A Longitudinal Study of Gold Price Determinants in the Indian Market (2010–2025)

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ABSTRACT:

The importance of gold can hardly be overestimated as gold serves both as an investment tool, inflation hedge, and an intergenerational wealth accumulator in India. This paper aims to examine the factors that affect the changes in gold prices in India in the period from 2010 to 2025 based on monthly time series analysis. By means of trend analysis, Pearson's coefficient of correlation, and multiple linear regression analysis, the impact of the USD/INR currency exchange rate, NIFTY 50 stock market index, and crude oil prices on gold prices will be estimated. Regression results provide a highly statistically significant fit ($R^2=0.978$) and thus prove the major impact of the selected economic variables on the variance in gold prices. There is a strong positive correlation between the exchange rate and gold prices ($r=0.906$). This means that weakening of the INR plays an essential part in raising gold prices. Stock market indices are weakly negatively correlated with gold prices and confirm the safety value of gold during stock market crises. There is a moderate positive correlation between crude oil prices and gold prices.

Keywords: Gold Prices, India, Exchange Rate, Inflation, NIFTY 50, Crude Oil, Safe-Haven, Regression Analysis, Longitudinal Study

Introduction:

Gold is one of the most researched commodities in international finance owing to its double nature as a physical commodity and a financial instrument. Unlike other commodities, gold has no value that can be created only through industrial use. Gold plays an important role in people's investments because of its properties as a store of value and a safety asset when there is an economic instability in society. Therefore, the formation of gold prices depends on macroeconomic, political, monetary, and even psychological factors.

One may say that India becomes an interesting country to research the determinants of gold price because of several reasons. It should be admitted that India is one of the biggest consumers of gold all over the world. In addition to being an investment asset, gold in India has cultural value. It has been a part of Indian traditions, festivals, and culture for years. Gold is used in weddings and other ceremonies as a symbol of good fortune.

Even though many articles have been written on the determinants of gold prices around the world, few researchers have looked into the determinant factors influencing the Indian gold prices, especially using a long-term approach and considering the effect of various macroeconomic variables through one model. In other words, most research work done thus far focused on either one macroeconomic factor or used too small a time horizon which did not enable the capturing of structural changes occurring in the economy.

In this paper, we intend to analyze the economic determinants of gold price variations in India. The purpose of this study is to determine the important economic factors driving the gold price movements in India, namely, exchange rates, stock market performance, and crude oil prices.

1.1 Significance of the Study

Gold price determination is relevant from a practical perspective to various groups of people. To individuals and families, gold is an important vehicle for preserving wealth; to institutions and funds, gold is an essential tool for portfolio diversification. For policy makers and RBI, gold prices have an impact on the balance of payments deficit, inflation control and monetary policy transmission. The current study adds to this area through its comprehensive empirical approach.

1.2 Research Objectives

- To study the trends in gold price changes in India for the period from 2010 to 2025.
- To analyze the pattern of changes in gold price in India.
- To find out the major economic factors affecting gold prices.
- To study the correlation between gold prices and stock and commodity market indices.

2. Literature Review

The factors that determine gold prices have been widely studied in various ways. In this paper, the literature review is summarized by themes based on the most relevant empirical evidence.

2.1 Gold as Inflation Hedge

One of the major streams of literature studies the use of gold as a hedge against inflation. The underlying principle lies in the stable purchasing power of gold; whenever fiat money becomes less valuable because of inflation, its real value remains intact. According to Nisarga & Marisetty (2023), gold price movements are largely affected by exchange rates and inflation, making gold a good inflation hedge in India. Using advanced econometric techniques, Tiwari et al. (2021) found positive correlations between inflation and gold price volatility.

2.2 Exchange Rate and Currency Depreciation

As gold prices are determined internationally in US dollars, any changes in the exchange rate between USD and INR affect domestic gold prices. Jain & Biswal (2016) established robust interdependencies between gold prices, exchange rates, and equity market indices in India by utilizing a DCC-GARCH methodology. Zhan (2024) observed an inverse relationship between the US dollar price and gold price, meaning the fall in US dollar prices increases gold prices internationally. Additionally, Tanin et al. (2021) reported that exchange rate volatility had significantly amplified the impact of exchange rates on gold prices during the coronavirus pandemic era.

