



INVESTIGATING THE IMPACT OF GOLD PRICE AND EXCHANGE RATES ON SENSEX: AN EVIDENCE OF INDIA

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Abstract

The present paper investigates the impact of gold price and exchange rates on sensex in India for the period from January 2, 1991 to October 31, 2013 using daily data with the application of unit root test, Johansen cointegration test and Granger causality test have been designed. In other words, this paper investigates the affiliation between three financial variables of gold price, exchange rates and sensex between 1991 and 2013. In recent times, Indian investors are demonstrating uncase in the stock markets due to continuous rising of gold prices on account of no fear and no future loss. Again, exchange rate fluctuations will affect international trades, thus influence the stock market. Johansen cointegration test result indicates that there exists a long-term relationship among the selected variables. Granger causality test result shows that there must be either bidirectional or no causality among the variables.

Keyword: Gold price, exchange rates, sensex, unit root test; Granger causality test, Johansen cointegration test.

JEL Classification: G00, G1

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I. Introduction

Empirical studies point up that Indian stock market counting sensex is very much prejudiced through few serious features, that is, Indian gold price and exchange rates (dollar and rupee). Generally, gold price and stock market moves in an opposite direction. When the economy is in a downturn and stock markets are going down, investors tend to park their funds in gold and wait out the storm. As the gold price rises, Indian investors tend to invest less in stocks, causing stock prices to fall (Bhunia and Mukhuti, 2013, Yahyazadehfar and Babaie, 2012, Bhunia, 2013). The co-movements of four macro-economic variables in terms of gold price, stock price, real exchange rate and the crude oil price based on 21 years data using econometric models for the periods from January 1989 to September 2009. The study exposes that there is a cointegration relationship between the variables (Samanta and Zadeh 2012). Yahyazadehfar and Babaie (2012) have made a study to examine the impact of macroeconomic variables such as interest rate, house price and gold price on stock price in capital market of Iran based on monthly data from March 2001 to April 2011 using VAR and Johansen-Juselius model. From the study it is clear that most of fluctuation in stock price can be recognized to itself, nevertheless among the selected variables, the house price has main role on stock price fluctuation. Kaliyamoorthy and Parithi (2012) have made a study to examine the relationship between gold price and stock market for the period from June 2009 to June 2010. They prove that there is no relationship with the stock market and gold price and stock market is not a ground for rising gold price. Sharma and Dasgupta (2012) has made a study to examine the long-run and short-run relationships between SENSEX and four key macroeconomic variables (wholesale price index, index of industrial production, exchange rate and call money rate) of Indian economy by using monthly data from April, 2007 to March, 2012



with the application of financial econometrics. Empirical results of the study showed that there are no short-run causal relationships between SENSEX and four macro-economic variables but confirmed long-run relationships between BSE SENSEX with index of industrial production and call money rate. Le et al (2011) have made a study to investigate the relationships between the prices of two strategic commodities, that is, gold and oil in terms of index of US dollar by using monthly data from January, 1986 to April, 2011 with the application of financial econometrics. Empirical results of the study showed that there is a long-run relationship existing between the prices of oil and gold and the oil price can be used to predict the gold price. A look at the historic data brings to the plane that when the stock market collapses or when the dollar depreciates, gold continues to be a safe haven investment for the reason that gold consumption and prices rise in such circumstances (Gaur and Bansal, 2010). The connection between exchange rates and stock prices has always been in mind of the economists because both play a vital role in persuading the development of an economy including India. Generally international trades are exaggerated by changes in the exchange rates and consequently it influences the stock market also. However, Indian rupee is increasing, an importer of India has to disburse lower amount in exchange of dollar at the time of import, it reduces the import bill and while such imported item is sold at matching price, the profit for the firm goes up and accordingly the stock price of the firm increases and vice versa (Arora, 2012). The link between gold price and exchange rates has also been important since both play a vital role in persuading the investor's confidence. When the dollar's exchange value falls, it takes more dollars to buy gold so the dollar gold price rises. On the contrary, when the dollar's exchange value rises, by reason of a bear-market assembly or any other reason, it takes smaller amount dollars to buy gold hence the dollar gold price falls (Mills, 2010). In view of that, Capie et al (2005) advocated that gold and exchange rates are typically depressingly associated but the influence of the association may be shifted over time.



