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A Study of Relationship between Gold Price, Inflation, Bond Yield and Equity Returns in India

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***Abstract:** The study focuses on the relationship between gold price, inflation, bound yield and equity returns. Various data are taken from different official website of India as well as global associations of gold. The emphasis is given on the impact of inflation on gold prices. It focuses on investment patterns in gold and equity. The paper also shows the risk involved in investment in gold.*

***Keywords:** Equity Returns, Gold Price, Inflation, Bond yield.*

I. INTRODUCTION

Indians see gold as a precious commodity. Even in religious texts of Hindus, gold finds a mention as a commodity of immense values. They treat it as a metal to be possessed only by kings and gods. Like in other countries, in India gold is demanded for three uses, namely, jewellery, retail investment and industrial use. From Table 1, we can see that the demand for gold in India is the highest as compared to other developed and developing nations. The primary driver of gold demand is demand for gold jewellery. Gold traditionally has been demanded for making gold ornaments. The sale during the 'Diwali' festival and marriage season is high. Most of the sales are bunched during this time as Diwali coincides with harvesting and sale of crops. Gifting of gold ornaments to the bride is an age-old practice in India.

Gold ornaments are also worn by Indian men as bracelets, rings, metal chains. Before the beginning of construction of houses, people are known to have stored gold at the construction site. It is gifted to relatives during ceremonies and as a sign of love and affection and social position. Gold provided the means to convert wealth into the most concentrated and indestructible form which also facilitated hassle free transfer of wealth from one generation to another.

Another reason for the economic significance of gold is the ease it offers in hoarding unaccounted wealth. Black money has been maintained in terms of gold bars, jewellery etc. Ayurveda, the ancient Indian medical system requires gold to be used in medicines. Gold fillings are also used by Indians.

Gold has always been looked upon as a store of value. (See Figure 1). The prices of gold and inflation have moved in the opposite direction from 1978-79 to 1986-87. After that till 1991-92 the prices have moved parallel to each other. The and only once has the inflation been higher than the rise in the price of gold. After 1991-92 inflation has started to fall. Whereas gold prices have started to move north. Also between 1978-79 and 1999-2000 the prices of gold have shown an upward trend. The results of correlation also support the trends. The correlation between inflation and gold prices for the same period is -0.13658.

This ability to act as a store of value has been known to our ancestors and habit of investment in gold has always been encouraged. Also, gold kept on person provided unlimited liquidity as against banks and eliminated safety concerns. It also does not get damaged during storage.

In one of the earliest research works on the subject (Rao and Nagabhushanam, 1960), it was empirically established that, during the period 1901 to 1913 (which was a sub-period of the gold exchange standard era 1898-1914), (i) gold demand exhibited higher income elasticity than both silver and merchandise, (ii) price elasticity for gold demand was negative, and (iii) gold was preferable to silver.

Liberalization of import restriction on gold has also encouraged demand. Drawing a relationship between the change in prices of gold and the events that have taken place would be useful to realise the importance of an economic study of gold. Figure 2 shows that the second raise in gold prices took place after the second oil shock in 1978-79.

Subsequent events have raised the price of gold to as high as US $ 600. The prices of gold rose by 24% after the liberalization process started in 1991-92. Similarly, the parliamentary elections in 1987-88 pushed the prices by 32.66%.

With the liberalisation of import norms of gold in 1993 the prices have improved but have never reached the heights set in 1978-79. After the 1997 the prices of gold have tended to drift downwards. With the signing of the Washington Agreement, the prices hardened to some extent. With the global stock markets picking up in 1999 and doing well till March 2000 the interest in gold diminished. After April 2001, the prices have again moved upwards.

Inflation and Gold Prices

Gold may be an inflation hedge in the long-run but it is also characterized by significant short-run price volatility (Aggarwal, 1992). Ghosh and others (2002) using monthly gold price data and cointegration regression techniques confirm that gold can be regarded as a long-run inflation hedge.

Interest Rates and Gold Prices

The correlation between gold prices and real interest rates for the period 1978-79 and 1999-2000 is 0.63877. The correlation coefficient signifies the average correlation between the two variables. A study of the interest rate movement vis-à-vis gold prices for 1978-2000 gives interesting results. Between 1978-79 and 1999-00 gold prices have maintained an upward trajectory. But the interest rates have moved down sharply.

