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## **Analyzing Gold Returns: Indian Perspective**

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## Abstract

Investors are forever in need of an asset that adds value to the portfolio. Therefore, along with fixed income investments, stocks, gold and other assets are inevitable parts of a balanced portfolio. For Indian investors, gold is not only an investment asset but a commodity with a major importance in the social customs that makes it all the more interesting to study. As an investment asset, it is considered a diversifier asset and a hedging asset. Not only that, it is called a 'safe-haven' asset for times of economic distress, meaning that it retains its value when the stock market is giving low or negative returns.

In this paper, we analyze the risk-return parameters of both the gold and Sensex for a period from 1992 to 2017 and find out how they perform along with each other. We also do detailed subperiod analysis in terms of Pearson's correlation coefficient and see how it changes in pre-recession and post-recession period. We analyze whether gold is a diversifier asset, a hedge, a safe haven or all three for Indian investors. It is interesting to note how the exchange rate variability has a great impact on gold's rate of return.

Keywords: gold, stock market, risk-return, correlation coefficient, hedge, safe-haven asset

## Analyzing Gold Returns: Indian Perspective

- **Introduction:**

Since its discovery, gold has been treasured as jewelry because of its versatility and radiance. Besides jewelry, due to its highly liquid nature, gold has been considered a form of money from early civilizations till the end of the gold standard. O'Callaghan (1993) notes "since 1971, a global market for gold as an asset in its own right has developed." Post the collapse of Bretton Woods system, gold has renounced its role as a currency but it is still considered a valuable commodity for investment. As a commodity it is used as a reserve asset, an investment, jewelry and for industrial purposes. O'Callaghan (1993) further notes "gold retains its importance as an official reserve asset with some 40 percent of the world's monetary reserves in gold." Because the gold production is low compared to its demand, overall the prices have more than doubled in the last half century. Post the economic recession of 2009, gold prices have been on a rise to reach its lifetime highs. Therefore, this paper attempts to analyze whether it is still a good investment asset and how does it perform when compared to the Indian stock market.

- **Literature Review:**

Gold is sometimes called a safe haven, a hedging asset and a good diversifier asset. However, these have different connotations. Diversifier means the asset which is able to reduce the overall risk of the portfolio and provide better returns. In short, it helps create an optimal portfolio. Gold as a commodity and investment asset is considered as a diversifier asset for an equity portfolio. A hedging asset means an asset which hedges the risk of inflation and provides positive real returns. A safe haven asset means an asset that does not lose its value or even increases its value during turbulent market conditions. So in this case, gold has to retain or increase its value during extreme volatile market conditions.

The early studies on the gold prices, the stock market and other economic variables are notable. The literature on the study of gold prices can be categorized as follows:

- 1) Diversification Properties of Gold:

Jaffe (1989) studied whether gold stocks and gold mutual fund can be used as a proxy investment for gold in the portfolio. He concluded that they can be used to reduce the overall portfolio risk in the long term as they have insignificant correlations with stock market

indices. Chua, Sick and Woodward (1990) analyze that gold bullion is able to diversify the stock portfolio risk in both short and long term. Conover, Jensen, Johnson and Mercer (2009) found out that indirect investment in precious metals provides higher benefits than the investment in gold bullion. Sherman (1986); Hillier, Draper and Faff (2006); Gilmore, Macmanus, Sharma and Tezel (2009) and Baur and Lucey (2010) also found positive diversification benefits of adding precious metals and/or metal proxies to an equity portfolio in developed economies. Anand and Madhogaria (2012); Baig, Shahbaz, Imran, Jabbar, and Ain, (2013); Panda and Sethi (2016) analyzed gold returns in developing economies and found similar results.

Contrary to the aforementioned studies, some researchers have found that gold does not have significant diversification benefits or even if it does have any diversification benefits it does not last over the long-run. Among them Johnson and Soenen (1997); Demidova-Menzel and Heidorn (2007); Mishra, Das and Mishra (2010); Bhunia and Mukhti (2013) and Bashiri (2011) are notable.

