'Golden' Nexus of Global Factors in India

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Abstract

The present paper tries to explore the relationship between Gold prices and various other external factors vis-à-vis Crude oil price, Foreign Institutional Investment, Standard & Poor's- 500, Foreign Exchange Reserves and the value of a dollar in terms of Indian Rupee. The study also attempts to find out whether fluctuations in the prices of gold are influenced by changes in these factors. For the purpose of study monthly statistical data for the abovementioned variables was analysed covering the period from April, 2004 to March 2013. In order to examine the relationship among these factors Multiple Regression Equation model (Galton, 1877) has been employed. The results reveal high co-relation among the factors used under the study i.e. Crude oil, Foreign Institutional Investment, S&P 500, Foreign Exchange Reserves and USD/INR & suggest that all these external factors significantly influence price of gold in India.

Keywords:

Crude oil, Foreign Institutional Investment, Foreign exchange reserves, Gold price, Standard & Poor's- 500, US Dollar, Regression Analysis.

Introduction

Gold, a metallic element which is considered to be one of the most precious metal and also sometimes used as a frequent commercial medium. Gold is measured as one of the most preferred investment avenues since its discovery. This glittering yellow metal has always fascinated all classes of investors irrespective of their geographical location due to the properties it offers such as liquidity, security & portfolio. Even in the era of industrialization the importance of gold is also evidenced from the fact that after the end of World War II, under the Bretton woods system the US Dollar remained pegged to gold at $35 per ounce till 1973. Away from being a safe investment, with the changing scenario its role is also changing in the current paradigm. The Gold is now being traded and forecasted as a commodity (Greely & Currie, 2008). Gold has always been considered as a commodity providing cushion against declining purchasing power of money thus investment in gold is often made to thwart the impact of inflation and currency depreciation. It also serves as an alternative source of investment in the event of bearish or volatile stock market. As both gold and stock are often substitutes to each other, universally there exists a reverse relationship between gold and stock prices because as the prices of gold rises the investors start investing less in gold consequently falls in stock prices and vice versa. When an economy experiences slow down with

falling returns from stock market investors withdrew their holdings from stocks and park their investments in gold until the economy revives. The role of liberalized and developed gold market in the interest of consumers is being increasingly realized and the efforts are underway for integrating the gold market with financial market (Reddy, 1997, 2002, Thorat, 1997, Bhattacharya, 2002).

The importance of this golden metal can also be recognized from the fact that it shares substantial portion of foreign exchange reserves of government and central banks all across the world. It is also evidenced from the world economic history that countries including India (in 1990s) had parked their gold holding as a security for loan to correct balance of payment disequilibrium. It has also been observed that the currencies having large backing of gold are stronger than others. It is evidenced from the historical gold and stock prices in India that whenever stock market falls or dollar weakens gold prices rises as gold becomes safe investment avenue under such circumstances (Gaur & Bansal, 2010). Similarly, gold also serves as an alternative source of investment to other financial assets such as securities, currencies, reality etc due to their volatility subjected to market conditions. Gold is now being used as an alternative for dollar since its collapse (Turk and Rubino, 2008). Another reason why gold is most preferred by an ordinary investor to other investment avenues is that it attracts no credit risk and can be easily liquidated at any time even in scenario of economic crisis, inflation and political unrest. The sharp rise in the price of gold & weakening dollar (for some time), tumbling stock market across the world aftermath of US subprime crisis, justifies its significance as an alternative to stock. The role of investment in gold has drawn more attention since this transformational economic crisis began to unfold in 2008 (Fei & Adibe, 2010).

India's rush for gold is also not hidden at all. Over the years, Indian demand for gold has not only sustained but has rise sharply, despite the fact that India imports a large chunk of its gold need & in wake of weakening Rupee in the recent years, gold has become second largest imported commodity after crude oil. Despite the sharp recent price rise in the international gold prices the demand for gold has sustained, not only as a component of safe haven but also its social and cultural importance (Mishra R and Mohan G 2012). According to Assocham's report, India accounts for one third of the global demand for gold further demand for gold in India is irrespective of the size of its GDP as compared to other countries. Indian gold demand is 37.6 percent more than that of China & consumer demand of gold for USA stood at 213.5 tonne whereas in terms of percentage share India's GDP is 27.7 percent of China and a meager 11.0 percent of USA.

During the last few years, gold prices witnessed a dramatic volatility. Aftermath economic slowdown triggered by US Subprime crisis it came to emerge as an alternative source of investment to falling stocks & then depreciating currencies. Gold, in India witnessed boost in its prices with tumbling US Dollar & stock market on the backdrop of US Subprime crisis & subsequent euro zone crisis, but in the recent past with the signs of revival of US economy coupled with slow down in emerging economies the prices of gold started losing its glitter & experienced high volatility.

