Full length research paper

Is it true that Indian gold price influenced by Indian stock market reaction?

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The present study investigates the reaction of Indian stock market index (Sensex and Nifty) on Indian gold price or the relationship between Indian gold price and Indian stock market index (Sensex and Nifty) for the period of study between 2nd January 1991 and 10th August 2012 using daily time series data with the application of bivariate and multivariate cointegration test. In times of national crisis, bank failures, rupee depreciation, and in case of negative real interest rate, people consider gold as a solid asset and safe haven and like to invest in such yellow precious metal because there is a little chance of getting better returns in the stock investment due to a fragile economic and financial position. Bivariate cointegration test results specify that there is no cointegration relationship between gold price and the two stock market indices. But multivariate cointegration test results show that there is a presence of steady cointegration relationship between the gold price and two stock market indices in India. So, gold price in India was increased during the study period because of stock market reaction in India along with other macro-economic factors.

Keywords: Gold price, stock market indices, India, unit root test, cointegration test.

INTRODUCTION

It is in fact hard to imagine a world without stock markets now. In the present-day situation that can be described by increasing combination of the financial markets and execution of various stock market reform measures in India, the activities in the stock markets and their relationships with the macro economy have assumed significant importance (Agrawalla, 2008). It is not feasible to condition that gold's value transforms in consequence of movement within the stock market and it is not feasible to circumstances that the intensity of the stock market changes on account of the movement in the gold market. It is more precise to say that gold reacts differently to factors that shock the stock market (Paul, 2012). Whereas high inflation, credit and debt crises, bank failures, currency crises, commodity price shocks and international tensions tend to negatively impact the stock market, gold has historically held its value, or even risen, during such conditions (Itmtrading, 2012).

In times of general economic and financial crisis, gold is a safe haven investment. When paper currencies are over-produced, gold rises in anticipation of future inflation. When bank credit is over-produced and society can no longer sustain elevated debt levels, gold rises in anticipation of deflation, stock market collapses and bond failures. Again, in times of national crisis, bank failures, war and invasions and in case of negative real interest rate, people consider gold as a solid asset and like to invest in such precious metal because there is a little chance of getting better returns in the stock investments due to a fragile economic and financial position. Safe haven gold has been one of the burning themes in the investing world including India now, and in the midst of superior explanation (Bhunia, 2013). Over the past years, the financial industry has observed quite a lot of financial crises all over the world. Those crises might have considerably negative impacts on portfolio management with investments' returns of different social classes.

Investors and/or speculators who endured heavy loss from stock price falling did think of investing in gold, either to locate a safe haven or to anticipate a higher return. Market analysts said new procuring by investors in cycle in the midst of a firm global trend after investors

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improved holdings to an all-time high and central banks added to reserves as Europe's debt crisis continued for the most part led to rise in gold futures. Gold prices rose by Rs. 76 to Rs. 31,925 per 10 gm in futures trade today as speculators created fresh positions, taking positive cues from overseas markets (Economic Times, 2012). Therefore, in addition to various other factors demand of gold has appreciated the value of gold price and many economic variables including gold price have effect on the stock market. In times of general economic and financial crisis, gold is a safe haven investment. When paper currencies are over-produced, gold rises in anticipation of future inflation. When bank credit is over-produced and society can no longer sustain elevated debt levels, gold rises in anticipation of deflation, stock market collapses and bond failures.

LITERATURE REVIEW

A number of economic literatures have delved into the short-term and long-term impact of gold prices on macroeconomic variables like inflation, growth rate, exchange rates, employment effects and monetary policy. There is, however, little research on how the Indian gold price is influenced by Indian stock markets' reaction. Many studies have documented the rising trend of domestic gold price. Sumner et al. (2012), Bashiri (2011) and Gaur et al (2010) confirmed that in crisis of countries stock market slump and the gold price always trends higher.

Many studies have documented the long-run and short-run relationships among stock price index and gold price in developed and developing countries. Shahzadi et al. (2012), Coudert et al. (2011), Kaliyamoorthy and Parithi (2012) confirmed that there is no relationship with the stock market and gold rate and stock market is not a reason for increasing gold rate. Yahyazadehfar et al. (2012), Mishra et al. (2012) and Le et al. (2011) confirmed that there is a significant relationship with the stock market and gold rate and stock market is a reason for increasing gold rate. Kaliyamoorthy and Parithi (2012) documented that Indian stock market is not associated with gold market and gold prices have not been increased continuously due to Indian stock market crash. Le et al. (2011) investigated the association between gold price and crude price based on monthly time series data from 1986 to 2011 and showed that both the variables are closely linked with each other. Wang (2010) observed the association between commodity market variable and stock market of one European country and two South Asian countries based on monthly time series data between 1999 and 2008 and confirmed that stock market of the European country is considerably associated with two macro-economic indicators but the stock market of two selected countries are not associated with macro-economic indicators in the long period.