## 2) Safe Haven Properties of Gold:

Baur and McDermott (2010) conduct a detailed analysis on whether the gold acts a hedge and safe haven in developed and developing countries. For developing countries, they find that gold retains the safe haven property for a short time. However, same cannot be concluded for the developing economies. Hillier et al (2006) also found the hedging effectiveness of gold during the periods of 'abnormal' stock market volatility. Baur and Lucey (2010) studied gold prices in the US, UK and Germany and analyzed that gold is a safe haven for stocks but its safe haven property is very short-lived. Beckmann, Berger, and Czudaj (2015) and Jaiswal and Voronina (2012) also conclude that gold serves as a hedge and a safe haven for most economies.

However, Conover et al (2009) take a different stance with their results stating that the returns on investing in the precious metals are higher during the tightening of monetary policy than during the expansive monetary policy.

## 3) Inflation Hedging Properties of Gold:

Ghosh, Levin, Macmillan and Wright (2004) studied whether gold returns hedge inflation or not over the period from 1976-1999. They analyze the gold price movements and state that in the long-run gold can be considered an inflation hedge asset. However, the short-run gold price movements do not reflect the same hedging capability and they are influenced

by other market influences. McCown and Zimmerman (2006) confirm that gold is a zero beta asset and its returns are higher than Treasury Bills. They further conclude that gold has a much stronger inflation hedging property than silver. Gold appears to have positive real returns in the long run as suggested by these researchers as well: Jastram (1977); Kanojia and Jain (2014); Panda and Sethi (2016).

#### 4) Impact of Exchange Rate on Gold Returns:

Mani and Vuyyuri (2003) state that exchange rate of USD has a positive impact on gold prices in India. Panda and Sethi (2016) also analyze the impact of exchange rate on the gold price and suggest that the higher returns shown in the Rupee values of gold prices is because of the depreciation of the Rupee. Nair, Choudhary and Purohit (2015) analyze that there is causal bidirectional relationship between the exchange rate of USD and gold prices in India pre-recession. However, that is impacted due to recession and the causality is changed to unidirectional post 2009.

This paper focuses on analyzing whether gold is a diversifier asset, a hedge for inflation, or a safe haven for times of economic distress for Indian investors or a combination of all three.

- **Research Objectives:**

1. To analyze the risks and returns of investment in gold versus investment in stock market
2. To analyze whether gold diversifies the risk of stock portfolios
3. To analyze if gold and stock market hedges inflation in the long term
4. To evaluate the exchange rate's impact on the gold's rate of return
5. To assess if gold acts as a safe haven for extremely volatile market conditions

- **Data and Methodology:**

We use monthly data for a period of twenty-six years from January 1992 to December 2017 for the research. Gold prices in Rupees and US Dollars are retrieved from the World Gold Council's database; Sensex values are retrieved from the website of Bombay Stock Exchange and the inflation data is retrieved from the Wholesale Price Index in India published by Reserve Bank of India. The exchange rate between Rupee and US Dollar is retrieved from the RBI database.

The statistical analysis and graphs are done using Microsoft Excel and statistical package – SPSS. The whole period is divided into sub-periods for a detailed analysis. Descriptive analysis and Pearson correlation coefficient analysis are carried out to test the following hypotheses:

$$H_0: \rho (\text{returns}) = 0$$

$$H_1: \rho (\text{returns}) \neq 0$$

Following formula is used to calculate the Pearson correlation coefficient:

$$r = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{[N \sum x^2 - (\sum x)^2][N \sum y^2 - (\sum y)^2]}}$$

