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Relationship Between the Gold Prices and Exchange Rate of Us Dollar in India and China

Shripad Marathe | Assistant Prof. DMs College , Assagao, Mapusa Goa

ABSTRACT The paper studies Impact of Inflation, Crude Oil prices and Exchange Rate on Gold Prices Fluctuations in India, China and USA. Applying co-integration and vector error correction models (VECM), Vector Auto Regression (VAR) and Granger Causality to data for 1996–2015 and found Exchange Rate has the short term relationship and there is Unidirectional Causality in India and China shows there is positive insignificant short term relationship between the Exchange Rate and it have Unidirectional Causality.

Introduction

A floating exchange rate will enhance monetary policy autonomy and help the economy adjust to external shocks, as China continues to become more integrated into both the global economy and global financial markets **(IMF, 2015)** In **(Omag, 2012)** shows that there is a positive relationship between US dollar and Turkish Lera **(Siti Nurul-huda Ibrahim, 2014)** stated that there is a negative relationship between exchange Rate and Gold Prices. **(K. S. Sujit, 2011)** stated that Gold prices are highly affected by change in Exchange rate. **(Rahul Bishnoi, 2014)** stated that Gold prices and US dollar to Indian Rupee Exchange rate are positively correlated. To analysis the Relationship between the Exchange Rate and Gold Prices India and China Gold Prices and Exchange Rate in US dollar are taken for consideration.

Literature Review

Allese, 2008 studied the development of the price of Gold. The author has studied Gold market and the factors and trends from 1997 to 2007, which effect the Gold prices fluctuation. The study concluded that Oil and Gold Prices and USD positive correlated.

Sujit, 2011 this study shows relationship among Gold price, stock returns, Exchange rate and Oil price. This study takes daily data from January 1998 to June 2011. Using techniques of time series the study studies relationship among these variables using vector autoregressive and co integration technique. The results show that Exchange rate is highly affected by stock returns, Exchange rate and Oil price.

Omag, 2012 this article Shows the relationship between Gold Prices and selected financial indicators in Turkey from January 2002 to December 2011. The results demonstrate that there is a positive relationship between national Gold Prices, Istanbul Stock Exchange 100 Index and the Exchange rate between Turkish Lira and the Dollar.

Bhunia, 2013 Study investigates the Co-integration relationships among Crude Oil price, domestic Gold price and selected financial variables (Exchange rates and stock price indices) in India for the period from January 2, 1991 to October 31, 2012. Johansen Co-integration 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.

Ibrahim, 2014 this paper analyzed factors that affecting the Prices of Gold in Malaysia covering data for 10 years period which are from 2003 until 2012. The researcher used variables that affect the Prices of Gold which are Crude Oil Prices, CPI rates and Exchange rates. The empirical results have found there is negatively significant relationship between CPI rates and Exchange rates on Gold Prices, while a Crude Oil price is positively significant.

Bishnoi, 2014 This paper analyses the critical factors affecting the price of Gold using ordinary least square, white-test and weighted least squares taken yearly data from 1994 to 2013. The results show

that Gold Prices, US dollar to Indian Rupee Exchange rate, and Crude Oil Prices are positively correlated albeit a negative relationship clearly emerges with the Rate of CPI, long run interest rates in the US and their Real GDP.

Dubey ,2014 Present study is based on the Gold price trends and what factors determine the Gold price in India. The paper specially focuses on increase in Gold Prices in India in the years between 2004 to 2013. According to empirical findings, highly positive correlation is found between Gold Prices and CPI rate of our country.

Jaiswal ,2015 This paper deals with various aspects attached to the paper basically uses the data available through journals, reports, articles,etc. and concludes that Investing in Gold is potentially a way to maintain purchasing power. The purchasing power of Gold rises and falls as the real price of Gold rises and falls.

