Dynamic Relationship between Gold Prices and Indian Stock Market- An Empirical Analysis

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ABSTRACT

Gold has traditionally been considered an attractive investment in India and its excellent performance in recent years has substantially confirmed the wisdom of that tradition. When markets are volatile and investors panic they tend to move out the risky assets such as stock and invest into assets such as gold. The main objective of the paper is to analyse the effect of Gold prices on Indian stock market represented by BSE-SENSEX. The study was based on the secondary data which has been taken from April 2007 to March 2016. The monthly average data has been considered for the study including 108 observations. Econometric regression analysis indicated that Gold prices had a significant influence on Indian Stock Market represented by BSE-SENSEX. Furthermore, Karl Pearson's correlation results showed the positive correlation between Gold prices and Sensex. It means that Sensex index lead to increase in gold price and rise in gold price lead to increase in Sensex.

Keywords: Gold, SENSEX, Descriptive Statistics, Unit Root Test, Econometric Regression Analysis and Karl Pearson's Correlation.

I.INTRODUCTION

Financial markets play a decisive role in the foundation of a stable and efficient financial system of any economy. There are numerous domestic and international factors which are seen to have a direct or indirect impact on the performance of stock markets. The relationship between core macroeconomic variables, commodities and a developed stock market is well documented in literature. Moreover, as far as the financial returns are concerned, the investment in the commodities has become a good spot for booking good returns in hedging against the inflation, since the returns in precious metals segments can be observed more than that of the returns expected in the equity and debt markets, as the former are negatively correlated (Jaiswal and Manoj, 2010). In commodity market, gold has its unique relevance. It has become one of the most widely discussed metals due to its prominent role in both the investment and consumer world. Even though gold is no longer used as a primary form of currency in developed nations, but it continued to have a strong impact on the value of those currencies. In addition to this, there is a strong correlation between its value and the strength of currencies trading on foreign exchanges. Moreover, many researchers have also identified the long-run and short-run relationships between stock price index and gold price in developed and developing nations. The research also explicates that the gold prices can influence the stock market to a great extent (Yahyazadehfar and Babaie, 2012). The investment in the gold mainly becomes appealing and radiant, when investors have to otherwise bear diminishing stock market returns in times of upset stock market conditions.

Gold was one of the first metals excavated by humans. Gold has traditionally been considered an attractive investment in India and its excellent performance in recent years has substantially confirmed the wisdom of that tradition. When markets are volatile and investors panic they tend to move out the risky assets such as stock and invest into assets such as gold. Gold like virtually all commodities is traded on a dollar dominated basis.

The domestic gold price in India is continuously increasing due to its heavy demand in the country. There are several reasons gold has high demand in India. The first reason is security; gold offers full security as long as it is retained by central banks. There is no credit risk attached to gold. Secondly, gold is able to maintain its liquidity even at times of crisis situations like high global inflation or political turbulence. The third reason for holding gold is to build a diversified portfolio (Narang and Singh, 2013).

II. REVIEW OF LITERATURE

Wang (2010) investigated the effects of variations and long run &short run relationships in crude oil prices, gold price and exchange rates of various currencies on the stock market indices.

Bhunia (2013) examined the relationship among crude price, gold price and financial variables. The period of the study was taken from 1991 to 2012. The study envisaged that there subsist a long term co integration and causality between the financial variables taken for the study of both NSE and BSE.

Narang and Singh (2013) aimed at investigating the dynamic relationship between gold prices and stock market returns in India. In the study, an attempt has been made to investigate the existence of unidirectional or bidirectional relationship between gold price and Sensex for the period of 10 years (2002-2012). The results of the analysis show that there is no causality between the gold price and Sensex.

Gayathri and Dhanabhakyam (2014) made an attempt to test the co-integration and causality between Gold price and NSE-Nifty for a period of ten years including 2888 daily observations. The result of the study indicated that there is a long run co-integration relationship between the variables. Furthermore, the study showed a unidirectional causality relationship between Gold prices and NSE-Nifty index.