Sharma and Mahendra (2010) estimated the long-term relationship between BSE and four macroeconomic variables consisting of exchange rates, foreign exchange reserve and inflation rate and gold price based on the secondary data between January 2008 and January 2009 using multiple regression models. The study divulges that exchange rate and gold price influences the stock prices in India. Keeping in view of this, this paper examines the impact of gold price and exchange rates on sensex in India.

II. Materials and Methods

2.1 Data source

The study is based enormously on secondary data acquired from RBI database, BSE database and World Gold Council database for the period from January 2, 1991 to October 31, 2013.

2.2 Sample design

This study considers daily data encircling the closing stock price indices of BSE (SENSEX), the daily Indianguard price and exchange rates between dollar and rupee. After appropriate fitting the data, there are 5463 observations. Eviews 7.1 package program has been used for arranging the data and execution of econometric analyses.

2.3 Tools used

In the course of analysis of the present study, only econometric tools include Augmented Dickey Fuller (ADF) and PP both at levels and 1st differences, Johansen's system co-integration test and Granger causality test have been used.

2.4 Hypotheses taken

Hypothesis-1

H₀: Gold price, exchange rates and sensex are not non-stationary.

H₁: Gold price, exchange rates and sensex are non-stationary.

Hypothesis-2



H₀: Gold price, exchange rates and sensex are not associated in the long period.

H₁: Gold price, exchange rates and sensex are particularly associated in the long period.

Hypothesis-3

H₀: Gold price, exchange rates and sensex are not related pairwise.

H₁: Gold price, exchange rates and sensex are very much related pairwise.

III. Empirical Results and Analysis

Cointegration test technique is greatly supportive to detect the cointegration association between the two variables in the long period and it is realistic if the two variables are stationary in any case. In the present research paper, three indicators, namely, Indian gold price and exchange rates may be connected in the long period with sensex on the prerequisite that they are not unpredictable or stationary. For the purpose of stationarity test, the present study us ADF and PP unit root test, both at levels and at 1st differences (intercept without trend and intercept with trend) in hopethesis-1 above (Dickey and Fuller, 1981; Philips-Perron, 1969).

Table-1: Unit Root Test Results

ADF		
Test equation-intercept	at level	at 1st difference
LSX	-0.801191 (0.8182)	-40.28302 (0.0000)
LGP	-0.425836 (0.9024)	-58.43265 (0.0001)
LER	0.376683 (0.9820)	-23.49332 (0.0000)
Critical values		
1%	-3.432221	-3.432221
5%	-2.862252	-2.862252
10%	-2.567193	-2.567193
PP		
Test equation-intercept	at level	at 1st difference
LSX	-0.829086 (0.8102)	-52.16573 (0.0001)
LGP	-0.413117 (0.9046)	-58.44153 (0.0001)
LER	0.421214 (0.9839)	-59.53974 (0.0001)
Critical values		
1%	3.432219	3.432219



5%	-2.862251	-2.862251
10%	-2.567193	-2.567193

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

Table-1 demonstrate the ADF and PP unit root test results at level and at 1st difference where it authenticates that Indian gold price, exchange rates and sensex are not stationary at levels [I(0)] and are stationary at 1st difference [I(1)] because test statistics are less than critical value at 1% level of significant both in the intercept without trend and intercept with trend. The unit root test moreover authenticates that constant variance is seen in case of error terms that indicates statistical dependency, as supported in (Shahzadi and Chohan, 2012).

Cointegration test results

Because Indian gold price, exchange rates and sensex are stationary, for that reason, multivariate cointegration method in Johansen approach can be applied to identify the cointegration connection between the variables in the long period. Simultaneously, this method can be determined the cointegration vectors. Since we make out two likelihood ratios, specifically, the Trace Test and the Maximum Eigen Value test can decide the cointegration vectors. At the time of testing, the present research study accepts linear deterministic trend unrestricted with intercepts without trends on account of using a lag of 1 to 4 at 1st differences derived from Swartz Information Criterion (SIC) for the selected indicators under the study.

