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Causality between gold prices and Sensex: An empirical analysis

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Abstract

The current paper explores the causality between the movement of gold prices and the stock market indices. Both gold and stock are considered as good avenues of investment and to diversify one's portfolio. The ADF Unit test, Granger causality test, and Johnson co-integration test have been conducted on monthly data from 2001 to 2017. The results show the absence of an association between the price of gold and Sensex in the long-run. Furthermore, there is a very weak causal effect of the stock market prices on the gold prices. The findings of the study do not reveal the existence of any link between gold prices and the Sensex. As a result, gold can be included in the portfolio as a means of diversification.

Keywords: Co-integration, gold prices, stock, SENSEX, Causality, relationship

Introduction

Stock market is considered an important indicator of how an economy is performing. They have and always will be the main regulated platform, where public can buy and sell shares. People get a chance to put in their savings into stocks of companies that are performing well to earn good returns. Thus it helps in mobilising resources from where it is in surplus to where it is needed. Investors invest in stock markets to diversify their investment, to make their money grow and stock markets provide liquidity to the investors and flexibility in which company they want to invest & from where they want to move out. The stock market indices that basically tracks the movement of a basket of securities is affected by many macroeconomic factors like the inflation, the interest rates, the global economy etc.

Gold is another form of investment which has been attractive to Indians since olden times. It is considered as a stable asset which protects one's investment in the long run. When the other assets show instability, people start purchasing gold which increases its price further. Whenever there is global political turbulence or instability in global equity markets, the investment demand for gold increases. Gold price remains more or less stable all over the world. It has the advantage of higher liquidity as even during political & financial uncertainties it can be encashed. Investment in gold is also a good means of diversification of portfolio. In fact it has been observed that the central bank has pledged gold to borrow on international capital markets to tide over Balance of payments difficulties. India had also resorted to this in 1992, by pledging it with the World Bank.

The common view is that gold prices and stock market prices move inversely. If stock market prices are low that is if the stock market is in a bearish phase people would like to invest in gold and gold prices will become even higher whereas if stock markets are performing well people would like to reap good returns and buy stocks. Gold has traditionally been considered as a secure investment which can be liquidated in times of need. When the stock market fails or the currency weakens, gold is a safe haven investment. According to new study from the Federal Reserve, investors are increasingly using gold to hedge their assets during times of crisis. Even when global stock markets plummeted, gold prices rose. The culture of investment in the stock market in India is relatively new compared to the age old practice of buying gold both for its ornamental value and as a backup in times of need.

Review of literature

The link between gold prices and stock market prices is a topic on which academics disagree. Dr A Bhunia & Mr Amit Das, (2012) [1] in their study on the domestic gold prices and stock market returns in the NSE for a period of April 2001 to March 2011, found that both stock market returns and gold Granger cause each other so the causality is from both sides. Hence they observed co- movement between the prices of the two.

Mishra PK, Das JR and Mishra SK, (2010) [3] delves into the data of the price of gold and Stock returns for a stretch of almost 20 years starting January 1991 to see if there is any causal connection. Their analysis shows evidence of feedback causality between the two variables, indicating that both Granger cause each other.

Srivastava & Babu (2016) [6], study the relationship between Gold and Stock market returns of the Nifty Index for a period from 2005 to 2014 to see what leads to the other. Their study suggests a unidirectional relation between Gold returns and Nifty returns. Gold returns cause equity returns in the long run.

Bilal, Ahmad Raza *et al*, (2013) conducted a study to find out the relationship between Gold prices and main indices of the Karachi and the Bombay Stock Exchanges. Their study finds that as far as gold prices and KSE 100 index is concerned, there is no evidence of a long term relation whereas a long term relation can be decoded in the case of gold prices and the BSE stock indices.

Narang, SP and Singh, RP, (2012) [4] in their analysis covering a period of ten years examine the cause and effect relation between gold price and sensdex. They find no existence of causality between the two variables, neither change in gold prices lead to change in sensdex and neither is the vice versa true.