Where,

N = number of pairs of scores,

$\sum xy$  = sum of the products of paired scores

$\sum x$  = sum of x scores

$\sum y$  = sum of y scores

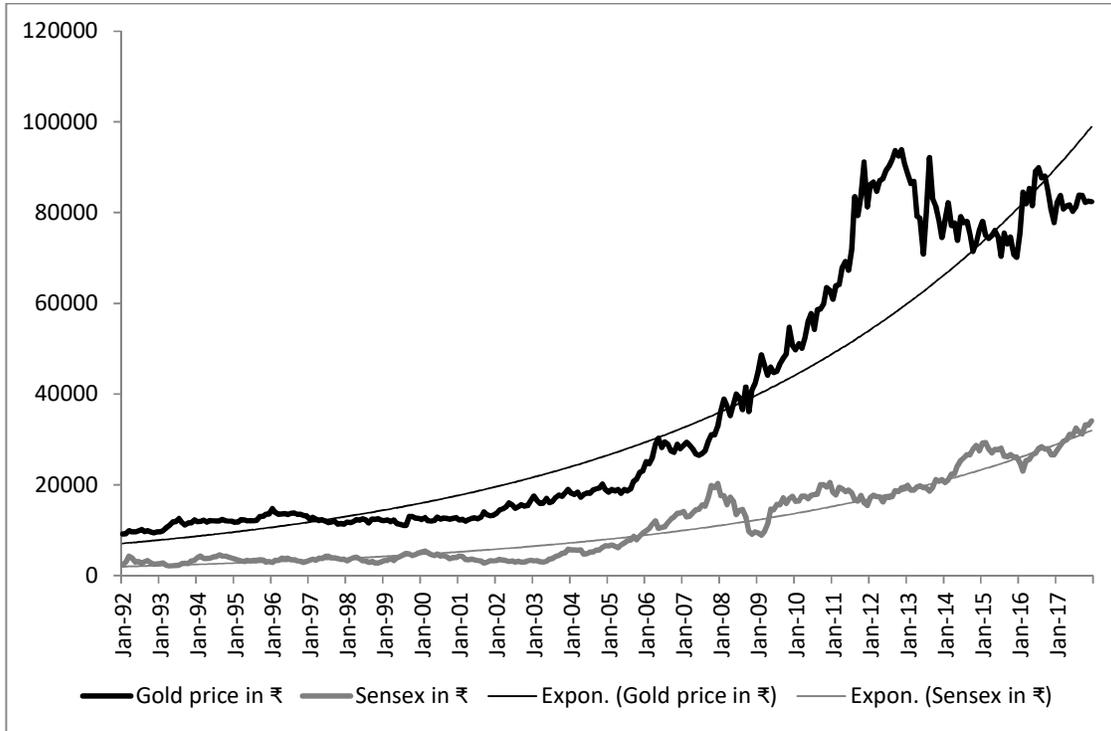
$\sum x^2$  = sum of squared x scores

$\sum y^2$  = sum of squared y scores

The significance of this correlation coefficient is tested at 95 percent confidence level.

- **Analysis and Findings:**

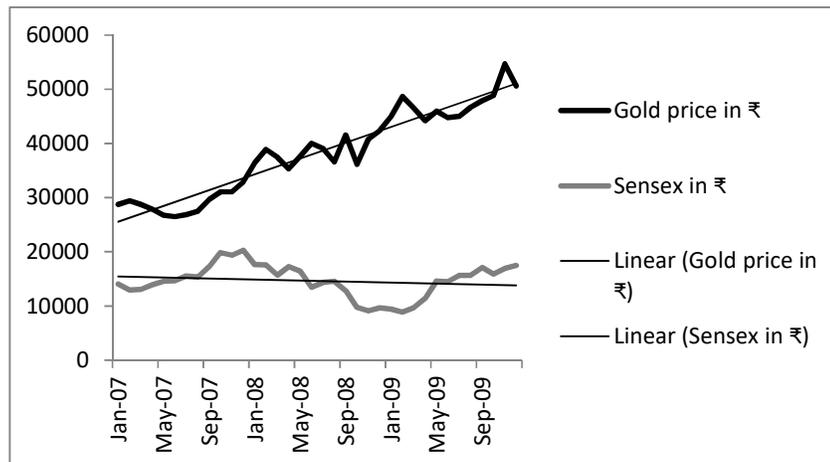
The gold price and Sensex have multiplied over the years as seen in the Figure 1. The stock market was in nascent stages in the 1990s and it picked up the pace post 2005. In the year 2008, when the economic recession hit the world, Sensex reacted negatively and showed a downward trend. However, gold prices increased even further from that same time which could be due to the spillover effects of the world stock indices and the reduced faith in the US Dollar during the recession in the US. This confirms what other researchers have found that gold prices increase in times of economic distress whereas the stock prices decrease. We also created exponential trend lines for the both variables to see how they continuously increase over the period.