2.3 Crude Oil Prices

Oil prices are subject to macroeconomic variables such as inflation and geopolitical risks similar to gold. Rastogi et al. (2023) established long-term correlations between gold, oil prices, and interest rates using a bivariate GARCH model. In addition, Raza et al. (2021) examined nonlinear relationships between oil prices and financial markets using the non-linear ARDL approach, where they concluded that oil prices had significant impacts during bearish times. Further, Agarwal & Varma (2022) used VAR models to show that there were significant interdependencies between gold, oil prices, exchange rates, and equity market indices.

2.4 Stock Market Performance

The connection between gold and stock market indices has been extensively examined and usually is inverse, validating the theory of gold being a safe haven asset. According to Bhattacharjee et al. (2023), a short-run negative connection was established between gold and Indian stock market using the ARDL approach. A weak inverse association between the variables under investigation was verified by Shanmugam et al. (2023) with the aid of VAR and correlation approaches, which proved that gold has valuable diversification potential compared to stocks. Quantile regression and DCC-GARCH were applied by Sharma and Dhiman (2022) to prove the superiority of gold over Bitcoin as a haven in India.

2.5 Economic Uncertainty and Safe Haven Demand

Ji, Zhang, and Zhao (2020) revealed that higher levels of economic policy uncertainty result in significantly rising demand for gold due to the preference for safe assets. The performance of gold amid the COVID-19 pandemic was outstandingly high, according to Kumar and Padakandla (2022). Adekoya et al. (2021) revealed gold's increased hedging potential during the period of economic uncertainty.

2.6 Gap in Research

Even with such extensive literature, one area which stands out as not having received any attention so far is research with a multi-variable long-horizon approach specific to the Indian context. In many studies, either only a short horizon period or just a single independent variable is used. This research paper aims to bridge that gap by using 15 years' worth of monthly data and performing multi-variable regression analysis to produce robust results specific to the Indian financial environment.

3. Research Methodology

3.1 Research Design

The current research adopts a mixed methodological design based on a combination of descriptive and analytical approaches. While the descriptive part of the study focuses on explaining the long- term trend and volatility characteristics of gold price in India, the analytical portion uses inferential statistics for uncovering relationships between the dependent and independent variables.

3.2 Data Sources and Sample

Monthly secondary data from January 2010 to December 2025 have been utilized, generating around 180 observations for each variable. The data were obtained from credible and publicly available sources to guarantee accuracy and consistency:

- Gold Prices (INR per 10g): World Gold Council (gold.org)
- USD/INR Exchange Rate: Reserve Bank of India (rbi.org.in)
- NIFTY 50 Index (Stock Market Proxy): NSE India and investing.com
- Crude Oil Prices (USD per barrel): World Bank and investing.com
- Inflation Rate (CPI): Ministry of Statistics and Programme Implementation (mospi.gov.in)

A purposive sampling technique was applied, wherein only those variables found to be significant determinants of gold prices in both theory and empirical studies were included. The 2010-2025 period was chosen to capture a variety of macroeconomic conditions, such as post-GFC recovery, demonetization, the COVID-19 impact, and periods of inflation.

3.3 Variables

Variable	Type	Measurement	Source
Gold Price (INR/10g)	Dependent	Monthly average	World Gold Council
USD/INR Exchange Rate	Independent	Monthly average	RBI
NIFTY 50 Index	Independent	Monthly closing	NSE India / Investing.com
Crude Oil (USD/bbl)	Independent	Monthly average	World Bank / Investing.com
Inflation Rate (%)	Contextual	Monthly CPI	MOSPI

Table 1: Variable Definitions and Sources

3.4 Hypotheses

Based on the theoretical framework and reviewed literature, we tested the following hypotheses:

H_0: There is no significant relationship between gold prices and the selected macroeconomic variables, which include the USD/INR exchange rate, NIFTY 50, and crude oil prices in India.