Stock Returns and Gold Price Returns

Kim, Youngje (2002) studied US equity markets represented by S&P 500 for the period 1985 to 1999 and found that gold prices do not exactly follow the S&P 500 Index. R-square, which shows the validity of the fitted line between S&P 500 and gold, is very low. The correlation between the two data was also found to be very low (-0.069). Also the negative beta of the gold market was –0.3671 concluding that gold can be used for hedging stock market risks to some extent.

Exchange Rates and Gold Prices

The movement of gold prices and Rupee – US dollar exchange rate has been moving upwards-indicating positive relation between the two.

Silver and Gold Prices in India

The correlation matrix of the prices of gold and silver in Mumbai between the periods of study indicates that the correlation between gold and silver prices is high at 0.94. The high positive correlation between the prices of the two commodities reduces the ability to diversify using both commodities.

In India, in the period following independence policy makers and economists alike approached gold with open hostility. Gold was seen as an illusion, a waste, contraband, and a relic of the cultural and economic backwardness of the past. The increasing demand for gold in the private sector was seen as resulting in loss of opportunities in two aspects. Viz. causing diversion of household savings from productive assets and the consequent diversion of precious foreign exchange resources, adding to the chronic demand-supply imbalance on the foreign exchange market. The excess demand was considered as one of the main reasons for the so-called external constraint, which hindered development and technological progress.

II. LITERATURE REVIEW

Mr.Baur&Mr.Mc Dermott found evidence of the safe haven effect for most developed country stock markets. However, the findings are strongest for daily data, especially for extreme shocks occurring with a probability less than one percent. These results suggest that investors react to short-lived and extreme shocks by seeking out the safe haven of gold. In this context, gold can be seen as a panic buy in the immediate aftermath of an extreme negative market shock. More gradual trends in stock markets – weekly or monthly losses – do not appear to elicit the same impulsive response from investors. They also on found evidence of a clear qualitative difference in the way investors react to shocks in developed and emerging markets. Gold is, at best, a weak safe haven for some emerging markets. That result fitted with our hypothesis that the safe haven asset plays a relatively minor role in emerging markets. Investors suffering losses in emerging market stocks, rather than seeking an alternative haven asset, may simply readjust their portfolios towards the average by with-drawing from emerging markets in favour of developed market stocks. That reflected the contention of Calvoand Mendoza (2000) that investors worry do not only about their absolute performance, but also about their performance relative to other investors.

Salent and Henderson (1978) examined the effects of anticipation of government sales polices on the real price of gold. Carter et al. (1982), Jaffe (1989), and Chua et al. (1990) examined the extent to which gold and gold related assets offer diversification opportunities superior to equity investments. In developed markets gold offers an additional investment option and has been considered as an addition to portfolio. But in India we do not have gold mutual funds and gold mining company stocks; therefore the investors are left with only gold bullion to invest in. But Gold Mutual funds and gold do not bring identical risks to an investor’s portfolio (Blose 1996).

Mr. Mani &Mr.Vuyyuri studied on the importance of gold in India need not be elaborated to an economist or to a layman. Traditionally gold has been deeply entrenched in the Indian social psyche. The economic importance is also not less as has been elaborated in the paper. But there have been few empirical studies. Hence in this paper tries to make an attempt at explaining the importance through a study of gold price determination.

In that study, they had studied the importance of gold to Indians and also the factors behind the demand for gold. They used a multiple regression method to estimate gold prices using lagged gold price, expected inflation, interest rate, and import demand for gold, exchange rate, stock market performance and qualitative variables such as removal of import restrictions on gold. The results are as expected and the model is able to explain the movement of gold prices. The movement of the gold prices is affected to a large extent by lagged prices of gold as it is perceived to be an investment. Further close, substitutes like silver also impacts the price of gold. The results also indicate that stocks do not seem to be perceived as an alternative to gold. The reason for holding gold is to a large extent a guided by individual sentiment. Besides, the equity culture in India is not as developed as in some other parts of the world. Gold has not lost its prime importance as a hedge against loss of wealth in times of crises.

Mr. Reddy had studied on Gold in The Indian Economic system, and he found some surprised facts about gold market in India that are as follow. First, on the demand side, while there are no authentic estimates, the available indications are that about 80 per cent is for jewellery fabrication (mainly of over 22 carat purity) for domestic demand, 15 per cent is for investor-demand (which is relatively elastic to gold-prices, real estate prices, financial markets, tax-policies, etc.) and barely 5 per cent is for industrial uses. The demand for gold jewellery is rooted in the societal preference for a variety of reasons viz. Religious, ritualistic a preferred form of wealth for women and as a hedge against inflation. Second, as the domestic production of gold is very limited, around 2 tonnes per year, and supply from fabricated old gold scraps estimated at around 62 tonnes per year being not adequate, the rising demand has to be sourced from outside the country.