Omag ,2012 this article observes the relationship between Gold Prices and selected financial indicators in Turkey from January 2002 to December 2011 with a regression model. The results demonstrate that there is a positive relationship between national Gold Prices, Istanbul Stock Exchange 100 Index and the Exchange rate between Turkish Lira and the Dollar.

Sindhu,2014 this paper is basically focused on the factors like Exchange rate of US dollar with INR, Crude Oil Prices, repo rate and CPI rate. Each of the factors is studied with the Gold Prices. The relationship between the factor and the Gold Prices is emphasized in this paper. There exists an inverse relation between the US$ and Gold Prices. The Crude Oil Prices have an impact on the Gold Prices. Gold Prices and repo rates are interdependent. Gold Prices and CPI rates are also dependent and positively correlated.

Scope of the study

Growing variability in Gold prices in the recent years, validate the need to examine such fluctuation from January 1996 to December 2015. The data for 20 years has been taken for consideration and the three markets are considered i.e. India, China and USA for studying the determinants of Gold Prices. In reality Gold price did not solely affected by single factor. In the study, the relationship between the Gold prices and Exchange Rate of the countries were being investigated.

Research Methodology

The Period of the Study is from January 1996 to December 2015 Sample size Contains three countries India, China and USA. The study undertook the secondary data for analysis. The Monthly values of Exchange rate were taken from various websites as Reserve Bank of India (Exchange Rate),World Gold Council (Gold Prices), US Energy information Administration (oil prices) and National Bureau of Statistics of China etc. Statistical Tools and Techniques used are

Unit Root Analysis (Augmented Dickey Fuller), (Phillip Perron)

The ADF Unit root is based on null Hypothesis Ho:-Yt is Not I(0). If the

calculated ADF Statistic is less than the critical value, then the null Hypothesis is rejected; otherwise accepted. ADF and Phillip Perron is used to see the stationarity between Gold Prices and Exchange rate of Rupee.

$$\Delta Y = \alpha 0 + \alpha 1 Y - 1 + \sum Yj \Delta Y - j + E$$

Vector Auto Regression

VAR Model is used to predict and analyze interrelated time series and dynamic effects that the random perturbations have on the variables system. There is no need to specify whether some variables are endogenous or exogenous. It shows the response of Exchange Rate and Gold Prices. It focuses more on the increase or decrease in trend. It is also used to detect the causal relationships among the variables.

Johansen Co-integration Test

The trace statistic can be specified as: Γ Trace

$$= -T \sum \log(1 - \lambda i)$$

Johansen Co-integration Test has been applied to check whether the long run Equilibrium relation exists between the Oil Prices and Gold Prices. It is based on two test statistic, i.e. Trace Test Statistic and the Maximum Eigen value test statistic.

Granger Causality Test.

The **Granger causality test** is a statistical hypothesis test for determining whether one time series is useful in forecasting another. So study helps to determine whether Exchange Rate helps to determine Gold Prices. A time series Exchange Rate is said to Granger-cause Y if it can be shown, usually through a series of t-tests and F-tests on lagged values of Exchange Rate (and with lagged values of Gold Prices also included), that those Exchange Rate values provide statistically significant information about future values of Gold Prices.

$$\hat{t} = \sum_{i=1}^{m} B1 Y - 1 + \sum_{i=1}^{m} ai Xt - i \quad X_{t=}$$

$$\alpha 0 + \sum_{i-1}^{m} \alpha i Xt - 1 + \sum_{i=1}^{m} \Lambda i Yt - 1$$

Analysis of the Study

Table I
Descriptive Statistics of Gold Prices and Exchange Rate from 1996-2015

Particular	Gold Prices	Gold Prices India	Exchange Rate	Exchange Rate
	China		India	China
Mean	2.285630	2.285879	1.667313	0.872904
Standard				
Deviation	0.282718	0.282779	0.065520	0.052399
Skewness	0.228366	0.229379	0.446558	-0.508829
Kurtosis	1.477696	1.480270	3.049901	1.511741
Jarque-bera	25.26013	25.20037	8.001461	32.50542
Probability	0.000003	0.000003	0.018302	0.000000

Source:-Authors compilation

The above **Table I** highlight dependent variable that is Gold Prices India has a highest standard deviation i.e. 0.282779 and kurtosis value of 1.480270.which points out that Gold Prices of India moves around 0.0282779, Gold prices have shown an increasing trend because the Average value is increasing over the period of time. Exchange Rate shows a Highest standard deviation for India i.e. 0.065520 Skewness shows that Exchange Rate are is positively Skewed in India but Negatively in China.