Literature Review

Though the prices of Gold in India are largely dependent on large number of factors such as its production, demand, substitute investment avenues etc. yet there also exists influence of different global macroeconomic factors on the prices of Gold in India. Keeping in view the significance of the global economic factors on the prices of gold, number of studies has been carried out across the world thus; there is an availability of ample literature in this regard.

Kolluri (1981) found the existence of association between gold price and inflation rate which can be utilized for hedging and other activities.

Sherrman (1983) employed multiple regression to explore the important determinants of gold prices wherein he found that tension index, interest rate, the US trade weighted exchange rate, the GDP, the excess liquidity and the unanticipated inflation are significant determinants of gold price with serial autocorrelation. When he tried to overcome it some variables like tension index become insignificant while other like unanticipated inflation became insignificant.

Moore (1990) in his empirical studies found negative correlation between gold price and stock/bond markets.

McCann et al. (1994) developed a forecasting mechanism based on a simple recurrent neural network to discover turning-points in the gold price so as to determine whether to take long or short position in the gold price.

Dooley, Isard and Taylor (1995) in their several empirical studies found that gold has explanatory power in predicting movements in exchange rates in addition to the movements in monetary fundamentals and other variables that enter standard exchange rate models.

Sajaastad and Scacciallani (1996) examined the relationship between the gold price and foreign exchange market for the period 1982-1990 wherein they found significant influence of change in European currency on the prices of gold where less influence of US dollar. They also found that among major currencies fluctuations in the real exchange rates explain almost half of the variation in the gold price

Graham (2001) found the existence of short term interaction and long term equilibrium gold prices and stock prices. Accordingly there is no long run relationship between the gold price and stock price but in short run stock price affect gold price.

Kannan et al. (2003) studied the various factors affecting demand for gold in India and concluded that gold has inverse relationship with its price and is positively related with income further they also found that financial wealth induced by medium term trends in equity prices has a positive impact on gold and real yield on government bonds have inverse relationship with gold demand.

Exploring the alternative to the US Dollar Kumar (2005) found that though Dollar plays a key role in storing wealth and a medium of exchange still if people suspect that the dollar may be vulnerable they may sell dollar and look for something more secure like other currencies or Gold.

Levin et al. (2006) covering the period of 1975-2006 proved the

existence of a long run relationship between the gold price and the average price level in US. Employing co integration test to analyse the long run relationship & error correction models to test short run dynamics they found that in a short run the main determinants of gold price are US inflation, inflation volatility, credit risk, the interest rate to lease gold and the US trade weighted exchange rate. Their studies also proved that 66% of a deviation of the long run relationship will disappear within five years after the shock that caused deviation. This research was an extension & value addition to the study 'Political risk in oil producing countries' conducted by Ghosh et al. (2000)

Wang et al. (2010) examined the oil price, gold price, exchange rates of dollar in contrast with currencies and stock markets of Germany, Japan, Taiwan, China, and USA. The empirical results found co-integration and long-term stable relationship among these variables in the mentioned countries except USA. Nevertheless, there is no co-integration and long term stable relationship among these variables in USA.

Mishra et al. (2010) analysed the causality relation between domestic gold prices and stock returns in India. Employing Granger Causality in Vector Error Correction Model they found that gold prices granger causes stock returns in India & stock returns also granger causes gold price in India during the sample period January 1991 to December 2009.

A. Karunagaran (2011) found that in wake of financial crisis in 2008 central banks of emerging and advanced economies started accumulating gold as a part of reserve management by either buying fresh stock of gold or by stopping selling of their existing stocks of gold.

Sujit et al. (2011) investigated dynamic relationship among gold price, stock returns, exchange rate and oil price covering the period January 1998 to June 2011. Using Vector autoregressive and Co-integration technique, they found that exchange rate is highly affected by changes in other variables whereas stock price have fewer role in affecting the exchange rate & found weak long term relationship among variables.

Mishra et al. (2012) found that both domestic and global gold prices are closely interrelated. They also examined the nature of changes in the factors affecting international gold prices during the last two decades wherein they found that short-run volatility in international gold prices used to be traditional factors such as international commodity prices, US dollar exchange rate and equity prices.

More recently, Ray et al. (2013) examined causal nexus between gold price and stock price for the period 1990-90 to 2010-11. Employing Granger causality test they confirmed the presence of uni-directional causality which runs from gold price to stock price.