In the face of a virtual ban on official import of gold for domestic consumption till 1990, the rising demand was met by illegal imports. During the period 1968 - 1995, smuggled gold into India varied in the wide range of 10 – 217 tonnes per year with the sole exception of 1980 when 9 metric tonnes were reported to have been smuggled out of the country to take advantage of the soaring gold prices in the international market. Third, in the absence of open import, the domestic gold prices relative to international prices appear to have been governed by two factors: (i) the spread between the official and market exchange rate of the rupee and (ii) the customs duty, transportation cost, storage cost, risk premium, etc.

Fourth, the value of gold imports through official channels increased from $ 1.25 billion in 1992 to $ 3.4 billion in 1995 while that of smuggled gold was in the range of $ 1.2 to $ 1.7 billion. Fifth, as the policy-debates would show the management of demand and supply of gold has important policy implications for fiscal policy and exchange rate management, and in the recent times, use of gold as a financial instrument, especially mobilisation of domestic gold has attracted attention.

Mr. Michaud, Mr. Michaud &Mr.Pulvermacher formed a report on behalf of World gold council. This report is provided solely for general information and educational purposes. The information in that report is based upon information generally available to the public from sources believed to be reliable. WGC does not undertake to update or advice of changes to the information in that report. Expressions of opinion are those of the authors and are subject to change without notice.

The evidence indicates that gold may be a valuable tactical asset. Gold is highly susceptible to geopolitical factors. During times of relative stability a small positive allocation may be useful. During time periods of abnormally positive economic activity gold returns may reflect multiplier effects associated with cultural issues. During periods of fiscal or monetary mismanagement, crises of various kinds or fundamental changes in the dominant currency, gold may be a very useful asset for hedging risk.

GrebTkacz had studied gold prices and Inflation in June 2007 and concluded that Using data for 14 countries over the 1994 to 2005 period, we assess the leading indicator properties of gold at horizons ranging from 6 to 24 months. We find that gold contains significant information for future inflation for several countries, especially for those that have adopted formal inflation targets.

This finding may arise from the manner in which inflation expectations are formed in these countries, which may result in more rapidly mean-reverting inflation rates. Compared to other inflation indicators for Canada, gold remains statistically significant when combined with variables such as the output gap or the growth rate of a broad monetary aggregate.

Levin, E.J. and Montagnoli, A. and Wright, R.E. (2006) had done research on short-term and long term determinants of prices of the Gold The results of the empirical analysis are consistent with the widely held belief that there is a long-term one-for-one relationship between the price of gold and the general price level in the USA. More specifically, a one per cent rise in US inflation raises the long-term price of gold by an estimated one per cent. One per cent increase in the long-term price of gold for a one per cent rise in the general US price level lies within the 95 per cent confidence interval. However, there are short-run deviations from the long run relationship between the price of gold caused by short-run changes in the US inflation rate, inflation volatility, credit risk, the US dollar trade-weighted exchange rate and the gold lease rate. There is a slow reversion towards the long-term relationship following a shock that causes a deviation from this long-term relationship. It takes about five years for the long-term relationship between the price of gold and the general price level to be restored following any shock that causes a deviation in this long-term relationship.

Ghosh, Dipak and Levin, Eric J. and MacMillan, Peter and Wright, Robert E. (2004) Gold as an inflation hedge? Studies in Economics and Finance, and they found that sizeable short-term movements in the price of gold are consistent with the gold price rising over time with the general rate of inflation. An analysis using monthly gold pric3e data and the cointegration regression techniques provide empirical conformation that gold can be regarded as a long term inflation hedge.

P K Mishra, J R Das & S K Mishra had studied on Gold Price Volatility and Stock Market Returns in India.The study of the capital market of a country in terms of a wide range of macroeconomic and financial variables has been the subject matter of many researches since last few decades. Recently one such variable, that is, gold price volatility has attracted the attention of many researchers, academicians and analysts. Thus, this paper is an attempt to analyse the causality relation that may run between domestic gold prices and stock market returns in India. The study by taking into consideration the domestic gold prices and stock market returns based on BSE 100 index, investigates the Granger causality in the Vector Error Correction Model for the period January 1991 to December 2009.