Table II
Unit Root Analysis of Gold prices and Exchange Rate

Unit Root	ADF			Phillip-Perron	
Null Hypothesis	T- Statistics	Prob.		T- Statistics	Prob.
Gold price USA has a Unit Root	-13.01519	0.0000		-13.01519	0.0000
Gold price India has a Unit Root	-13.02951	0.0000		-13. 03678	0.0000
Gold price China has a Unit Root	-12.99907	0.0000		-12.99907	0.0000
Exchange Rate of India has a Unit Root	-12.45943	0.0000		-12.5042	0.0000
Exchange Rate of China has a Unit Root	-5.158155	0.0000		-10.30796	0.0000

Source:-Authors compilation

Table II shows that the data is significant at 1% level(i.e. p value<1%) and become stationary at First differenced so this data can be used to find the Johansen (1998) and Johansen and Juselius (1990) Co-integration for long term relationship.

Table III
Johansen Co-integration between Exchange Rate of China, India and Gold Prices

Source:-Authors compilation

Table III shows there is no Co-integration equation between India, China Exchange Rate and Gold prices or we also find co-integrating variables when p value is less than 0.05% then there is a co-integrating variables in the equation. In above table we can see that all the p values are more than 0.05% then we conclude there is no long term relationship and we use VAR model to determine the Short term relationship between the variables.

Table IV
Vector Auto Regression between Exchange Rate and Gold prices

Perticular	China Exchange Rate and Gold Prices		India Exchange Rate and Gold Prices	
Independent	Dep.Gold Price China	Dep. Exchange Rate China	Dep.Gold Price India	Dep. Echange Rate India
Gold Price (-1)	1.156471*** (0.06604) [17.5125]	-0.000108 (0.00015) [-0.72569]	1.004158*** (0.00589) [170.481]	0.000949 (0.00046) [2.07637]

Gold Price(-2)	-0.164979** (0.06720) [-2.45498]	-0.00000 (0.00015) [-0.03408]	-	-
Exchange Rate (-1)	-14.10999 (27.8638) [-0.50639]	1.369658 (0.06297) [21.7492]	-0.246384 (0.12426) [-1.98282]	0.990991** (0.00964) [102.804]]
Exchange Rate (-2)	13.18160 (27.3733) [0.48155]	-0.388758 (0.06187) [-6.28384]	-	-
Constant	9.639019 (24.6859) [0.39047]	0.165897 (0.05579) [2.97347]	11.48078** (5.17823) [2.21713]	0.325727 (0.40171) [0.81086]

* Indicates significance at 10% ** significance at 5% ***significance at 1%

Source:-Authors compilation

Table IV shows that in Gold prices (-1) and Gold Prices (-2), Exchange Rate (-1) and Exchange Rate (-2) are the dependent variables. It shows that in China as the time goes Gold prices are increasing. Gold Price (-2) is negative and it is significant at 5% level. It means gold prices are affected by its own past values. In India Gold prices Lag (-1) is significant at 1% level shows that today's prices are affected by its past one month prices and Exchange Rate Lag(-1) is significant 5% and shows that past values of exchange rate effecting today's Exchange Rate.