Gilmore et al. (2009) illustrated that stock market index was linked with gold mining companies' gold price index in the long period after utilizing the daily time series data between 1996 and 2007 and furthermore illustrated that both the variables persuaded each other in the short -run.

Smith (2001) wanted to find out the relationship between the price of gold and stock price indices for the United States over the period beginning in January 1991 and ending in October 2001 using cointegration test and Granger causality test. Over the period examined, there is no cointegration involving a gold price and US stock price index. There is no long-run equilibrium and the series do not share a common stochastic trend. Only short-run relationships are evident.

Yahyazadehfar et al. (2012) have used a sample of monthly data from March 2001 to April 2011 with the application of Variance Auto Regression model and Johansen-Joselius cointegration test to determine the impact of gold price on stock prices of Teheran Stock Exchange. The estimated long-run relationship shows that there is a negative relationship between gold and stock prices in Iran. They confirmed that gold price can greatly affect the stock market.

There is no relationship with the stock market and gold rate and stock market is not a reason for increasing gold rate (Kaliyamoorthy and Parithi, 2012). Their study intends to examine the relationship between gold market and stock market (SENSEX) for a period June 2009 to June 2010 using chi-square analysis. There is no relationship with the stock market and gold rate. Stock market (SENSEX) is increased and gold rate is also increased. Stock market is not a reason for increasing gold rate.

There was no existence of long term relationship among the gold prices and stock price indices (Shahzadi et al., 2012). Their paper evaluates the impact of gold prices on Karachi Stock Exchange which is major stock exchange of Pakistan by using data of five years from 2006 to 2010 using Johansen's Co Integration Test and Granger Causality Test (GCT) have been used. There is a perfectly negative relationship between monthly average gold prices and Karachi Stock Exchange 100 index. Keeping in view of this, the present study examines the relationship between Indian stock market index and Indian gold prices for the period from 2nd January 1991 to 10th August 2012 as a factor responsible for rising gold price in India continuously.

MATERIALS AND METHODS

Sources of data

The present study is based on secondary data collected from Bombay Stock Exchange database, Reserve Bank of India database and world gold council database for the

period from 2nd January 1991 to 10th August 2012 with a number of 5200 observations.

Sample design

In the present research work, daily Indian gold price and closing price of daily stock market index of Bombay stock exchange (Sensex) and National stock exchange (Nifty) have been taken for the selected periods. The entire empirical test has been arranged by using econometric (Eviews 7) software.

Tools employed

To analyze, test of stationerity through Augmented Dickey Fuller unit root method, bivariate and multivariate cointegration methods and pairwise Granger causal method have been employed in the present research work.

Test of Hypotheses

Hypothesis-1
H_0: Selected gold price and stock market index are not stationary.
H_1: Selected gold price and stock market index are stationary.

Hypothesis-2
H_0: Selected gold price and stock market index are not associated in the long period.
H_1: Selected gold price and stock market index are remarkably associated in the long period.

EMPIRICAL RESULTS

Unit root test results

Cointegration analysis is necessary where there is any long-term impact of gold price on stock price indices of Bombay Stock Exchange and National Stock Exchange. Cointegration analysis is possible if the series are stationary. In order to stationarity analysis, unit root tests of Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests are conducted with the levels and first differences of each series on the condition that the null hypothesis is non-stationary, so rejection of the unit root hypothesis supports stationarity.

Cointegration test has been exercised to establish the long term equilibrium associations between the selected variables and to evaluate the cointegrating vectors of the data series. Two likelihood ratio tests are utilized, the Trace Test and the Maximum Eigen Value test, to find out the number of co-integrating vectors. The inference for

every series supposes unrestricted intercepts and no trends. A lag of two is utilized for each series, based on the Swartz Information Criterion (SIC).

Subsequently, Johansen multivariate cointegration test is used to determine whether there is cointegration as well as the number of co-integrating relationships, that is, whether there is any long-term impact of gold price on Indian stock price indices or not. Two likelihood ratio tests are used, the Trace Test and the Maximum Eigen Value test, to determine the number of co-integrating vectors.

The estimation for each series assumes linear deterministic trend unrestricted with intercepts and no trends. A lag of 1 to 4 (in 1st differences) is used for each series, based on the Swartz Information Criterion (SIC).

DISCUSSION

Table 1 shows the results of unit root test. It reveals that time series are not at stationary levels. However, the table shows that the gold price and Bombay Stock Exchange and National Stock Exchange stock price indices are stationary at 1st difference [1(1)]. Augmented Dickey Fuller unit root analysis test reveals that errors have constant variance and are statistically independent. At the same time Phillip-Perron unit root test is used to check the stationarity of the data series. This test allows the error variance to be heterogeneously distributed and less dependent. It proves that the selected series are stationary at 1st difference [1(1)]. Therefore, cointegration test can be applied on these variables, as supported in (Shahzadi et al., 2012).