Patel, SA,(2013) [5] used monthly data on Mumbai Gold prices, Sensdex and CNX Nifty for a duration of over 20 years starting January 1991 and ending December 2011, for studying the existence of a causative relation among gold

prices and the above indices in India. They discovered a long run equilibrium relation between all variables and that Granger causality is from gold price to nifty only, suggesting thereby that gold price has a capacity to forecast nifty returns.

Tripathy, Naliniprava. (2016) [7], found that in the short run there was no causal link between gold and stock market price, though the study found a co movement between Gold & stock market price in the long run.

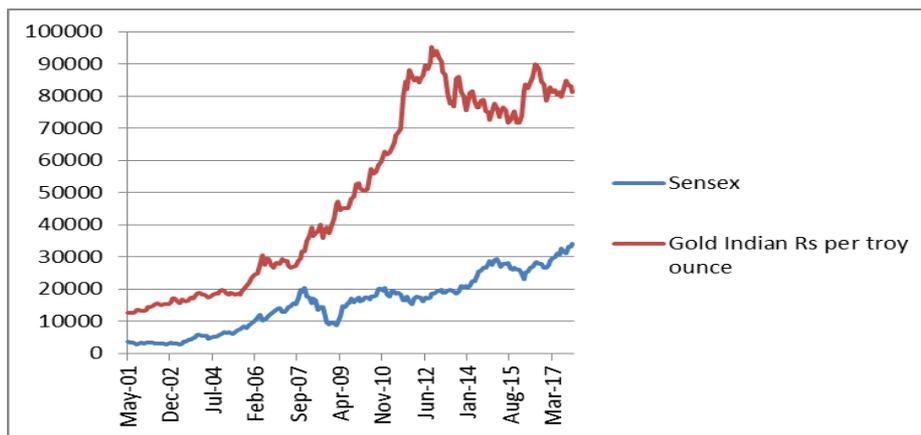
Thus, there is no broad consensus among researchers regarding the relationship between the prices of the precious yellow metal and stock market returns. In the following section, this study seeks to make an empirical investigation.

Data and Methodology

The study takes into account monthly data on gold prices in the national market and stock market performance during 2000 to 2017 in India. We used the log value of each variable because we were using time series dated data. The information was gathered from the Yahoo Finance website. To ensure stationarity, an augmented dickey fuller test was performed. The proper lag was chosen using the VAR Lag Order Selection Criteria. The long term relationship was then tested using the Johansen Cointegration test, which included Trace and the Maximum Eigenvalue test. To check for short-run causality between the two variables, the study considered Granger causality test

Empirical Analysis

Figure 1 shows the monthly data of BSE Sensex vis a vis Gold prices. The trend line of both SENSEX and Gold prices are rising over the period of 17 years. While the gold prices rises at steady pace, SENSEX seems to rise at steep pace. The Correlation between the two variables is 0.8634, which suggest that both the variables are quite correlated. Because we utilised time series dated data, we took the log value of each variable.



Source: Researcher own

Fig 1: Comparison of Stock Market and Gold Prices from 2000 to 2017

An Augmented Dickey Fuller test was performed to ensure the stationarity of our data. At the level value, all variables are non-stationary. As a result, variables were transformed into first differences. Table 1 demonstrates that for each variable, the null hypothesis of unit root is rejected at a p value of 0.00.

Table 1: Augmented Dickey-Fuller test statistic

Null Hypothesis	t-Statistic	Prob
LNSENSEX has a unit root	-1.074633	0.7257
LNGOLD has a unit root	3.243443	0.9997
D(LNSENSEX) has a unit root	-12.85538	0.0000
D(LNGOLD) has a unit root	-12.58241	0.0000

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

Author Calculation

Using the VAR Lag Order Selection Criteria, we chose Lag 1 for further investigation as seen in table 2. The majority of tests, including “FPE” (Final prediction error) “SC”

(Schwarz information criteria), and “HQ” (Hannan-Quinn information criterion), indicate that lag 1 is the best test.

