Causal Relationship between Gold Price and SENSEX

Sowmya Jakkampudi Assistant Professor, Dept of MBA Sowmya.jakkampudi1@gmail.com T Srinivas Assistant Professor, Dept of MBA

Avanthi Institute of Engineering & Technology, Visakhapatnam

Abstract: This paper studies about the causal relationship on gold price and SENSEX in India. The monthly time series of closing data for BSE 100 and Gold price from World gold council are used for the period April, 2007 to March, 2017. By applying simple statistical analysis, Augmented-Dickey Fuller Unit Root Test to test stationarity in time series data. Ganger Causality Test is used to find the causal relationship between the variables. The result revealed thus price of gold and SENSEX has no affect in this period of study.

Key Words: Gold price, SENSEX, Stationarity, Causality

INTRODUCTION

Gold is most popular as an investment. Investors generally buy gold as a way of diversifying risk. The relationship between stock valuation and the gold prices is widely discussed correlation. The standard view is that two markets are negatively linked. When the stock goes up, the yellow metal dives and vice versa. Indian stock prices is influenced by no. of factors, but is greatly influenced by gold prices. In recent past two decades, a gold price remained comparatively stagnant, and stock market gave exception returns.

In the past decade, the increase in gold prices has been notable. However, a sudden jump in the price from Rs. 18,500 in 2010 to Rs. 26,400 in 2011 is drastic increase. The price of 10 gram of gold in the year 2012 it was Rs. 31,050. In Dec, 2013 it was RS. 29,600. Initially the increase in gold prices was less from year to year but there is a drastic increase in recent years. If the trend continuous common man will see gold not an investment but as an unreachable asset. Many researchers have done the long run and short run relationship of the stock price index and gold in developed and developing countries. With the Stock market volatile this indicates there is a correlation between these two.

OBJECTIVES

The main objective of the study is

- 1. To determine the existence of co integrating vector between BSE SENSEX and Gold Prices
- 2. To check whether there exists causality between the selected two variables (SENSEX and Gold prices)

HYPOTHESIS

 H_0^{-1} : There is no co integration relation between SENSEX and gold

 H_0^{2} : There is a causal relationship between SENSEX and Gold

RESEARCH METHODOLOGY

The study fully based on secondary data from various data sources. To analyze the causal relationship between the variables, the study considered monthly closing data of SENSEX and the monthly gold prices from World Gold Council for the period of 10 years from 2007 to 2017.

Statistical Tools

In this study Granger causality and Correlation method is using to find out the relationship between gold and SENSEX.

Granger causality is tested in the context of linear regression model

For illustration,

$$y(t) = \sum_{i=1}^{\infty} \alpha_i y(t-i) + c_1 + v_1(t)$$

$$y(t) = \sum_{i=1}^{\infty} \alpha_i y(t-i) + \sum_{j=1}^{\infty} \beta_j x(t-j) + c_2 + v_2(t)$$

Correlation coefficient which range between -1 to 1. Perfect positive correlation implies that one security moves either up or down the other security will move in same direction. The perfect negative correlation means that if one security move in either direction the other security will move in opposite direction. If the correlation is 0, the movement of securities has no correlation.

Empirical Analysis

Correlation result:

Table 1 correlation test

	SENSEX	GOLD
SENSEX	1.000000	0.566327
GOLD	0.566327	1.000000

The value of pearson's correlation coefficient(r) between SENSEX and GOLD series over the period 2007 to 2017 is 0.566327

The Granger Causality test assumes stationarity of the time series. Thus to check the time series properties of the two variables Sensex and gold price, the most popular technique: The Augmented Dickey - fuller test has been used. The unit root tests for stationarity has shown that SENSEX and Gold Prices are not stationary in levels but are stationary on first difference.

Unit root test:

To analyse the sationarity of the series, ADF is conducted with the log of SENSEX with the null hypothesis that SENSEX has a unit root.

Table 2.1 unit root test of SENSEX at level

Exogenous: Constant Lag Length: 0 (Automatic - based on t-statistic, lagpval=0.1, maxlag=0)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.742273	0.4086
Test critical values:	1% level	-3.460173	
	5% level	-2.874556	
	10% level	-2.573784	

Null Hypothesis: SENSEX has a unit root

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

From the table 2.1, the ADF test statistical value -1.74 is greater than the test critical value at 1%, 5% and 10% at the probability value of 0.4086 which is greater than 5%. Hence null hypothesis is accepted. Hence, the first difference of the SENSEX is tested for unit root as next step.

