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**Research Paper**

# A Study on Relationship Between Indian Gold Market and Index

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***ABSTRACT:***
*This paper examines the complex interrelationship between India's gold market and its primary stock indices, the BSE Sensex and Nifty 50. Gold has long been a fundamental component of Indian investment culture and serves as a hedge against economic volatility, while equities support contemporary portfolio expansion. Utilizing daily data from 2020 to 2025, this study applies various analytical techniques, including descriptive statistics, Pearson correlation, regression analysis, Z-tests, and ARIMA forecasts, to elucidate the interactions between gold prices and stock indices in India's dynamic financial landscape. The findings underscore gold's unique function as a diversifier and safe-haven asset, exhibiting only a marginal direct influence on equity market fluctuations. The paper concludes with a discussion of the policy and investment implications derived from this analysis.*

***KEYWORDS:***
*Gold Market, BSE Sensex, Nifty 50, Correlation Analysis, Regression, ARIMA Model, Portfolio Diversification,Indian Stock Market, Statistical Analysis, Financial Interdependence, Volatility.*

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## I. INTRODUCTION:

India's financial landscape is significantly influenced by the importance of both gold and equities. Gold plays a crucial cultural role as a means of wealth preservation and serves as a protective asset during periods of market volatility. This is contrasted by the corporate-driven dynamics of benchmarks such as the BSE Sensex and Nifty 50, which reflect broader economic conditions and investor sentiment. The interaction between these asset classes holds considerable importance for effective portfolio management and economic strategy.

In light of the ongoing modernization of the market, investors are increasingly diversifying their portfolios by incorporating various forms of assets, including physical gold, gold exchange-traded funds (ETFs), and equity mutual funds. This shift necessitates a reassessment of traditional investment approaches. With rising macroeconomic uncertainties and evolving regulatory frameworks, comprehending the relationship between gold prices and major Indian indices is essential for both investors and policymakers alike.

## II. LITERATURE REVIEW:

Numerous studies have investigated the dynamic relationship between gold and stock markets, both in India and internationally. Research conducted by Kumar (2025) and ICICI (2025) indicates that gold often demonstrates superior performance during periods of economic volatility, as investors tend to seek the safety of gold when equity markets decline. Empirical studies, including those byGandhi (2024), reaffirm gold's status as a reliable hedge against crises and reveal its distinct trends compared to equities, particularly during global economic stress events.

Recent studies, including those by Tomasetti & Moorthy Ari (2024), Fatima et al. (2023), and Prasad (2023), utilize econometric methodologies to explore the causality and volatility among various asset classes.

These investigations reveal that correlations typically intensify during exceptional financial crises. Furthermore, Valarmathi (2023) highlights the conditional independence between gold and equity indices, indicating that gold prices hold limited predictive power in forecasting short-term movements in Indian stock markets.

These findings highlight the importance of conducting analyses that are specific to both assets and sectors. They also draw attention to existing research gaps in the areas of long-term pattern recognition, sectoral index comparisons, and the application of advanced time-series models within the Indian context.

**THEORETICAL FRAMEWORK:**

Modern Portfolio Theory (MPT) advocates for the strategic combination of assets that exhibit low or negative correlations to mitigate risk through effective diversification. In this context, gold stands out as an optimal asset due to its limited correlation with equities. This is particularly relevant in India, where cultural and economic factors contribute to sustained demand for gold. Additionally, behavioral finance provides insight into investors' propensity to favor gold during periods of uncertainty, thus bolstering its status as a safe-haven investment.

The research is firmly based on well-established principles of asset allocation, risk management, and financial economics. It utilizes a range of statistical methodologies—including correlation analysis, linear regression, Z-tests, and ARIMA modeling—to effectively analyze both current and predictive relationships between gold and stock indices.

## III. RESEARCH METHODOLOGY:

This research employs a quantitative descriptive-analytical design utilizing secondary daily data for gold, Nifty 50, and BSE Sensex returns from 2020 to 2025. The data was obtained from reputable sources, including NSE, BSE, and commodity market records, resulting in a comprehensive dataset comprising 1,226 observations for each asset.

