

AN EMPIRICAL STUDY ON IMPACT OF GOLD AND SILVER PRICES ON STOCK MARKET: INDIAN CONTEXT

Mr.DILEEP, Asst Prof,
Dept of Finance, R.V Institute of Management, Bangalore

Dr.G.V.KESAVA RAO,
Professor & Head Dept. of MBA Global Academy of Technology Bangalore



ABSTRACT

This research paper presents empirical evidences from Indian stock market and precious metals like gold and silver. Indian stock market rapidly thriving from last two decades, which made researcher to find any association and/or impact between stock market and precious metals in India. A sample consisting of Gold, Silver and Sensex has been selected for the study based on the research objectives. Six years data has been considered for the study and collected from CMIE data base. Normality test, Unit root test by using Augmented Dickey-Fuller test, Multi-Collinearity test, Multiple Regression Analysis, Correlation and Vector Auto Regression model. The result shows that, there was no association between the selected variables, there was no impact between Sensex as dependent variable and Gold & Silver are independent variables and predicted one month (June 2018) gold and silver prices.

Key Words: Sensex, Gold prices, Silver prices, ADF and Correlation and Vector Auto Regression.

1. Introduction

Stock market movements make headlines every day in India. Stock market plays a vital role for the development of the economy. Surprisingly only 3.23 crore investors registered in Indian stock market which is less than 2%. However stocks prices are highly fluctuates in the market based on the many reasons in the economy. Gold has occupied a unique role in the financial systems of cultures worldwide. Unlike virtually every other commodity, gold has value far beyond its applications in industry. The supply of above-ground gold is limited. Gold deposits are difficult to find, and extracting the metal from gold mines is an expensive and time-consuming endeavor. There are several common factors that typically move the price of gold such as Supply and demand, Central bank policies and demand for financial instruments that invest in gold.

Silver is a shiny white metal with several extraordinary characteristics. It is malleable, pliable and beautifully lustrous. Silver is also highly reflective and conducts electricity extremely well. It even kills bacteria. Reasons to invest in silver: Investors should consider silver for its potential to mitigate portfolio risk, emerging economies are less likely to trust flat currencies and more likely to trust hard assets such as silver.

2. Review of Literature

Patience Hlupo, (2017) in his study have tested the relationship between Gold Prices and Equity Market using data obtained from the industrial and mining indices and Stock prices were collected from ZSE. To find out the relationship various analytical tools were used like ADF Unit Root Test,

Granger Causality Test, Regression and Variance Decomposition. From the correlation, regression, granger causality and variance decomposition results that there is an insignificant relationship between gold prices and stock market performance proxied by the ZSE Industrial Index. The same tests show that there is a short-run association between gold prices and the performance of gold mining firms listed on the ZSE. However in this study only Gold as a commodity was considered'. Maria E. de Boyrie, (2016), Boyrie through this paper has calculated the correlation between equity markets and commodities using the dynamic conditional correlation (DCC) model introduced by Engle (2002), while emphasizing the differences between emerging and developed markets co-movements with commodities. For this the data used is - 24 physical commodity futures are included in the GSCI commodity index and the five sectors they span are energy, agriculture, livestock, industrial metals and precious metals, The MSCI indices. And tools used are ARCH/GARCH type model, DCC model and correlation. The results reveal that emerging markets, especially those in Asia, show a much lower level of co-movement with commodities than developed markets do. It is found that both agricultural and precious metals commodities offer better diversification possibilities in the less developed markets². Antwi Kofi Gyasi, (2016), Gyasi in this paper has tried to find the relation between Ghana Stock Exchange Market and Oil price changes by using various analytical tools like Bi-variate VAR-GARCH-BEKK model, BFGS (Broyden, Fletcher, Goldfarb, Shanno) algorithm, ADF, KPSS, ARCH, mean, median, standard deviation, Kurtosis and Skewness. The data stretches over a period of 5 years starting from 24th February, 2011 to 24th February, 2016 generating 1306 observations. The paper