Table 2.2 unit root test of SENSEX at I(1)

Null Hypothesis: D(SENSEX) has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on t-statistic, lagpval=0.1, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.58358	0.0000
Test critical values:	1% level	-3.460313	
	5% level	-2.874617	
	10% level	-2.573817	

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

Here as the statistical value at first difference (-14.58) is less than the test critical values at 1%(-3.46), 5% (-2.86) and 10% (-2.57) at Probability less than 5%. Hence Null hypothesis that there is no unit root for log of SENSEX is rejected. The rejection of null hypothesis supports the stationarity of SENSEX at first difference i.e. at I(1).

Table 3.1 unit root test of Gold at level

Null Hypothesis: GOLD has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on t-statistic, lagpval=0.1, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.849154	0.3553
Test critical values:	1% level	-3.486064	
	5% level	-2.885863	
	10% level	-2.579818	

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

Table 3.2 unit root test of SENSEX at level I(1)

Null Hypothesis: D(GOLD) has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on t-statistic, lagpval=0.1, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.48163	0.0000
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

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

From the above table 3.1 and table 3.2 we can observe that the statistical value of gold at I(0) is greater than its critical values at 1%,5% and 10% at probability 35% which is greater than the 5%. So null hypothesis is accepted. And the statistical value at level I(1) -12.48 is less the critical values at 1%, 5% and 10% at the probability which is less than that of 5%. Hence null hypothesis is rejected. The rejection of null hypothesis supports the stationarity of gold price at first difference.

Granger Causality Test

Granger Causality test examines the lag lead relationship between variables at 0.05 level of significance with taking F Test findings. This test is a statistical proportion test for determining whether one time series is helpful in forecasting other.

Table 4 Granger Causality test of gold and SENSEX

Null Hypothesis:	Obs	F-Statistic	Prob.
GOLD does not Granger Cause SENSEX	107	1.86286	0.1605
SENSEX does not Granger Cause GOLD		0.03146	0.9690

The above table reveals that gold to SENSEX does not have significant relationship hence the probability value is greater than 5%. So null hypothesis is accepted. Gold price does not granger cause SENSEX. There is also no significant relationship between SENSEX to gold prices as the probability value is less than 5%. Hence Null hypothesis is accepted. SENSEX does not granger cause Gold prices.

CONCLUSION

The purpose of this study is to examine the relationship between gold and stock returns by means of correlation. World Gold Council Report says that Indian stands today as the world's largest single market for gold consumption. First, the study find distributional properties of monthly series of BSE SENSEX and gold prices during the study period using descriptive statistics.

Second, the co integration and causality test are conducted for the study period March 2007 to April 2017 using Augmented Fuller test for stationarity and Granger Causal Test for causality test. ADF test results in stationarity of series of gold as well as SENSEX at level I(1). Ganger causality test concluded that there is no affect on one another at this study period.

REFERENCES

- Kumar, K. S. (2011). STUDY ON DYNAMIC RELATIONSHIP AMONG GOLD PRICE, OIL PRICE, EXCHANGE RATE AND STOCK MARKET RETURNS. International Journal of Applied Business and Economic Research, Vol. 9, No. 2, (2011): 145-165.
- [2]. Prof. S P Narang, R. P. (2013). Causal Relationship between Gold Price and Sensex. Vivekananda Journal of Research, 33-37.
- [3]. S K Patel Institute of Management and Computer Studies, Causal Relationship between Stock Market Indices and Gold Price: Evidence from India, The IUP Journal of Applied Finance, Vol. 19, No. 1, January 2013, pp. 99-109
- [4]. Wang M, W. C. (2010). Relationships among Oil price, gold price and exchange rate and international stock markets. International Research Journal of Finance and Economics, 47, 80-89

Website References

- [1]. Historical Gold prices from: www.gold.org/
- [2]. SENSEX data from: www.bseindia.com/indices/IndexArchiveData.aspx