Bhunia and Ganguly (2015) studied the influence of two commodity indicators, namely gold and crude oil, GDP growth rate and exchange rates on the stock market index in India. The period of the study was ranging from the year 1991 and to the year 2013. It was found that there is significant long-term co-integration and unwavering relationship between the respected variables. Further, it was concluded that the Indian stock market index is much dependable upon the prices of international crude oil, prices of gold, exchange rates and GDP growth rate.

Rejeb and Arfaoui (2016) analysed the relationships between oil, gold, US dollar and stock prices from January 1995 to October 2015. It has been discussed that when business cycles reflects downfall, and the dollar and stock exchanges move downwards, then gold becomes more appealing and thus its value increases. In addition to this it has been found that gold prices are concerned by changes in oil prices, US dollars and changes in stock markets but somewhat also depends on the US oil gross imports and default premium.

III. OBJECTIVE OF THE STUDY

The main objective of the study is to investigate the influence of Gold prices on Indian stock market represented by BSE-SENSEX.

IV. RESEARCH METHODOLOGY

In the study, a time span of 9 years has been chosen for this study from April, 2007 to March, 2016 uses monthly data to portray a larger view of the relationship including 108 observations. BSE-SENSEX is the representative of Indian stock market. Here, descriptive statistics provide a historical account of variables behaviour and convey some future aspects of the distribution of data set. For the purpose, measures of central tendency (mean) and measures of variability (standard deviation, range, minimum & maximum, skewness, kurtosis and Jarque-Bera statistics) to explain the dataset. The current study unravels the linkage between Gold and Sensex in the Indian context using techniques like ADF test & Unit root test, correlation and regression using Eview7 Software. RBI website has been referred for Gold prices. Lastly SEBI website has been referred for collecting the data of BSE-SENSEX.

V. EMPIRICAL ANALYSIS AND FINDINGS

Descriptive Statistics of Gold during the Sample Period

Figure 1 highlights the average value of gold during the sample period 21877.12 with the standard deviation of 7283.09. The results indicate the presence of negative skewness and moment of kurtosis of gold. Fig 1 depicted that the distribution is not normal as the probability value (0.004) of Jarque- Bera Test statistics (10.76) and this is due to the presence of negative skewness (-0.38) and platykurtic behavior of broad money (1.65). The maximum price of gold was found to be 31672.83 during the period. The minimum gold price during the said period came out to be 8707.42.
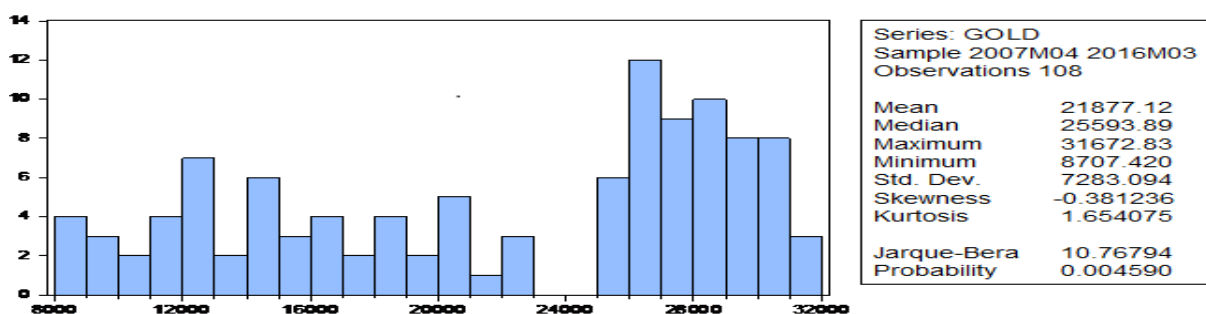

Series: GOLD Sample 2007M04 2016M03 Observations 108	
Mean	21877.12
Median	25593.89
Maximum	31672.83
Minimum	8707.420
Std. Dev.	7283.094
Skewness	-0.381236
Kurtosis	1.654075
Jarque-Bera	10.76794
Probability	0.004590