Table V
Granger Causality Test between Gold Prices and Exchange Rate

Null Hypothesis:	Obs.	F-Statistics	Prob.	Decision	Nature of Causality
Gold prices China does not Granger Cause Exchange Rate	235	2.36708	0.0405	Rejected	Causality
Exchange Rate China does not Granger Cause Gold Prices	235	0.70468	0.6205	Accepted	No Causality
Gold prices India does not Granger Cause Exchange Rate	228	2.85780	0.0012	Rejected	causality
Exchange Rate does not Granger Cause Gold Price India	228	0.69592	0.7545	Accepted	No causality

Source:-Authors compilation

Table V shows the results of Granger Causality Test between India ,China Gold prices and Exchange Rate The Probability value is less than 5% then we reject the null hypothesis i.e. There is no Causality between the variables. This test shows that Gold Prices China Causes the Exchange Rate of China so we reject the null hypothesis and accept that past values of Gold prices effect the present values of Exchange Rate so there is unilateral Causality. In India also the Gold prices affect the Exchange Rate of India. So in India there is unidirectional causality between the Exchange Rate and Gold Prices.

Conclusion
In this obective we have analyzed the relationship of Exchange Rate in US dollar and Gold Prices and China and India is taken for consideration .We use the time series data from January 1996- December 2015 and apply Cointegration , Granger Causality test and Vactor auto Regrassion. In India the relationship between the Exchange Rate and Gold prices are positive insignificant short term relationship and variables are not cointegrated and we found that Gold prices drives Exchange Rate and the past values of Gold prices affect the present value of Exchange Rate. So there is unilateral causality. In China we found that the relationship between the Exchange Rate and Gold Prices are not co integrated and \have a positive insignificant short term relationship between the variables. We also found that there is unidirectional causality and the past values of China Gold prices affect the present Value of Exchange Rate. In India and china the investor are advised that if the Exchange Rate depreciates then invest in Gold for a short period it will help the investor to hedge the Exchange Rate in terms of US dollar

because the relationship between the Exchange Rate and Gold Prices have Positive significant short term relationship.

References

1.   Allese, k. (2008). Understanding the development and influences of the price of gold. International university audentes.
2.   Bhunia A. (2014). Investigating the impact of gold price and exchange rates on sensex: an evidence of india. European journal of accounting,finance and business , 2 (1).
3.   Bhunia, A. (2013). Co-integration and causal relationship among crude price, domestic gold price and financial variables an evidence of bse and nse. Journal of contemporary issues in business research , 1-10.
4.   Bishnoi R., (2014). An empirical analysis of factors affecting gold prices. IJHPD 3 (2).
5.   Ibrahim S.N. (2014). The determinants of gold prices in Malaysia. Journal of advanced management science, 38-41.
6.   IMF. (2015). World economy and financial survey. IMF .
7.   K. S. Sujit (2011). Study on dynamic relationship among gold price, oil price, exchange rate and stock market returns. International journal of applied business and economic research, 145-165.
8.   Omag, A. (2012). An observation of the relationship between gold prices and selected financial variables in turkey. Muhasebe ve finansman dergisi , 195-204.
9.   OPEC. (2016). OPEC monthly oil market report. Organization of the petroleum exporting countries.
10.   Prakash,P. (2014). An empirical analysis on the relationship between gold and silver with special reference to the national level commodity exchanges, India. International journal on recent and innovation trends in computing and communication , 2 (8), 2224– 2233.
11.   Sheetal Dubey, a. H. (2014). An analysis of determinants that influence the gold price movements in India. International journal of research in commerce, economics & management , 4 (3).
12.   Sindhu. (2014). A study on impact of select factors on the price of gold. Journal of business and management , 84-93.
13.   Sood V. (2013). An econometric analysis of gold price: a paradigm change in Indian capital markets in dynamic business environment. Altius shodh journal of management & commerce (2348 – 8891)
14.   Tufail, B. (2013). An analysis of the relationship between inflation and gold prices: evidence from Pakistan. The Lahore journal of economics, 1-35.
15.   World Gold Council reports (2015)
16.   China, N. B. (2015).Retrived from www.nationalberauof statisticsof china.com