The analysis incorporated the following tools:

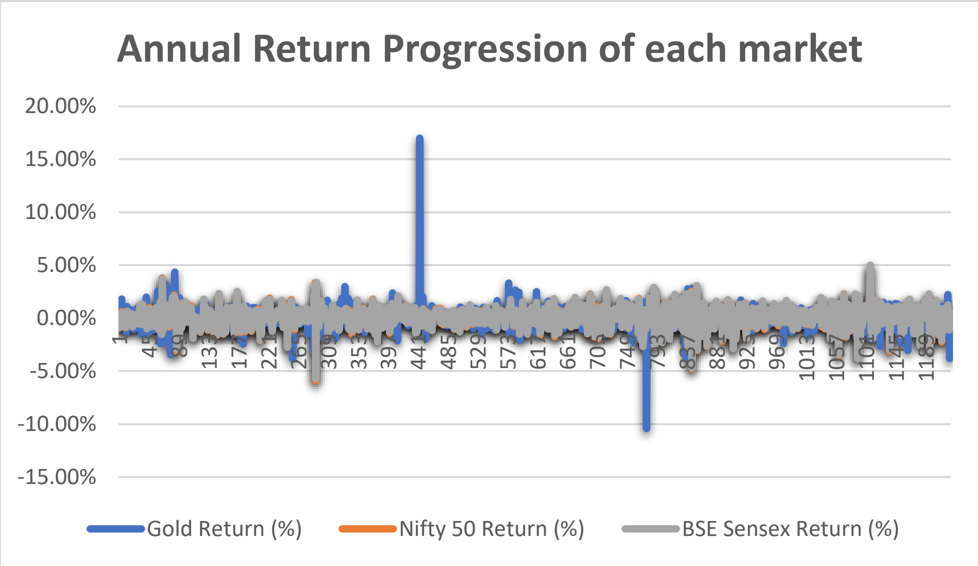
- Descriptive statistics (mean, standard deviation, skewness, kurtosis)
- Pearson correlation (to assess the linear relationship)
- Linear regression (to evaluate explanatory capacity)
- Z-tests (to determine the statistical significance of mean differences)
- ARIMA (1, 1, 1) models (for short-term forecasting)

All computations were conducted using MS Excel. Stationarity of the data was confirmed through Augmented Dickey-Fuller tests, with appropriate differencing applied when necessary.

## IV. DATA ANALYSIS AND DISCUSSION:

**Descriptive Statistics** - The analysis of daily returns for gold, Nifty 50, and BSE Sensex reveals that they are predominantly centered around zero. The stock indices exhibit slightly higher average returns compared to gold. Notably, gold displays extreme kurtosis (78.39) along with positive skewness, suggesting a greater likelihood of significant price fluctuations during uncertain market conditions. In contrast, the stock indices exhibit more stable and consistent distributions.

| Descriptive analysis | Gold Return (%) | Nifty 50 Return (%) | BSE Sensex Return (%) |
|---|---|---|---|
| Mean | 0.00054 | 0.00067 | 0.00064 |
| Standard Error | 0.00028 | 0.00026 | 0.00026 |
| Median | 0.00035 | 0.00087 | 0.00078 |
| Mode | 0.00000 | #N/A | #N/A |
| Standard Deviation | 0.00996 | 0.00918 | 0.00924 |
| Sample Variance | 0.00010 | 0.00008 | 0.00009 |
| Kurtosis | 78.38667 | 3.57729 | 3.38172 |
| Skewness | 2.95805 | -0.41039 | -0.32659 |
| Range | 0.27426 | 0.10672 | 0.10742 |
| Minimum | -0.10425 | -0.05929 | -0.05741 |
| Maximum | 0.17001 | 0.04742 | 0.05001 |
| Sum | 0.65957 | 0.82294 | 0.79043 |
| Count | 1226 | 1226 | 1226 |




**Interpretation:**
The graph illustrates the yearly return trends for gold, Nifty 50, and BSE Sensex. It's interesting to see that, for the most part, the returns from all three markets show typical fluctuations, marked by frequent small ups and downs. This pattern is quite common in stable financial environments, reflecting the natural ebb and flow of daily trading, economic cycles, and overall market sentiment, where returns generally hover around zero.
**Correlation Analysis** - The Pearson correlation coefficients obtained between gold and the stock indices are very weak, recorded at 0.050 for Nifty 50 and 0.047 for Sensex, indicating a notable degree of independence. Conversely, a robust positive correlation of 0.995 exists between the Sensex and Nifty 50, underscoring their shared systemic drivers and overlapping market dynamics.

| Correlation Analysis | Gold Return (%) | Nifty 50 Return (%) | BSE Sensex Return (%) |
|---|---|---|---|
| Gold Return (%) | 1 | | |
| Nifty 50 Return (%) | 0.04996 | 1 | |
| BSE Sensex Return (%) | 0.04749 | 0.99474 | 1 |