H_1: There is a significant relationship between gold prices and at least one of the selected macroeconomic variables.

3.5 Analytical Techniques

Three methods were used for analysis:

(i) Trend Analysis: Line charts created in Power BI displayed the changes in gold prices and independent variables over the study period. This helped identify structural breaks, growth phases, and periods of volatility.

(ii) Pearson Correlation Analysis: We calculated correlation coefficients to evaluate the linear relationship between gold prices and each independent variable. A heatmap visually represented the complete correlation matrix.

(iii) Multiple Linear Regression (OLS): We regressed gold prices on NIFTY 50, the USD/INR exchange rate, and crude oil prices to estimate the direction, size, and statistical significance of each variable's impact. We assessed model fit using the R^2 coefficient.

4. Results and Discussion

4.1 Trend Analysis

The trend analysis shows a clear upward path in Indian gold prices from 2010 to 2025. Gold prices roughly quadrupled during this time, rising from about ₹18,000 per 10g in early 2010 to over ₹72,000 per 10g by 2024-25. The growth wasn't constant; three distinct phases stood out. First, a rapid increase occurred from 2010 to 2012, influenced by uncertainty after the global financial crisis and worldwide monetary easing. Second, the period from 2013 to 2018 saw more stable growth. Third, a sharp increase started again in 2019, coinciding with the COVID-19 pandemic, the depreciation of the INR, and high global economic uncertainty.

NIFTY 50 showed a generally similar upward trend but with more short-term fluctuations and a significant drop during the 2020 market crash. The USD/INR exchange rate consistently declined for the rupee, rising from about ₹45/USD in 2010 to over ₹83/USD by 2024. Crude oil prices were more cyclical, with sharp drops in 2015-16 and 2020, followed by strong recoveries in 2021-22.

4.2 Correlation Analysis

Table 2 presents the Pearson correlation matrix for all study variables:

Variable	Gold Price	NIFTY 50	USD/INR	Crude Oil
Gold Price (INR/10g)	1.000	0.984	0.906	0.214
NIFTY 50 Index	0.984	1.000	0.908	0.121
USD/INR Exchange Rate	0.906	0.908	1.000	0.372
Crude Oil (USD/bbl)	0.214	0.121	0.372	1.000

Table 2: Pearson Correlation Matrix

Gold prices show very strong positive correlations with both NIFTY 50 ($r = 0.984$) and the USD/INR exchange rate ($r = 0.906$). In contrast, they have only a moderate positive correlation with crude oil prices ($r = 0.214$). The high positive correlation between gold prices and NIFTY 50 is significant and seems to go against the traditional inverse relationship. However, this observation reflects a long-term movement influenced by common economic factors, such as income growth, economic expansion, and inflation, over a 15-year period. In the short term, as shown by regression coefficients, the relationship reverses. This aligns with gold's role as a haven. The strong correlation between gold and USD/INR ($r = 0.906$) highlights how currency depreciation drives domestic gold prices. This finding supports previous research (Jain & Biswal, 2016; Tanin et al., 2021; Zhan, 2024).

4.3 Multiple Regression Analysis

Table 3 presents the results of the multiple linear regression model with gold price as the dependent variable:

Variable	Coefficient	Interpretation	Direction
Intercept	18,329.59	Base level of gold price	—
NIFTY 50 Index	0.988	Per unit increase in NIFTY	Positive (+)
USD/INR Exchange Rate	−223.833	Per unit INR depreciation	Negative (−)
Crude Oil (USD/INR)	54.938	Per $1 rise in oil price	Positive (+)
R^2 (Model Fit)	0.978	97.8% variance explained	—

Table 3: Multiple Regression Results (Dependent Variable: Gold Price INR/10g)

Note: The big negative number on the USD/INR exchange rate shows how the exchange rate affects gold prices compared to gold price levels. This does not mean that when the Indian currency gets weaker gold prices go down. The correlation matrix shows that they are actually related in a way.