**Figure 1. Historical Performance of Gold and Sensex from 1992-2017. Data for gold price from World Gold Council, Sensex from Bombay Stock Exchange**

Let us see the Figure 2 from the year 2007 to 2009 for impact of economic recession on gold and stock market to further test our assumption. As expected, the linear trend line for both the assets shows a cone shape which is wide on the right and narrow on the left. These trend lines show that the gold price and Sensex follow opposite trend in times of economic distress. This means that gold acts as a safe-haven in times of economic distress. However, for taking the benefit of the safe-haven property of gold one must have invested before the economic volatility begins or the increased prices won't assure higher returns.

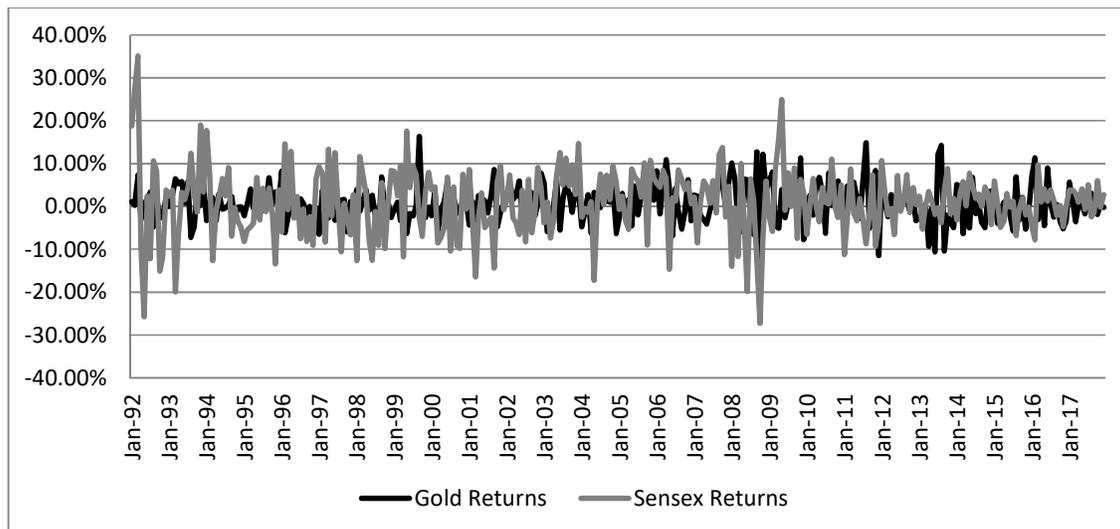
Figure 3 represents the monthly returns from both the variables for the total period.



**Figure 2. Gold Price and Sensex during Economic Recession. Data for gold price from World Gold Council, Sensex from Bombay Stock Exchange**

Sensex returns are much more volatile

than the gold returns. If we study how the asset returns perform during the year 2007 to 2009 (graph is not included due to shortage of space), it does not confirm our assumption that gold returns and stock market returns move in exactly opposite direction whether concurrent returns or one period lagged returns. Therefore, this data alone is not sufficient to prove the safe-haven property of gold in India.



*Figure 3. Gold and Sensex Monthly Returns. Adapted from World Gold Council and Bombay Stock Exchange database*

The descriptive analysis for gold and Sensex is given in Table 1. The overall monthly gold returns are 0.71 percent which if we calculate separately for the pre-recession period, during recession and post-recession period, it more than doubles in the recession years. However, the volatility also nearly doubles for the same period. That volatility could be due to the rush for gold as it provides higher returns than other assets during the economic distress.

Investors turn to gold in search of stability when stock market is losing its potential. Sensex returns are better than gold for the pre-recession period but they turn negative during recession and are slightly better than gold in the post-recession period. The stock market volatility doesn't increase in the post-recession period, but instead it decreases, which could be possibly due to the cautious investor sentiment in the stock market.