The analysis provides the evidence of feedback causality between the variables. It infers that the Gold prices Granger-causes stock market returns and stock market returns also Granger-causes the gold prices in India during the sample period. Thus, both the variables contain some significant information for the prediction of one in terms of another.

III. RESEARCH METHODOLOGY

Assumptions of the study

1. We have taken average of gold price for closing of every day to calculate yearly average price. (Data source: World Gold Council)
2. Inflation rates (CPI- Consumer Price Index) are also taken for 15 years.
3. The selected Index is Nifty 50.
4. We have consider every day's closing points of index and get the average for a particular month and at last for calculating yearly average we have taken the average of monthly average.
5. Gold price is taken in India rupee and for 10 grams.
6. Here the investment in gold is considered in Gold's original form that means we have not considered price of gold in jewellary form.
7. Other factors may affect our three variables which are gold price, inflation and index but we have not considered that factors and assume that these factors will be constant.

Objective of Study

- To check that relationship between gold price & Inflation.
- To compare Investment in Gold or in Equity market.
- To study where the higher return, in government securities or in Gold.
- Risk involvement in Gold Investment.

Hypotheses

1. **Null Hypotheses:** There is no relation between gold price and inflation. (H_0)
   Alternative Hypotheses: There is relation between gold price and inflation. (H_1)

2. **Null Hypotheses:** There is lower return in gold investment than equity market. (H_0)
   Alternative Hypotheses: There is higher return in equity market than investment in gold. (H_1)

IV. DATA ANALYSIS AND INTERPRETATION

Table-1 Inflation and Gold

Years	Inflation (CPI) (In %)	Gold Price (Per 10 grms In □)
2001	5.16	4111.58
2002	3.2	4836.10
2003	3.72	5435.05
2004	3.78	5955.57
2005	5.57	6301.28
2006	6.53	8796.00
2007	5.51	9223.71
2008	9.7	12142.54
2009	14.97	15111.33
2010	9.47	17997.31
2011	6.49	23624.08
2012	11.17	28639.38

2013	9.13	26440.16
2014	5.86	24835.06
2015	6.32	23903.21

Table-2 Gold Price and Index (Nifty50)

Years	Gold Price (Per 10 grms In ₹)	Index (Nifty 50)
2001	4111.58	
2002	4836.10	
2003	5435.05	
2004	5955.57	
2005	6301.28	2250.5
2006	8796.00	3359.167
2007	9223.71	4567.5
2008	12142.54	4317.5
2009	15111.33	4087.5
2010	17997.31	5455
2011	23624.08	5338.417
2012	28639.38	5351.417
2013	26440.16	5910.083
2014	24835.06	7367.417
2015	23903.21	8285

