. Further, if the exchange rate weakens then NIFTY will increase. Moreover, the probability values for oil price and exchange rate are below 0.05, indicating that they are significant at 5 per cent level. The results indicate that the null hypothesis (H0): All the independent variables (asset price and exchange rate) have no equal influence on NIFTY has been rejected.

Table 2: Hypothesis Testing

Null Hypothesis: D(NIFTY) has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag = 9)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.602904	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	
Null Hypothesis: D(GOLD_PRICE) has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag = 9)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.270690	0.0019
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	
Null Hypothesis: D(OIL_PRICE) has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag = 9)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.480206	0.0148
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	
Null Hypothesis: D(EXCHANGE_PRICE) has a unit root			
Exogenous: Constant			
Lag Length: 1 (Automatic - based on SIC, maxlag = 9)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.060437	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

Table 3: Pairwise Granger Causality Tests

Sample: 2014M01 2016M12			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
OIL_PRICE does not Granger Cause EXCHANGE_RATE	34	1.50662	0.2385
EXCHANGE_RATE does not Granger Cause OIL_PRICE		0.18569	0.8315
GOLD_PRICE does not Granger Cause EXCHANGE_RATE	34	8.60077	0.0012
EXCHANGE_RATE does not Granger Cause GOLD_PRICE		2.72035	0.0826
NIFTY does not Granger Cause EXCHANGE_RATE	34	4.87976	0.0149
EXCHANGE_RATE does not Granger Cause NIFTY		0.12991	0.8787
GOLD_PRICE does not Granger Cause OIL_PRICE	34	2.54391	0.0960
OIL_PRICE does not Granger Cause GOLD_PRICE		0.78057	0.4675
NIFTY does not Granger Cause OIL_PRICE	34	1.73192	0.1947
OIL_PRICE does not Granger Cause NIFTY		0.25019	0.7803
NIFTY does not Granger Cause GOLD_PRICE	34	0.32442	0.7255
GOLD_PRICE does not Granger Cause NIFTY		2.94779	0.0683

Table 4: Initial Regression Values

R	R Square	Standard Error of the Estimate
0.649	0.422	553.66839

Table 5: ANOVA Table

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	7150665.275	3	2383555.092	7.775	.000

It was found based on the results that the oil price and exchange rates influence NIFTY indirectly; whereas gold price had a direct impact on National Index Fifty (NIFTY) (stock market index). It is evident from the results that volatility in the price of gold is mainly dependent on the exchange rates and vice versa. However, the relations between other variables are unidirectional as seen from the Granger Causality Test (GCT). All the variables affect National Index Fifty (NIFTY) in some way or the other. However, it is evident that gold has a direct and significant relationship with NIFTY. From the study findings, it can be summarised that the macroeconomic variables like, commodity prices oil and gold and foreign exchange rate have a healthy relationship on the return on securities at the national stock exchange. This is supported by both the various inferential statistics findings as presented.

5. Conclusion

After the results derived on the basis of analysis and discussion it is concluded that there is a relationship between exchange rate, stock index, oil price and price of gold which has been analyzed comprehensively, but still needs to be further studied. This is because of the complexities arising because of the trade and policy changes in different countries. New important and significant events tend to affect the impact of these factors in the short-run. This can hamper the investments made in any one of these investment avenues. In current investment circles, gold is considered as an investment to hedge one's losses in the financial markets. Nevertheless, some people see it as a pure investment avenue and want to make profits from these investments. Historically gold was used as a hedge against inflation, social unrest and war. Moreover, it was widely utilised as hedge touching the stock market and not as an investment avenue. Financial advisors would advise the sale of gold during the period of economic growth as the value of stocks increased.

In the context of oil, investments in oil peaks due period of oil price uncertainty. The various similar studies reflected the healthy existence of a reverse relationship between share market movement and oil price. The exchange rates are a macroeconomic indicator which can often predict the health of an economy. A more robust exchange rate means higher purchasing power and a strong economy. However, all the above statements have been proved by numerous studies taking long run times series data. How valid these assumptions hold in short-run needs to be tested every two to three years.

Table 6: Regression Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	21034.28	4563.119	4.609627	0.0001
GOLD PRICE	0.023456	0.020696	1.133349	0.2655
OIL PRICE	-85.86429	19.74545	-4.348560	0.0001
EXCHANGE RATE	-200.4305	72.26472	-2.773559	0.0092

This is because, in today's globalized and technologically networked world, information good or bad travels faster, and its effects are shown immediately. Therefore, in the long run, any investment will do much better than its current worth. However, it is significant to determine the value of investments changes in the short-run shocks. Investors, governments and even policy advisors will be better placed if the impacts of these shocks are assessed in the short-run period.

From literature, it is frequently seen that many economic indicators influence the continuous economic growth. The interrelationship between many of these variables is studied and analyzed in depth. The simple relationship between four essential variables in the short run is not studied or analysed. The purpose of this study is to examine the dynamic relationship of the exchange rate, stock index, gold price and oil price. For the purpose of this study monthly time series data has been utilized to examine the interrelationship between the four variables. Further, the impact of fluctuations among oil price (International oil price), stock index (NIFTY), an Exchange rate (INR/USD) and gold price (Troy per ounce) has also been studied. The links between variables which influence NIFTY variations and its relation with variations of oil price, exchange rate and gold price have been investigated in detail in the study. The study aims to establish the relationship using the Granger Causality Test (GCT) and relationship analysis among gold price, oil price, exchange rate and stock index. The study utilized a model to show the dynamic interrelationship. The regression model measured the price of gold in Indian rupee terms. Instead, new dimensions have been added, the research has used the International oil price as the indicator for crude oil prices. (BD per Barrel).

The increase in investment is primarily because of the desire to have a better return (revenue) on the stock market. Also, the investments needed in the exchange rates, commodity prices and policies in regulating macroeconomic variables. All the variables are market, driven sound trade and macroeconomic policies can stabilize the returns and help investors and countries avoid volatility. This means that countries must adopt proper policies, which are ethically sound, have a positive perceived appropriate impact, innovative and most importantly, sustainable in the long run. This study employed four different sets of

macroeconomic variables, and the analysis of these results will serve as a shred of evidence for some of the future researches in other areas of study by employing more components of macroeconomic indicators. Moreover, the period could also be extended. Nevertheless, the researcher also argues against long run investments as short-run gains and losses outweigh the long-run gains in the current economic and political context including the technological shift of capturing, storing, sending and analyzing information.

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