Table 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-222.9050	NA	0.035686	2.342761	2.376693	2.356504
1	607.2147	1634.298*	6.53e-06*	-6.262653*	-6.160856*	-6.221425*
2	608.6656	2.826258	6.71e-06	-6.236100	-6.066439	-6.167386
3	609.8978	2.374597	6.91e-06	-6.207269	-5.969743	-6.111069
4	611.1873	2.457996	7.11e-06	-6.179034	-5.873644	-6.055349

“Endogenous variables: LNGDP LNFDI

Exogenous variables: C

* indicates lag order selected by the criterion

LR stands for sequential modified LR test statistic (each test at 5% level)

FPE stands for Final prediction error

AIC stands for Akaike information criterion

SC stands for Schwarz information criterion

HQ stands for Hannan-Quinn information criterion”

There is no co-integrating relationship between gold prices and the stock market, which can be seen in Table 3. At the 0.05 threshold, both the Trace and Max-eigenvalue tests

show no cointegrating eqn (s). It indicates that there is no association between stock market and gold prices in the long run.

Table 3: Results from the Johansen Cointegration Trace and the Maximum Eigenvalue test

Test	Hypothesized relations	Trace test statistic	Probability
Trace test	None *	10.12542	0.9195
	At most 1	3.124076	0.8614
Maximum Eigenvalue test	None *	7.001342	0.9007
	At most 1	3.124076	0.8614

The table reports results from Johansen cointegration Trace tests, and Maximum Eigenvalue tests, ** denotes significance at the 5% level, and * at the 10% level

Compiled by Author

The Granger causality test was used to assess the causality between gold and stock prices, in the short-run and the findings are given in table 4. At the 5% threshold of significance, neither gold nor the sensdex index influence gold prices or GDP per capita at lag 1. At a 10% level, we observed weak causation from the sensdex to gold prices. We observed no causality between SENSEX prices and Gold price at 5% level of significance.

Table 4: Results from Granger Causality Test

Granger-Causality test with intercept	Test statistic	p-value
Lnsensex does not Granger Cause Lngold	2.87686*	0.0914
Lngold does not Granger Cause Lnsensex	0.75550	0.3858

Research Outcome * significance at 10% level, ** significance at 5% level, *** significance at 1% level

Conclusions and Implications

The incidental association between the Sensex and gold price has been investigated in this research. The study makes use of data acquired on a monthly basis from Yahoo finance. In the long run, johansen's co-integration test shows that there is no relation between parameters studied. According to the Granger causality test, neither do Sensex index returns lead to an increase in gold price, nor does a rise in the price of gold have any impact on the Sensex. Our findings are consistent with those of Bilal, Ahmad Raza et al. (2013) and Narang, SP, and Singh, RP (2012) [4]. The price of gold is dependent on many factors like demand by consumers, as a protection against volatility, as a hedge for inflation, the rupee- dollar exchange rate etc.

The stock market prices are more a reflection of the country’s industrial growth, stability and economic performance and the fundamentals of the economy. Hence the determinants of the two are different & there is little chance of they being related. Although it has been observed that sometimes there is a negative correlation between the two, an inverse relation exists between the prices of the stock market and gold, it can be true for all asset classes that when one crashes, people will invest in the other whose value is stable or on the rise. Gold holds a similar relation with interest also. When interest falls people would like to take out money from fixed income securities & invest in gold. So such an economic relation will hold good for all investment classes.

As seen in our analysis such a specific relationship does not exist between gold & stock prices in particular.

Though the equity markets give considerable returns during a bullish phase they also have a shortcoming of going to the rock bottom in adverse conditions. Gold is a reliable and dependable metal in that Gold prices have never hit a rock bottom and hence has been a safer form of saving. Also if the equity stock market is not doing well and people choose debt or real estate to park their savings, there is a always the fear of not being able to find a customer in case property has to be sold or in case of debt there may be a lock-in period whereby the debt cannot be redeemed. Hence gold is considered a safe haven for investment.

A well-diversified portfolio which includes both stocks and gold as an investment, can give good returns as well as avoid panic reactions in markets and impart more stability.

Since the price of gold doesn't change dramatically it is considered a good tool of hedging in the event of inflation and/or currency devaluation.

It would be wise to complement stocks with gold because it acts as a hedge against inflation, currency depreciation, has no credit risk, is a hedge against systemic risk and it not having an obvious correlation with any one variable, it's a good investment diversifier. Also when other assets are under stress gold can protect one's portfolio from volatility.

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