**Table 1. Monthly Return Statistics of Gold and Sensex from 1992-2017**

	Entire Period 1992-2017		Subperiod A (1992-2007)		Subperiod B (2008-2009)		Subperiod C (2010-2017)	
	Gold	Sensex	Gold	Sensex	Gold	Sensex	Gold	Sensex
Mean	0.71%	0.92%	0.67%	1.23%	1.80%	-0.62%	0.51%	0.70%
Standard deviation	4.51%	7.72%	3.80%	8.42%	7.05%	11.64%	5.03%	4.44%
Variance	0.002	0.006	0.001	0.007	0.005	0.014	0.003	0.002
Annualized Rate of Return	8.48%	11.08%	8.04%	14.77%	21.59%	-7.49%	6.09%	8.35%
Annualized Standard Deviation	15.61%	26.75%	13.17%	29.17%	24.41%	40.31%	17.41%	15.37%
Annualized variance	0.024	0.072	0.017	0.085	0.060	0.162	0.030	0.024

Source: Adapted from World Gold Council and Bombay Stock Exchange database

Current published literature on the correlation analysis between the gold and stock market is available but only for the absolute prices of both assets. We think that the statistical properties of asset prices are non-stationary, they have log-normal distribution and time-varying volatility, and therefore they are not suitable for providing the actual correlation coefficients.

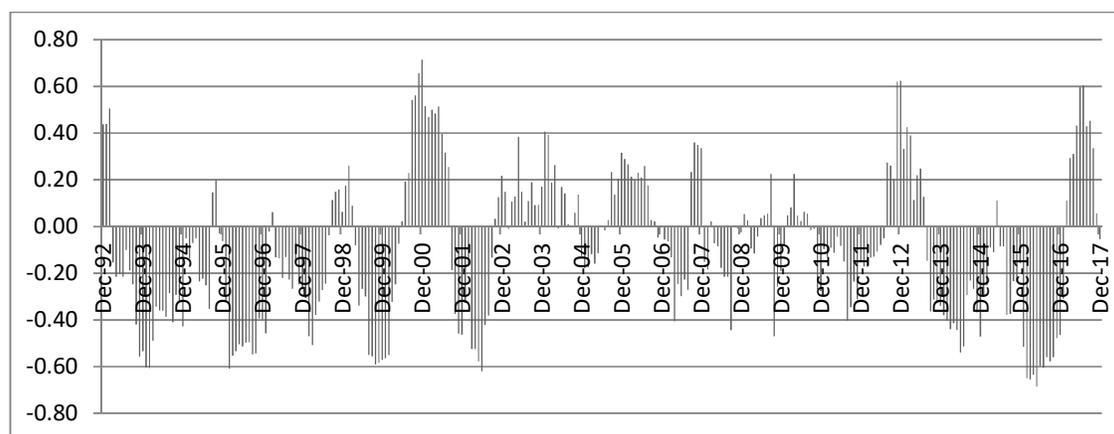
Following Table 2 shows the correlation between gold and Sensex returns for the entire period under study. These correlation coefficients provide one important insight into how to returns are related. The correlation coefficients for all periods except period C are negative but they are not significantly different than zero. Therefore, at 95 percent confidence level the correlation between both the variables is statistically insignificant. For subperiod C only, the Pearson correlation coefficient is statistically significant at 5 percent significance level. We even did a one period lagged correlation analysis between the returns but it provides similar results. We do not reject the null hypothesis  $H_0: \rho(\text{returns}) = 0$  for all periods except subperiod C. We reject the null hypothesis for the subperiod C and accept the alternate hypothesis  $H_1: \rho(\text{returns}) \neq 0$ . Even if the relationship is not statistically significant between gold and stock market for all periods except for subperiod C, it does suggest that there are some benefits to including gold in the stock portfolio and it is able to diversify the risk while providing better returns.

**Table 2. Summary Table for Correlations between Gold and Sensex Returns**

	Entire Period 1992-2017	Subperiod A 1992-2007	Subperiod B 2008-09	Subperiod C 2010-2017
Pearson Correlation	-.074	-.023	-.096	-.208*
Sig. (2-tailed)	.193	.749	.657	.042
N	312	192	24	96
* Correlation is significant at the 0.05 level (2-tailed).				

Source: Adapted from World Gold Council and Bombay Stock Exchange database

Figure 4 represents the 12 month rollover correlation for the entire period under study. It is interesting to observe that the correlation does not stay stable or even in one direction either positive or negative. Since, gold and stocks both are economic variables and as such they get influenced by the market movements, economic cycles, growth rates, investor preferences, etc. Still the correlation coefficient is negative more often than it is positive especially during the years from 2008 to 2012.