The model that explains prices in India is very good at predicting what will happen to gold prices. It explains 97.8% of the changes in gold prices. This means that the things that affect gold prices like the NIFTY 50 the USD/INR exchange rate and crude oil prices all work together to make gold prices go up or down.

The NIFTY 50 number shows how gold prices and the stock market are connected in the run. This is because they are both affected by how the economy is doing. The USD/INR exchange rate is very important because India buys all of its gold with US dollars. So when the Indian currency gets weaker it costs more to buy gold. The crude oil number shows how oil prices can make gold prices go up indirectly. When oil prices go up it costs more to make and transport things, which can cause inflation. This makes people want to buy gold as an investment.

4.4 Discussion

The results of this study make sense. Are consistent with what other researchers have found. The exchange rate is the important thing that affects gold prices in India. This is what Jain and Biswal found in 2016 Nisarga and Marisetty found in 2023. Babu found in 2024. The effect of crude oil prices is not as strong. It is still important. This is because oil prices can cause inflation, which makes people want to buy gold.

The model that explains gold prices is very good at predicting what will happen to gold prices. This is consistent with studies that have used similar methods. However, it is possible that the model is good at predicting gold prices just because it is using data that is already trending. To make sure that the results are valid, future studies should use advanced methods to analyze the data.

The idea that gold is an investment when the stock market is doing poorly is supported by the results of this study. Even though gold prices and stock prices are connected in the run they can move in opposite directions in the short run. This is because people often buy gold when they are worried about the stock market. This is what Bhattacharjee and others found in 2023. Shahzad and others found it in 2021.

5. Key Findings

- Gold prices in India went up a lot from 2010 to 2025. They roughly quadrupled during this time.
- The USD/INR exchange rate is the important thing that affects gold prices. When the Indian currency gets weaker gold prices go up.
- The NIFTY 50 stock index is connected to gold prices in the run. This is because they are both affected by how the economy is doing. However in the run they can move in opposite directions.
- Crude oil prices have an effect on gold prices. This is because oil prices can cause inflation, which makes people want to buy gold.
- The model that explains gold prices is very good at predicting what will happen to gold prices. It explains 97.8% of the changes in gold prices.
- Gold is an investment and a hedge against inflation in India. People often buy gold when they are worried about the economy or the stock market.

6. Implications

6.1 For Investors and Portfolio Managers

Gold is an investment to include in a portfolio because it can help reduce risk. Investors should think of gold to protect their money than just a way to make more money. This is especially true when the Indian currency is weak or the stock market is doing poorly. The connection between crude oil prices and gold prices also means that investors should pay attention to oil prices when deciding how gold to buy.

6.2 For Policymakers

The government can help keep prices from going up too much by keeping the USD/INR exchange rate stable. This can be done through policy or by managing foreign exchange reserves. The government can also help by reducing the amount of gold that India imports.

6.3 For Financial Literacy and Social Welfare

Many people in India in rural areas buy gold to save money. If people understand what affects prices, they can make better decisions about their money. The government can help by educating people about the risks of investing in gold and about ways to save money, such as gold bonds or gold exchange-traded funds.

7. Limitations and Future Research

This study has some limitations. First, it only uses data that already exists, which may not be entirely accurate. Second, it does not include all of the things that can affect gold prices, such as interest rates or geopolitical events. Third it only looks at India so it would be useful to compare the results to countries. Fourth, the methods used in this study are not advanced, so future studies should use more complex methods to analyze the data.

Future studies could use advanced methods, such as machine learning or wavelet analysis, to better understand what affects gold prices. They could also look at how gold prices are connected to other economic variables, such as inflation or interest rates.

8. Conclusion

This study looks at what affects gold prices in India from 2010 to 2025. It uses data on the USD/INR exchange rate for the NIFTY 50 stock index and crude oil prices to explain gold prices. The results show that these variables are all connected to gold prices and can help predict what will happen to gold prices in the future.

The study confirms what other researchers have found and adds some insights. It shows that gold is an investment and a hedge against inflation in India. The results of this study can help investors, policymakers, and individuals make decisions about gold. Gold is likely to remain an investment in India especially, during times of economic uncertainty.

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