The relationship between gold prices and various domestic and international economic factors is strongly supported by the above literature thus provides basis for further research in this regard.

Research Methodology

Objectives of The Study

1. To explore different global factors determining the price of gold in India.
2. To study the impact of Crude oil, FII, S&P 500, Foreign exchange reserves, USD/INR on Gold price taken together.

Sample Discription

In the present study monthly time series data has been used of Gold price, Crude oil price, Foreign exchange reserves, Foreign institutional investment, S&P 500, and Exchange rates (expressed in Indian rupee per US Dollar). The study uses the sample covering the period of April, 2004 to March, 2013. Various considerations were taken into account while selecting these variables. All these variables were subject to high volatility aftermath 9/11 subsequent US Subprime crisis and recent Euro zone crisis. In the present scenario while the advanced economies are again bouncing back to growth track while developing economies which emerged as the global growth engine after 2007-08 are experiencing slump in their growth rate, currency depreciation, high inflation, high interest rates & market volatility etc. due to global and domestic reasons.

Gold has been subjected to dramatic volatility since subprime crisis. It experienced huge appreciation after crisis due to its emergence as the major hedging cum investment asset after subprime crisis & started losing its glitter for last few months due to gradual resurgence of US & other European economies. Although in Indian context excessive import of gold with unprecedented depreciating Indian Rupee has became a menace to India's Fiscal fundamentals. It is evidenced from the fact that while in 2007-08 the share of gold import to India's total import was 16723.6 million US Dollar while in 2010-11 it has touched a mark of 33875.8 million US Dollar.

In view of the above, we try to explore the relationship between above mentioned global factors as independent variables and Gold price as dependent variable. For the purpose of study data for Foreign exchange reserves has been obtained from the Hand Book on Indian Economy published by Reserve Bank of India. Further average monthly data for exchange rates and gold has been collected from the OANDA Forex Trading and Exchange Rates Service online database & World Gold Council database respectively.

Empirical Testing Procedure

For the purpose of study Multiple Regression Analysis, a statistical technique that simultaneously develop a mathematical relationship between single dependent variable and two or more independent variables, has been employed to evolve the dependency of Gold price on FII, S&P 500, Foreign exchange reserves, USD/INR and Crude oil. The relationship has been tested using following equation-

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + U$$

Where,

Y indicates Gold price

α is the intercept

X_1 stands for the Foreign Institutional Investment as FII

X_2 stands for Standard & Poor's-500 abbreviated as SNP

X_3 stands for the Foreign Exchange Reserves abbreviated as FOREX

X_4 stands for US Dollar (exchange rate) abbreviated as USD

X_5 stands Crude oil abbreviated as CROIL

β_1, β_2, β_3, β_4, & β_5 are the regression coefficients or slopes of X_1, X_2, X_3, X_4 & X_5 respectively. They represent the rate of change of dependent variable as a function of changes in the other. In nut shell, how one unit change in dependent variable as accompanied by change in how many units in the independent variable.

The significance of the coefficients may be checked by respective t values or p values. The null hypothesis is rejected if the p-values obtained is less than and accepted if it is greater than the assumed level of significance that is 5 percent in this case at which we are testing hypothesis. This happens as a p value (or probability value) is the probability of getting a value of the sample test static that is *as least as extreme* as the one found from the sample data, assuming that the null hypothesis is true. By *extreme* we mean: far from what we would expect to observe if null hypothesis is true. In other words, a small p value indicates that observation of the test-statistic would be unlikely if null hypothesis is true. The lower the p value, the more the evidence there in favour of rejecting the null hypothesis.

Hypotheses

1. H_0: Gold price is not dependent on Foreign Institutional Investment.

   H_0: Gold price is significantly dependent on Foreign Institutional Investment.

2. H_0: Gold price is not dependent on S&P- 500.

   H_0: Gold price is significantly dependent on S&P- 500.

3. H_0: Gold Price is not dependent on Foreign Exchange Reserves.

   H_0: Gold price is significantly dependent on Foreign Exchange Reserves.

4. H_0: Gold price is not dependent on US Dollar.

   H_0: Gold price is significantly dependent on US Dollar.

5. H_0: Gold price is not dependent on Crude oil.

   H_0: Gold price is significantly dependent on Crude oil.

Scope And Limitations of The Study

- The scope of the present study is confined to various macroeconomic variables namely Gold, Crude oil price, FII, Foreign exchange reserves, S&P-500, & Exchange rates.
- During the period under the study there might have some effect of contemporary economic, social, political situations prevailing in India & global economy, on the variables under the study.