concludes that there exists a strong relationship between these commodities and the Ghana stock exchange market, there is a strong bi-directional relationship between the Ghana stock exchange and crude oil prices, there is unidirectional relationship means that the Ghana stock market only receives shocks and volatility from gold price changes. This study considers only two commodities for its study i.e., Gold Price and Oil price³. Dr. Mustafa Ildirar and Dr. Erhan Iscan, (2015), In this article the authors have investigated the long-run relationship between commodity prices and stock prices in ECA countries using data obtained from IMF, IFS iLibrary System, which includes Stock Prices, Oil price, Iron price, Rubber price, Wheat price within 212-1025. For that study tools used are Panel Co-integration test, Panel Unit Root test of Levin, Lin and Chu, Pedroni's Panel Co-integration Test, ADF test and PP test. Results show that there is no co-integration between commodity and stock market. Estimates indicate that interaction between stock market and commodity market is uncertain. The research conducted is for a very limited period which doesn't give a reliable result. As the test is conducted for different countries, the economic factors differ from one country to another and its impact also varies which cannot be measured under same frame⁴. Dr. Shefali Tiwari and Dr. Barkha Gupta, 2015, Shefali and Barkha in their study have examined the causal relationship between gold prices and stock market returns in India using the data collected from various sources like moneycontrol.com, BSE INDIA, MCXIndia.com. The sample is collected from July 2005 to August 2014. They have used important tools like ADF and Granger Causality Test. The results of Granger causality test reveals that returns of Sensex index does not lead to increase in gold price and rise in gold price does not lead to increase in Sensex. The commodity considered here is only gold. Other commodities can also be considered to give the impact of commodity on stock market⁵.

3. Research Methodology

Descriptive research was used for the study, with the characteristics of prices/values and volatility of the prices/values of Gold, Silver and Sensex.

- a. Method of Sampling - The sampling technique followed for this study was convenience research sampling. The sample unit was gold, silver and Sensex values.
- b. Sample Size - A sample consisting of Gold and Silver and one stock index from the Indian capital market has been selected for the study based on the research objectives.
- c. Research Techniques - Following are the tools and techniques used in the study:
 - 1. Jarque-Bera test was applied to test the Normality of the selected variables.

- 2. Further to the Normality Test the selected data was tested for the stationary and this was done by using the Unit Root Test with the help of Augmented Dickey Fuller Test.
- 3. Vector Auto Regression (VAR) was used to model the relationship between time series variables and for estimate and forecast the values.

4. Objectives for the Study

- 1. To understand the relationship between Gold and Silver prices and stock market in India.
- 2. To study price discovery of Gold and Silver futures prices in Indian Capital Markets.
- 3. To study the impact of Gold and Silver prices towards stock market in India

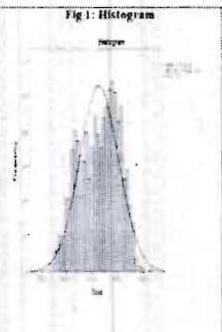
5. Scope for the Study

In this study, the attempt was made to understand whether prices of Gold and Silver affect the Sensex. But, it is not practically possible to study the impact of all the commodities. Therefore the scope of the study was restricted to only to Gold and Silver precious metals and their impact on Sensex, This study was restricted to data of the market from 1st April, 2012 to 31st May, 2018.

6. Data Analysis

Table 1: Descriptive Statistics of Gold Silver and Sensex

	Gold	Silver	Sensex
Mean	27752.64	43250.63	23481.06
Median	27658.90	41890.70	25230.03
Maximum	37343.90	63166.60	29681.77
Minimum	25580.30	30770.60	19948.10
Std. Dev.	5005.878	8382.766	4825.346
Skewness	0.111386	0.585913	-0.292376
Kurtosis	2.690782	2.191312	1.970647
Jarque-Bera	10.04120	169.1466	122.707
Probability	0.000000	0.000000	0.000000
Sum	4438111	53890921	29311147
Sum Sq. Dev.	4.98E+09	9.61E+10	5.00E+09
Observations	1276	1276	1276



The above table reveals the information normality with the help of descriptive statistics for all the selected variables. From the table, researcher can see that the Jarque – Bera test value of computed p-value of all the three variables are less than 0.05 significance level hence null hypothesis is rejected i.e. the errors are not normally distributed. Here, it was also found that Skewness of distribution is a greater than 0.00. It is also specify that selected three variables are positively skewed. Kurtosis is a measure of symmetry and peakedness of a distribution. The Sensex, Gold and Silver are follows platykurtic distribution. Jarque-Bera Test shows higher values for all the three variables signifying that the variables differ significantly from the normal distribution.