**Regression Analysis** - The results from linear regression indicate $R^2$ values falling below 0.3% for both indices. This suggests that gold returns provide only minimal explanatory power regarding equity returns. Furthermore, the coefficients associated with gold are not statistically significant, implying that fluctuations in daily gold prices do not serve as reliable predictors for short-term movements in the indices.

| Regression Analysis | Coefficients | | Standard Error | t Stat | P-value |
|---|---|---|---|---|---|
| Intercept | 0.00062104 | c | 0.00026395 | 2.352871469 | 1.88E-02 |
| Gold Return (%) | 0.044016341 | M | 0.026461314 | 1.663422338 | 9.65E-02 |

| Regression Analysis | Coefficients | | Standard Error | t Stat | P-value |
|---|---|---|---|---|---|
| Intercept | 0.000646465 | c | 0.000262463 | 2.46307 | 1.39E-02 |
| Gold Return (%) | 0.0460443 | M | 0.026312243 | 1.74991 | 8.04E-02 |

**Z-Test** - The Z-tests conducted to assess the impact of gold returns on Nifty 50 and BSE Sensex yielded high p-values of 0.626 and 0.697, respectively. These findings reinforce the conclusion that the influence of gold on stock returns is negligible within the scope of this dataset.

| Statistic | Gold-Nifty50 | Gold-Sensex |
|---|---|---|
| Mean Difference | 0.00013 | 0.00011 |
| Pooled Std | 0.00958 | 0.00961 |
| Z-statistic | 0.487 | 0.389 |
| p-value | 0.626 | 0.697 |

**ARIMA Forecasts** - Time-series modeling anticipates continued, gradual increases in both gold and index prices in the near term (August 11–20, 2025), assuming no unforeseen disruptions occur on either a global or domestic scale.

| Date | Forecasted Gold Price | Forecasted Nifty 50 | Forecasted BSE Sensex |
|---|---|---|---|
| 11-Aug-25 | 102238.94 | 24,377.65 | 83145.84 |
| 12-Aug-25 | 102299.76 | 24,388.37 | 83249.31 |
| 13-Aug-25 | 102366.44 | 24,399.08 | 83345.55 |
| 14-Aug-25 | 102421.64 | 24,409.80 | 83424.82 |
| 18-Aug-25 | 102476.41 | 24,420.51 | 83508.40 |
| 19-Aug-25 | 102729.09 | 24,585.05 | 83673.91 |
| 20-Aug-25 | 102781.53 | 24,619.35 | 83753.83 |

## V. FINDINGS:

- Gold demonstrates higher volatility and more frequent extreme returns than stock indices, underscoring its responsiveness to global events.
- During stable market conditions, the correlation between gold and equities tends to be weak, which reinforces gold's position as a strategic diversifier in investment portfolios.
- Statistical analyses, including regression, Z-tests, and ARIMA models, consistently show that gold does not exert a significant direct impact on the Nifty 50 or BSE Sensex over the short term.
- While stock indices generally exhibit strong cohesion, they appear largely insulated from daily fluctuations in gold during the observed period.
- ARIMA forecasts suggest that upward momentum will continue across all three markets, although gold's pronounced response to macroeconomic disruptions remains a notable characteristic.

## VI. SUGGESTIONS:

- Investors should consider incorporating gold into their portfolios primarily for the purposes of diversification and risk management, rather than attempting to predict or enhance equity returns.
- When conducting policy analysis, it is essential to examine the specific impacts on various sectors, as well as the growing significance of newer financial instruments, including gold ETFs and digital gold products.
- Future research endeavors should utilize extended data series, sector-specific indices, and a broader range of econometric models to more accurately interpret the intricate relationship between gold and Indian equities.
- Enhancing financial education and consistently monitoring global economic trends will empower practitioners and planners to leverage the defensive qualities of gold without becoming overly dependent on short-term predictive correlations.
- Regulators and investment managers ought to be vigilant regarding any unusual fluctuations in gold prices, as these may serve as potential indicators of broader market or policy-related stress.

## VII. CONCLUSION:

The relationship between India's gold market and its prominent equity indices is characterized by a low correlation, distinct risk-return profiles, and a stable long-term coexistence, rather than any direct causality. Gold remains a crucial asset for Indian portfolios, acting as a haven and stabilizer, while showing minimal predictive influence on daily equity prices. These insights are significant for portfolio construction and macroeconomic policy and highlight the need for further research into asset-liability dynamics within India's rapidly expanding financial sector.

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