Table-2 reveals the multivariate cointegration test results in the course of Johansen approach that offers surety regarding connection between Indian gold price, exchange rates and sensex of in the long period as trace statistics is more than critical value in case of both the likelihood ratio test, to be exact, the trace test and the maximum eigenvalue test. Consequently, the results of the multivariate cointegration test do not accept the null hypothesis (talked about in hypothesis-2 above). This test also established



the number (two) of cointegration vectors. It is moreover indicating that two common stochastic trends or a degree of market integration are present there.

Table-2: Cointegration Test Results

Included observations: 5459 after adjustments

Trend assumption: Linear deterministic trend

Series: LSX LGP LER

Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.007540	27.52782	29.79707	0.0894
At most 1	0.001138	3.603699	15.49471	0.9329
At most 2	1.49E-06	0.004719	3.841466	0.9443

Trace test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.007540	23.92412	21.13162	0.0197
At most 1	0.001138	3.598979	14.26460	0.8991
At most 2	1.49E-06	0.004719	3.841466	0.9443

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Pairwise causal test

To establish the causal relationship with movement of causation between Indian gold price, exchange rates and sensdex, pairwise causal (Granger, 1969) test has been utilized in the present study. Table-3 illustrates the results of pairwise causal test and point up that there is no causal relationship exist (talked about in hypothesis-2 above) between (i) Indian gold price and sensdex, (ii) Sensdex and Gold price, (iii) exchange rates and



sensex, (iv) sensex and exchange rates, (v) exchange rates and gold price because the probability is more than 0.05. Table-3 also shows that there is bi-directional causal relationship exist between gold price and exchange rates because the probability is less than 0.05. Hence, pairwise causal assertion linking Indian gold price, exchange rates and sensex indicates that trend in one indicator is not the grounds for trend in other indicator under the study. Therefore, this study may conclude that causal relationship is merely a trend of the selected data under the period of study, as supported in (Awe, 2012).

Table-A.3: Pairwise Granger Causality Tests (Lags: 2)

Null Hypothesis	Obs	F-Statistic	Prob.	Decision	Type of Causality
Gold price \uparrow Sensex	5461	0.16297	0.8496	DNR H_0	No causality
Sensex \uparrow Gold price		1.89860	0.1499	DNR H_0	No causality
Exchange Rates \uparrow Sensex	5461	0.49372	0.6104	DNR H_0	No causality
Sensex \uparrow Exchange Rates		1.25162	0.2862	DNR H_0	No causality
Exchange Rates \uparrow Gold price	5461	0.73458	0.4798	DNR H_0	No causality
Gold price \uparrow Exchange Rates		3.40063	0.0335	Reject H_0	Bi-directional causality

Note: Decision rule: reject H_0 if P-value $<$ 0.05, DNR = Do not reject; \uparrow = does not Granger cause.

IV. Conclusion

The primary finding of the present study is that selected three financial variables are stationary time series data at I(1) that is an indication of the [impact of gold price and exchange rates on sensex](#) in the long period. The empirical results of cointegration method in the course of Johansen approach mention that protected cointegration association



between the selected variables under the study are greatly present in the long period **which confirms that sensex is influenced by gold price and exchange rates**. This research moreover illustrates that there are bidirectional causal connection present between gold price and exchange rates in the study period.

The above findings cleanly wrap up that in long term the Indian stock market is further obsessed by Indian macroeconomic causes more willingly than global causes. The marks of the present study have not to be extravaganced seeing that convincing for an investment. Despite considerate Indian stock market rooted in the involvements of the noteworthy variables, there stay behind erstwhile significant subjects so as to influence the return produces method. These concerns may be the asset valuation, industry analysis, and in next to no time. Any investor should think about every pertinent causes of information at what time building an investment choice, as supported in, (Makan et al, 2012).

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