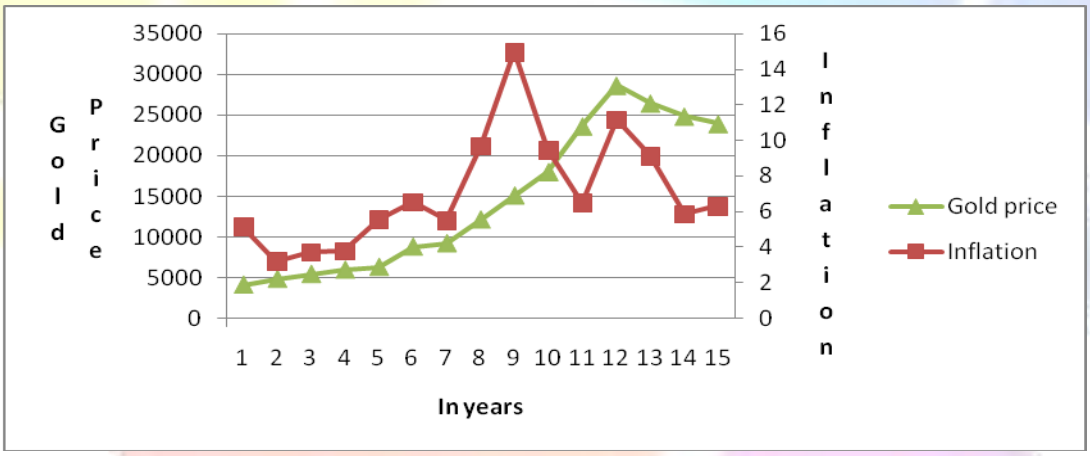

Fig. 1 Inflation and Gold

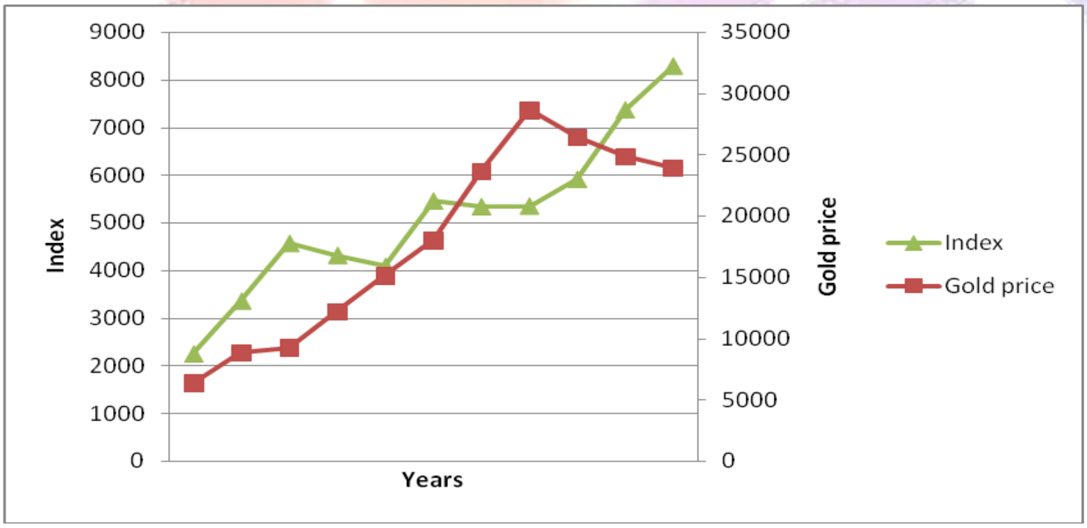

Fig. 2 Gold Price and Index (Nifty50)

TABLE 3
Inflation and Gold
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.507200616
R Square	0.257252465
Adjusted R Square	0.200118039
Standard Error	8010.893307
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	288950581.6	288950581.6	4.502582485	0.053631902
Residual	13	834267350.4	64174411.57		
Total	14	1123217932			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4429.72	5172.72	0.86	0.41	-6745.25	15604.70	-6745.25	15604.70
X Variable 1	1415.90	667.27	2.12	0.05	-25.65	2857.45	-25.65	2857.45

TABLE 4
Gold Price and Index (Nifty50)
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.780574854
R Square	0.609297103
Adjusted R Square	0.56588567
Standard Error	1126.95539
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	17825365.37	17825365.37	14.03540635	0.00458014
Residual	9	11430256.05	1270028.45		
Total	10	29255621.42			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2125.35	867.89	2.45	0.04	162.05	4088.64	162.05	4088.64
X Variable 1	0.17	0.04	3.75	0.00	0.07	0.27	0.07	0.27

V. RESULTS AND FINDINGS

As per objectives of this report we have compared gold price with inflation rate in India for last 15 years and also with the Nifty 50 Index for last 10 years. As we can prove from the help of the regression test that there is no relationship between gold price and inflation. That means we are accepting Null hypothesis and rejecting the Alternative hypothesis. The level of signification is 0.054

between gold price and inflation. The second most important objective of the study is that to check that where is the higher return either in equity market or in gold? Here the regression analysis was done to check that where the higher returns is and we found that there is lower return in equity market rather than investment in gold. That means gold is safer investment than investments in equity. It also can be said that we are accepting Alternative hypothesis and rejecting Null hypothesis. The level of signification here is 0.00045 between gold price and Nifty 50 Index.

VI. CONCLUSION

The objective of the study is to examine the gold as an investment option and compare with equity market in India. We also tried to measure the impact of inflation rate on gold prices. Our methods avoided the limitations of previous studies by using longer historical periods, conservative estimates of return, a focus on gold price return, improved and consistent risk estimation and enhanced Optimization technology.

The evidence indicates that gold may be a valuable tactical asset. Gold is highly susceptible to geopolitical factors. During times of relative stability a small positive allocation may be useful. During time periods of abnormally positive economic activity gold returns may reflect multiplier effects associated with cultural issues. During periods of fiscal or monetary mismanagement, crises of various kinds or fundamental changes in the dominant currency, gold may be a very useful asset for hedging risk.

The result also teaches that gold may have higher returns than equity market and it is safer than stock market. As we have also seen in the example there is approx. difference of 94.93%. And there is also no relation between Inflation and Gold prices.

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