Unit Root Test- Augmented Dickey Fuller (ADF) Test for Gold

H0: Gold Price has Unit root (Gold prices are Non-Stationary)

H1: Gold Price does not have a Unit root (Gold prices are Stationary)

Table 2: ADF Test Results for Gold

Null Hypothesis: GOLD has a unit root			
Exogenous: Constant			
Lag Length: 7 (Automatic - based on SIC, maxlag=24)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.755082	0.0651
Test critical values:	1% level	-3.433813	
	5% level	-2.862956	
	10% level	-2.567571	

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

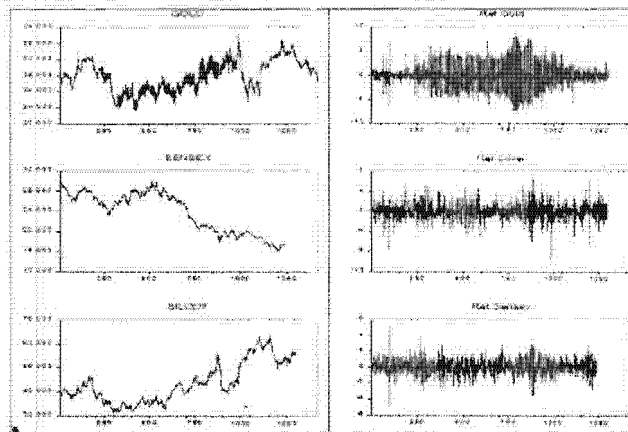
Source: Data collected from COMET and Author's Calculation using EViews 9.

Table 3: Table Showing ADF Test Results at Level and First difference

Sl. No.	Variable	Level			First Difference		
		ADF T-Statistic	P-Value	Hypothesis	ADF T-Statistic	P-Value	Hypothesis
1	Gold	2.755	0.064	Accept H ₀	13.588	0.00	Reject H ₀
2	Silver	0.978	0.763	Accept H ₀	30.71	0.00	Reject H ₀
3	Sensex	0.9173	0.772	Accept H ₀	22.5674	0.00	Reject H ₀

Source: Author's Calculation using EViews 9.

In the above table ADF test values for selected variables are rejected null hypothesis at level and accepted at first difference. The selected data has a unit root at level i.e. p-value of Gold, Silver and Sensex are 0.064, 0.763 and 0.783 respectively which is greater than 0.05 significance level hence it accept the null hypothesis for all three variables. The selected data does not have a unit root at first difference i.e. p-value of Gold, Silver and Sensex all are 0.00 which is less than 0.05 significance level hence it reject the null hypothesis for all three variables. This particular test help us to know that, the selected data can be used directly for further estimation and forecasting or should be convert them into returns.



Sensex and Gold shows low level of correlation with the value of 0.0115. Sensex and silver are negatively correlated with the value of -0.011. Therefore from the above analysis, researcher can specify that, there is no exists correlation between gold and silver and stock market and they do not influence each other.

Vector Autoregressive (VAR) Model

For forecasting the future price of Gold and Silver prices in Indian Capital Market VAR is used. The price is forecasted for Gold and Silver for next one month.