Table 2 illustrates the bivariate co-integration trace test result, which substantiates that, there are no long-term relationships existing between the selected variables. Besides, Max-Eigen value statistics test was employed to authenticate the outcomes of co-integration Trace statistics analysis in table 2. It furthermore ensures no co integrating equations have any level of significance (Shahzadi et al., 2012).

Table 3 reveals the multivariate co-integration test results. It assures the long-term relationship between the selected variables. The result confirms that the series is cointegrated, as both the trace and the maximum eigenvalue tests reject the null hypothesis of no co-integration, suggesting that there is one significant co-integrating vector in the model. This implies that there are two common stochastic trends, indicating a degree of market integration. Therefore, it may concluded that there exists a stationary, long-run relationship among the variables.

CONCLUSIONS

The present study investigates the relationships between gold price and stock market index (Sensex and Nifty). In other words, this study examines the relationship

Table 1. Unit Root Test Result

ADF		
	at level	**at 1ˢᵗ difference**
Gold price	0.784469	-77.16061
Nifty	-1.6699151	-50.62846
Sensex	-1.8443263	-65.98076
Critical values		
1%	-3.431425	-3.431330
5%	-2.861900	-2.861858
10%	-2.567004	-2.566982
PP		
	at level	**at 1ˢᵗ difference**
Gold price	0.830414	-77.14896
Nifty	-1.702241	-65.42885
Sensex	-1.810382	-65.95544

Table 2a. Bivariate Cointegration Test Result (lag 4)

Unrestricted Cointegration Rank Test (Trace)

	Hypothesis	Eigen Value	Trace Statistic	0.05 Critical Value	Prob.**	Remarks
Gold Price	r = 0	0.002113	11.13933	15.49471	0.2031	No cointegration
Nifty	r 1	2.95E-05	0.153122	3.841466	0.6956	
Trace test indicates no cointegrating eqn(s) 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 Eigen value)

	Hypothesis	Eigen Value	Maximum Eigen Statistic	0.05 Critical Value	Prob.**	Remarks
Gold Price	r = 0	0.002113	10.98620	14.26460	0.1549	No cointegration
Nifty	r 1	2.95E-05	0.153122	3.841466	0.6956	
Max-eigen value 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**		

Table 2b. Bivariate Cointegration Test Result (lag 4)

Unrestricted Cointegration Rank Test (Trace)

	Hypothesis	Eigen Value	Trace Statistic	0.05 Critical Value	Prob.**	Remarks
Gold Price	r = 0	0.001935	10.06183	15.49471	0.2760	No cointegration
	r 1	7.11E-08	0.000369	3.841466	0.9867	
Trace test indicates no cointegrating eqn(s) 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)

	Hypothesis	Eigen Value	Maximum Eigen Statistic	0.05 Critical Value	Prob.**	Remarks
Gold Price	r = 0	0.001935	10.06146	14.26460	0.2079	No cointegration
Sensex	r 1	7.11E-08	0.000369	3.841466	0.9867	
Trace test indicates no cointegrating eqn(s) at the 0.05 level		*** denotes rejection of the hypothesis at the 0.05 level**		****MacKinnon-Haug-Michelis (1999) p-values**		

Table 3a. Multivariate Cointegration Test Result

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None *	0.027987	157.2287	29.79707	0.0001
At most 1 *	0.001880	9.791931	15.49471	0.2971
At most 2	3.82E-06	0.019831	3.841466	0.8879

Trace 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

Table 3b. Multivariate Cointegration Test Result

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None *	0.027987	147.4368	21.13162	0.0001
At most 1 *	0.001880	9.772100	14.26460	0.2273
At most 2	3.82E-06	0.019831	3.841466	0.8879

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; Included observations: 5194 after adjustments; Trend assumption: Linear deterministic trend; Lags interval (in first differences): 1 to 4

between two stock market indices and gold price in India for the period from 2nd January 1991 to 10th August 2012 based on daily time series data. The primary conclusion from both the Augmented Dickey Fuller and Philips Perron unit root test illustrate that three selected variables are stationary at first differences, which is a pointer of long-run relationship or cointegration relationship. Bivariate cointegration test results indicate that there is no cointegration between gold price and Sensex as well as gold price and Nifty. Moreover, multivariate cointegration test results show that there is a presence of steady cointegration relationship between the gold price and two stock market indices in India, that is, gold price in India is influenced by Indian stock market indices in the long-run. So, gold price in India was increased during the study period because of stock market reaction in India along with other macro-economic factors.

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