Fig 1: Descriptive Statistics of Gold price

VI. DESCRIPTIVE STATISTICS OF SENSEX DURING THE SAMPLE PERIOD

Figure2 indicates that the mean value of Sensex during the sample period is 7415.013 with the standard deviation of 1943.361. The high standard deviation value indicates the high level of deviations in sensex values during the sample period. The results also indicate the presence of positive skewness (0.291) and platykurtic behavior (2.86) (where kurtosis is less than 3) of Sensex. The distribution is also normal as indicated by probability value (0.44) of Jarque-Bera Test statistics (1.611). The highest value of sensex is found to be 11454.35 during the period. The minimum value of sensex during the sample period is found to be 3232.110.
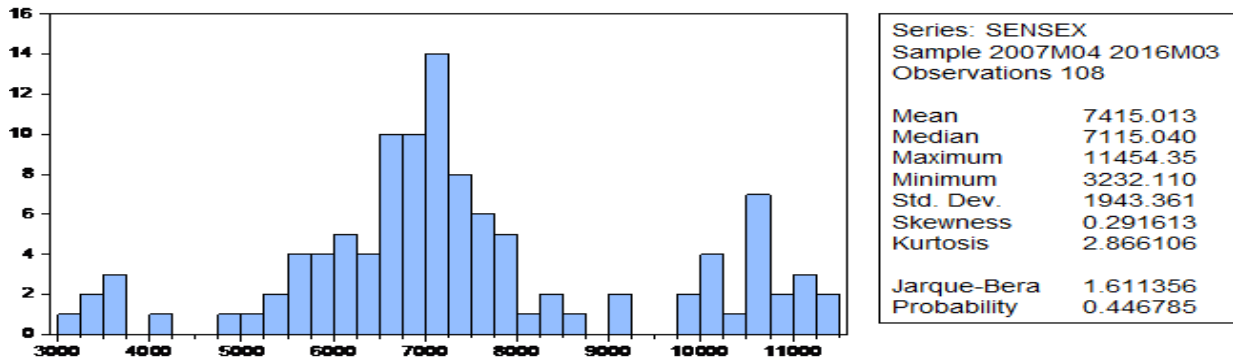

Fig

Fig 2: Descriptive Statistics Of Sensex

VII. UNIT ROOT TEST RESULTS

The ADF test is conducted for gold prices to test the stationary of the series where the mean and variance are constant. The results of the ADF test are exhibited in Table1 below:

Table1: Unit Root Test of Gold at first differencing I (1) level

Null Hypothesis: D(GOLD) has a unit root				
Exogenous: Constant				
			t-Statistic	Prob.
Augmented Dickey-Fuller test statistic			-9.193236	0.0000*
Test critical values:	1% level		-3.493129	
	5% level		-2.888932	
	10% level		-2.581453	
*MacKinnon (1996) one-sided p-values.				

Source: Compiled with E-views Software   *Significant at 5% level
D (GOLD) =log values of Gold

Here, as the test statistic value -9.193236 is less than the critical values at 1% (-3.493129), 5% (-2.888932) and 10% (-2.581453) respectively at the probability value less than 0.05 i.e. 0.0000. Hence, the null hypothesis that there is no unit root for log of gold price is rejected and the alternative hypothesis is accepted. The rejection of null hypothesis supports the stationarity of Gold prices at first difference i.e. I (1) level.

From the Table 2 that reflects the result of ADF implies that, the ADF test statistic value (-5.370422) is less than the test critical values at 1% (-3.494378), 5% (-2.889474) and 10% (-2.581741) respectively with the probability value less than 5%. Hence, the null hypothesis is rejected. The rejection of null hypothesis supports the stationary of Sensex at I (1) level.

Table2: Unit Root Test of Sensex at first differencing I (1) level

Null Hypothesis: D(SENSEX) has a unit root				
Exogenous: Constant				
			t-Statistic	Prob.
Augmented Dickey-Fuller test statistic			-5.370422	0.0000*
Test critical values:	1% level		-3.494378	
	5% level		-2.889474	

			-2.581741	
10% level				

*MacKinnon (1996) one-sided p-values.