**Figure 4. 12 Months Rollover Correlation between Gold and Sensex Returns. Adapted from World Gold Council and Bombay Stock Exchange database**

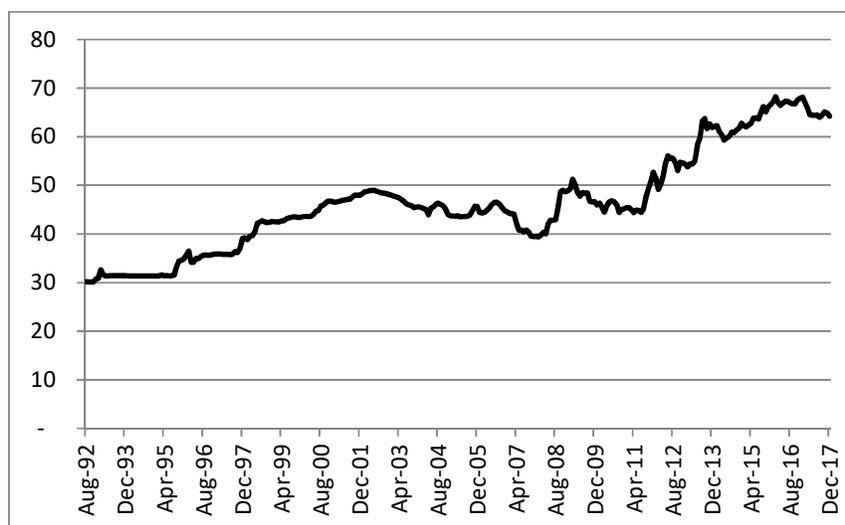
Table 3 gives an overall picture as to what is the change in inflation rate, gold and Sensex for the period from January 2000 to December 2017. The mean monthly change in Wholesale Price Index is 0.39 percent which is a lot less than change in gold and Sensex prices. The average annualized rate of WPI Inflation is less than 5% which confirms that gold and Sensex both provide higher return than inflation to Indian investors in the long-term.

**Table 3. Monthly Statistics for WPI Inflation Rate, Gold and Sensex (2000-2017)**

	WPI	Gold	Sensex
Mean	0.39%	0.71%	0.92%
Annualized Rate	4.69%	8.48%	11.08%

Source: Adapted from Reserve Bank of India, World Gold Council and Bombay Stock Exchange database

We have already discussed how the gold has performed as an investment asset over the years in Rupee values. However, since most of gold is imported from other countries, it makes it interesting to see how the exchange rate affects the rupee returns of gold. Figure 5 shows how the Rupee US Dollar exchange rate has changed over the years. The Rupee-US Dollar exchange rate has more than doubled in all these years.



**Figure 5. US Dollar Rupee Exchange Rate (₹/\$). Data from Reserve Bank of India**

Table 4 shows the performance of Rupees versus the USD and the gold returns in Rupees and USD as follows:

**Table 4. Exchange Rate & Gold Returns - September 1992 to December 2017**

	₹/\$ Exchange Rate	₹ Gold Returns	\$ Gold Returns
Mean Monthly Rate of Change	0.25%	0.70%	0.44%
Annualized rate of Change	2.99%	8.45%	5.27%

Source: Adapted from Reserve Bank of India and World Gold Council database

The Rupee has devalued about 3% annually on average since 1992. The annualized gold returns in USD are 5.27% on an average for the period of study. This confirms the assumption that Rupee-USD exchange rate is a major factor in the high gold returns in Rupee terms.

- **Conclusion:**

The correlation analysis suggests that there is negative correlation between gold returns and stock returns. However, it is statistically significant only for a short duration in the entire study. The analysis suggests that gold is less volatile and risky than the stock market and provides good returns so it could be used as a diversifier asset for an equity portfolio. Gold usually provides higher returns than the inflation and so does the stock market. Gold provides better returns than the stock market in times of economic distress so we can safely say that gold is a 'safe-haven' asset. Therefore we conclude that gold is an important diversification asset, an inflation hedge and a safe-haven asset for Indian investors.

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