Table 5: Predicted price comparing with actual prices

Date	GOLD			SILVER		
	Forecast	Actual	Variation (%)	Forecast	Actual	Variation (%)
6/1/2018	30865.9	31100	0.75	39803.5	42800	6.77
6/2/2018	30877.6	31016	0.45	39889.8	42800	6.78
6/4/2018	30890.5	31470	1.84	39892.5	42600	6.36
6/5/2018	30898	31480	1.85	39888.9	42700	6.58
6/6/2018	30904.9	31450	1.73	39885.2	42800	6.81
6/7/2018	30911.8	31500	1.87	39881.6	42900	7.04
6/8/2018	30918.9	31540	1.97	39877.9	43000	7.90
6/9/2018	30925.9	31600	2.13	39874.1	43600	8.54
6/11/2018	30939.9	31530	1.93	39866.9	43700	8.77
6/12/2018	30947	31560	1.94	39867.3	43700	8.80
6/13/2018	30954	31550	1.88	39859.6	43900	9.20
6/14/2018	30961	31600	2.02	39856	44100	9.62
6/15/2018	30968	31160	0.62	39852.3	44500	10.44
6/16/2018	30975.1	31380	1.92	39848.7	45200	11.84
6/18/2018	30989.1	31500	1.62	39841.4	45300	10.06
6/19/2018	30996.2	31600	1.91	39837.7	45300	8.42
6/20/2018	31003.2	31550	1.73	39834.1	45200	7.79
6/21/2018	31010.2	31560	1.74	39830.4	43000	7.37
6/22/2018	31017.3	31500	1.53	39826.8	43000	7.16
6/23/2018	31024.3	31510	1.54	39823.1	43700	8.87
6/26/2018	31045.4	31450	1.29	39817.2	45300	8.05
6/27/2018	31052.5	31460	1.29	39808.6	43700	8.90
6/28/2018	31059.5	31470	1.30	39804.9	43000	7.43
6/29/2018	31066.6	31350	0.90	39801.3	43100	7.65

The prices of gold and silver converted into return because of stationary purpose and further with the help of VAR the gold and Silver are forecasted for one month i.e. June 2018. The model provides the estimation of returns for next one month which again converted into prices and compared with actual prices of gold and silver. It is identified that, the forecasted price of the gold is more appropriate than the silver, Gold has very small variation of average of 1.57% whereas Silver has average variation of 8.22%.

Table 4: Showing Correlation Matrix for the selected Commodities and SENSEX:

	Return Gold	Return Sensex	Return Silver
Return Gold	1	0.0115	0.0008
Return Sensex	0.0115	1	-0.011
Return Silver	0.0008	-0.011	1

Source: Author's Calculation using EViews 9.

Table 5: Multiple Regression Test

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	0.047348	0.027302	1.734245	0.0831
RET_GOLD	0.004735	0.011527	0.410814	0.6813
RET_SILVER	-0.006505	0.016854	-0.385965	0.6996

R-squared	0.000252	Mean dependent var	0.047516
Adjusted R-squared	-0.001368	S.D. dependent var	0.959509
S.E. of regression	0.950165	Akaike info criterion	2.759000
Sum squared resid	1137.646	Schwarz criterion	2.771418
Log likelihood	-1703.441	Hannan-Quinn criter	2.763671
F-statistic	0.155633	Durbin-Watson stat	2.041104
Prob(F-statistic)	0.855890		

From the above multiple regression test, it has been considered that, Sensex is a dependent variable whereas Silver and Gold prices are independent variables. The result can be concluded that there is no impact between Sensex and Gold and Silver as the p-values of the test are 0.6813 and 0.6996 respectively, which is more than 5% value and thus can be concluded that there is no impact between Sensex and Gold and Silver. Durbin Watson test statistic is 2.041, which specifies about the model fitness even though r squared value has very less.

7. Conclusion

In this research paper, the study of impact of Gold and Silver Prices on Stock Market has been examined. The study uses daily data which is collected from CMIE database. Jarque-Bera test reveals that the data series of all the variables and even stock market does not come from a normal distribution. The results of Augmented Dickey- Fuller test conclude that the series are stationary and integrated of order one. There is no correlation between stock market with and Gold and Silver. Multiple-regression test concludes that there is no impact between Sensex and Gold and Silver. Hence it can be concluded that, the test as influence of Gold and Silver as precious metal to stock market which does not take place and selected data are interdependent. There are many factors which influence the stock price in the stock market, this research paper provides the information to the investors that, they need not to be focus on gold and silver performance which, that is not much influencing the stock market.