Source: Compiled with E-views Software   *Significant at 5% level

D (SENSEX) =log values of Sensex

VIII. ECONOMETRIC REGRESSION RESULTS

Econometric Regression analysis is a technique to check the effect of Gold on Indian Stock Market and found some interesting results for the relationship. Gold price has a dependent relationship among BSE-SENSEX. The null hypothesis has been tested on the basis of the p-value while the overall significance of model has been tested on the basis of F-sign. If the p-value and t-statistic is less than the critical p-value and t-statistic at 5% of significance level, then the null hypothesis is rejected and there will be a significant relation between the variables. The following statement of hypotheses is as follows:

H_0: There is no significant impact of Gold prices on Indian Stock market represented by BSE-SENSEX.
H_a: There is a significant impact of Gold prices on Indian Stock market represented by BSE-SENSEX.
The following variables which are stationary at the first differencing, take the log of original values and make a new variable which can be expressed as symbolically:

SENSEX NEW= d log (SENSEX)
GOLD NEW = d log (GOLD)
        The result of regression model is represented in Table 3 which can be expressed mathematically as:
        Y= α+β₁ GOLD NEW+Ɛ
Where Y= **SENSEX NEW**,
 α= Intercept,
 β₁= Slope
 Independent variable = **GOLD NEW**

Table 3: Econometric Regression Model by Equation between GOLD and BSE-SENSEX

Dependent Variable: SENSEX NEW				
Method: Least Squares				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
GOLD NEW	-0.510546	0.191419	-2.667166	0.0089*
C	0.011467	0.007530	1.522910	0.1308
R-squared	0.063451	**Mean dependent var**		0.006085
Adjusted R-squared	0.054532	**S.D. dependent var**		0.077174
S.E. of regression	0.075040	**Akaike info criterion**		-2.323080
Sum squared resid	0.591253	**Schwarz criterion**		-2.273120
Log likelihood	126.2848	**Hannan-Quinn criter.**		-2.302827
F-statistic	7.113776	**Durbin-Watson stat**		1.691401
Prob(F-statistic)	0.008861			

Source: Compiled with E-views software   *Significant at 5% level

The table above shows simple linear regression test for Gold price and Sensex. It was found through p-value and t-statistics that there is a significant relationship between Gold and Sensex. BSE-SENSEX is considered as the representative of Indian stock market and used to obtain a measure of market price movement of Indian securities. Thus, Gold prices (t-value=-2.66, p-value=0.0089 respectively) had a significant impact on BSE-SENSEX. It leads to the rejection of null hypothesis (H_0) as p-value is less than 0.05 at level of significance. Thus, H_0 is rejected from which it can be inferred that there is a significant impact of Gold price on Indian Stock market represented by BSE-SENSEX. R^2 shows the model fitness of a regression equation and also explains the variation in dependent variable which is made by an independent variable. Table 3 presented that Gold price explain approximately 6.3 per cent of variation in BSE-SENSEX.

IX. CORRELATION TEST RESULTS

Table 4 exhibited the Karl Pearson's Correlation (r) between Gold price and Sensex during the period of time taken for the study. According to the results, there is a significant positive correlation subsist between the variables (r=.442, p-value=.000 respectively at 5% significant level). It means that more the value of Gold, high will be the value of Sensex and vice versa.

Table4: Karl Pearson's Correlation between Gold price and Sensex

Results		Sensex	Gold
Pearson Correlation	Sensex	1.000	.442
	Gold	.442	1.000
Sig. (1-tailed)	Sensex	.	.000*
	Gold	.000*	.

Source: Compiled with SPSS Software   *Significant at 5% level

CONCLUSION

In the study, the dynamic relationship has been examined between Sensex and gold price. The results of Augmented Dickey- Fuller test conclude that the series are stationary and integrated of order one. There is a positive correlation between Sensex and Gold price from 2007 to 2016 even economic crisis breaks out in USA in 2008 and 2011. Hence, the correlation results reveal that Sensex index lead to increase in gold price and rise in gold price lead to increase in Sensex. The results of econometric regression reflected that gold prices had a significant impact on stock market indicator BSE-SENSEX. It shows the dependency relationship among the variables taken under study.

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