Findings and Discussions

Table:1 Descriptive Statistics

	N	Mean	Std. Deviation
GOLD	108	46108.89	24322.99
FII	108	30613.20	41652.41
SNP	108	1244.23	175.75
FOREX	108	236714.03	69117.48
USD	108	46.32	4.04
CROIL	108	77.11	26.24
Valid N (listwise)	108		

Table 1 shows that standard deviation of Gold, FII, Forex Reserves & Crude oil is very high. While S&P-500 and USD shown low variability during the period under study.

Table 2: Correlations[a]

		GOLD	FII	SNP	FOREX	USD	CROIL
GOLD	Pearson Correlation	1	.215*	.174*	.787**	.739**	.766**
	Sig. (1-tailed)		.013	.036	.000	.000	.000
FII	Pearson Correlation	.215*	1	.165*	.302**	-.138	.224**
	Sig. (1-tailed)	.013		.044	.001	.076	.010
INDEX	Pearson Correlation	.174*	.165*	1	.090	-.151	.476**
	Sig. (1-tailed)	.036	.044		.177	.059	.000
FOREX	Pearson Correlation	.787**	.302**	.090	1	.321**	.823**
	Sig. (1-tailed)	.000	.001	.177		.000	.000
USD	Pearson Correlation	.739**	-.138	-.151	.321**	1	.277**
	Sig. (1-tailed)	.000	.076	.059	.000		.002
CROIL	Pearson Correlation	.766**	.224**	.476**	.823**	.277**	1
	Sig. (1-tailed)	.000	.010	.000	.000	.002	

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

a. Listwise N=108

On applying Karl Pearson's Coefficient of Correlation at 5% level of significance as shown in the Table-2 above, it seems that there is a significant relationship between Gold price and other variables as their respective significance values are less than our assumed level of significance i.e. 0.05. Further, Forex Reserves, US dollar and Crude oil are found to be in a high positive correlation with Gold prices whereas; S&P-500 and FII were found low correlated with Gold price.

Table:3 Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.970[a]	.942	.939	6016.32917

a. Predictors: (Constant), CROIL, FII, USD, SNP, FOREX

b. Dependent Variable: GOLD

	Coefficients	Standard Error	P-Value
Intercept	-185529.349	10206.587	9.145633151755937E-34
FII	.069	.015	2.054907620787391E-5
SNP	14.640	5.026	0.00440107211908879
FOREX	.130	.020	1.462569088811513E-9
USD	3554.827	162.204	2.2570601497408305E-40
CROIL	204.780	57.651	5.803107779343942E-4

As it is evidenced from the above tables that all the variables i.e. FII, SNP, Forex Reserves, US dollar, and Crude oil are significantly affecting the Gold price as their respective P-values are much less than 0.05 in each case. SNP, US Dollar and Crude oil are strongly positively correlated with Gold price while FII and Forex Reserves found weakly positively correlated with Gold price. The ratio of estimated variation to actual variation is explained by R-Square. Thus, it explains that how much variation in dependent variable is explained by the independent variables. Thus, as per the above calculated statistics 94 percent of the total variation in the Gold price is explained by our model.

Table: 4 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-185529.349	10206.587		-18.177	.000		
	FII	.069	.015	.118	4.467	.000	.815	1.226
	SNP	14.640	5.026	.106	2.913	.004	.434	2.307
	FOREX	.130	.020	.370	6.652	.000	.185	5.411
	USD	3554.827	162.204	.591	21.916	.000	.785	1.274
	CROIL	204.780	57.651	.221	3.552	.001	.148	6.770

a. Dependent Variable: GOLD

From the above table it can be seen that VIF values of all independent variables are less than 10 which indicates the absence of multi co linearity among the independent variables under the study.

(Generally, VIF values should be less than 5 but, in the Social Science researches VIF values up to 10 are also acceptable. Thus, considering this, Foreign Exchange Reserves and Crude oil lack multi co-linearity & are justified by our model.

Hypothesis Testing & Conclusion

From the Table 4 given above we test our set hypothesis as following-

As the respective significance values of all independent variables i.e. Foreign Institutional Investment, Standard & Poor's -500, Foreign Exchange Reserves, US Dollar and Crude oil prices are less than our assumed level of significance i.e. 5.0% to test the hypothesis set for respective variables. Thus all Null hypothesis set for abovementioned independent variables are rejected and Alternative Hypothesis are accepted. Therefore, it can be concluded that above global factors i.e. Foreign Institutional Investment, S&P-500, Foreign Exchange Reserves, US Dollar, and Crude oil significantly affect the Gold price in India.

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