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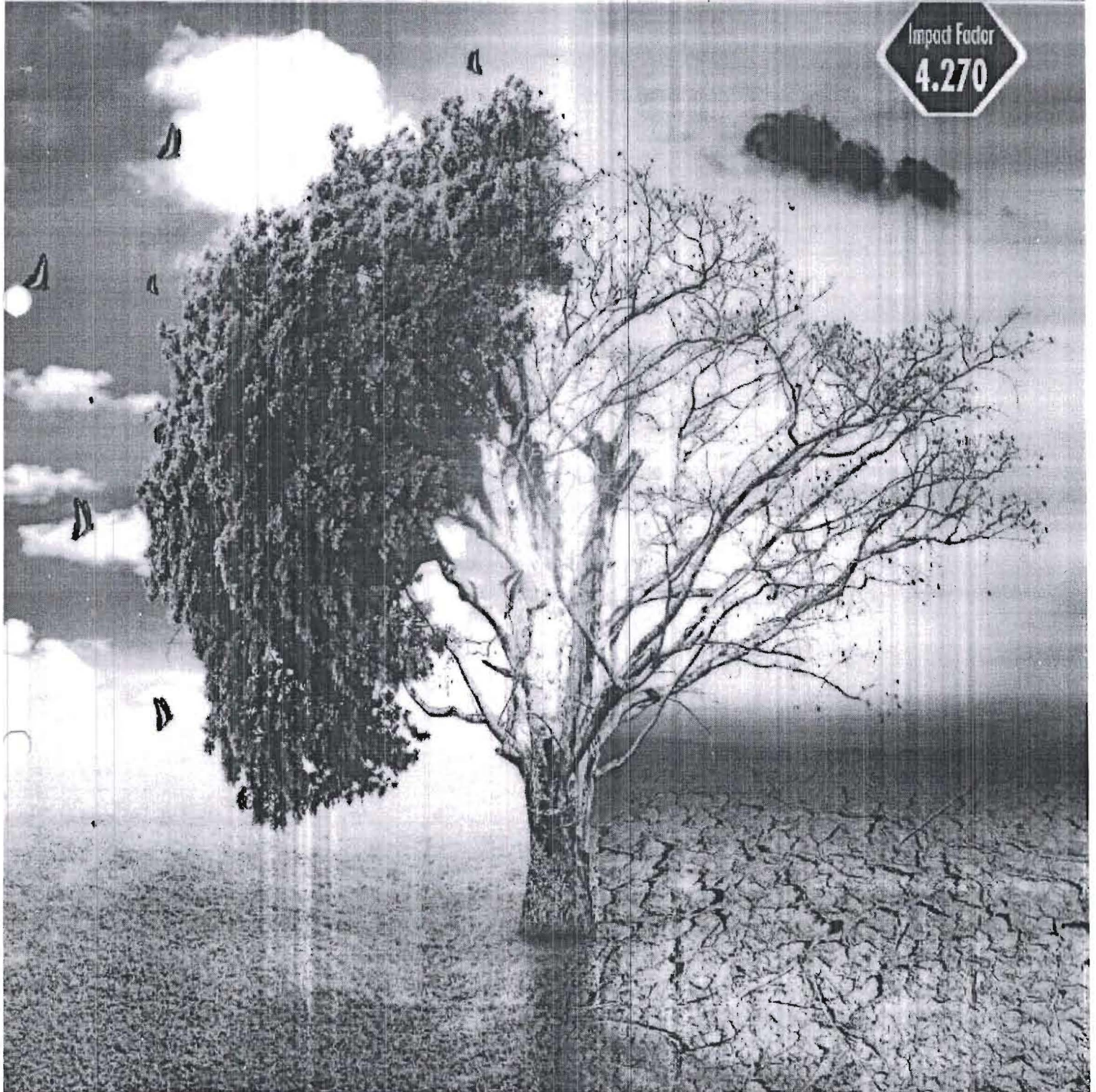
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