Journal DOI: 10.36713/epra1013 | SJIF Impact Factor (2024): 8.431 ISSN: 2347-4378
EPRA International Journal of Economics, Business and Management Studies (EBMS)
Volume: 11 | Issue: 8 | August 2024 -Peer-Reviewed Journal

AN EMPIRICAL STUDY ON IMPACT OF GOLD PRICE ON EXCHANGE RATE IN INDIA

Arup Banik
Assistant Professor, Department of Commerce, Raja Peary Mohan College

Article DOI: https://doi.org/10.36713/epra18089
DOI No: 10.36713/epra18089

ABSTRACT

Macroeconomic variables play a vital role in the economic performance of any country. They act as the barometer for measuring the success of any economy. The macroeconomic variables are interlinked with each other and in many instances influence each other's performance. Hence it is of utmost importance to study the interrelationship among them, to construct a concept about contribution of each variable and as well as it's impact on other variables in the economic development.

The present study focuses on the interrelationship between two macroeconomic variables – Gold price in India & Exchange rate (USD/INR). Karl Pearson's Correlation Coefficient is used to study the extent to which the movement of the two variables is associated. A linear regression model with Exchange rate as dependent variable & Gold price as independent variable is fitted. Further ANOVA analysis is done to evaluate the acceptability of the model from statistical perspective. The study concludes that the selected macroeconomic variables are strongly associated with each other & a tenable regression model is developed with a very high degree of Coefficient of determination. Further the validity of the developed model is also justified by the p value from ANOVA table.

KEYWORDS: *Karl Pearson's Correlation Coefficient, Linear regression model, ANOVA*

I. INTRODUCTION

Gold, an item of luxury, an embodiment of status symbol, an emblem of royalty, beauty, and a barometer of wealth & power, is also considered as a safe-haven asset in times of economic uncertainty. The importance of Gold is somewhat inversely proportional to the citizen's confidence in traditional currencies. This is where the concepts of the theoretical models like the Currency Substitution Model and the Store of Value Concept comes into existence.

In India, the demand for gold is dependent on a lot of factors, such as culture, tradition, the desire to look beautiful with golden ornaments and finally an effective tool of investment to seek financial protection during crisis. Broadly speaking in India gold is viewed as an avenue of investment & as well as an instrument for adornment.
An exchange rate can be defined as a relative price of one currency expressed in terms of another currency. For countries that actively engage in international trade, the exchange rate is an important economic variable. Any fluctuation in Exchange rate affects economic activity, inflation and the nation's balance of payments.

The present study is an attempt to evaluate the relationship between the two important macroeconomic variables – the Gold price and the Exchange rate. The study takes into consideration the daily data of over a period of 139 months.

II. LITERATURE REVIEW

Bernard, Barreto & D'silva (2018) studied the dynamic relationship between gold prices and exchange rates with data for the period January 2013 to December 2017. The researchers used Karl Pearson's Correlation Analysis to evaluate the relationship between exchange rates and gold prices. The study is based on four different exchange rates GBP/USD, EURO/USD, JPY/USD, and INR/USD. The study results indicate that for some of the exchange rates there exists positive relationship between the two selected variables, whereas in some cases negative relationship exists between the two macroeconomic variables.

Tanin, Sarker & Brooks (2021) examined the relationships between seven leading currency exchange rates and gold prices using daily data from January 2017 to April 2021 applying the nonlinear autoregressive distributed lag method. The results reveal that in the short term, while negative United States dollar (USD) to United Kingdom pound, negative USD to Canadian dollar, negative USD to Japanese yen, negative USD to Danish krone, and positive USD to euro exchange rates increase gold prices, a lagged positive USD to euro and lagged positive USD to Danish krone exchange rates decrease gold prices.

Nair, Choudhary & Purohit (2015) studied the impact of recession of 2008 on relationship between exchange rate of US dollar in INR and gold prices in India. The study uses Johansen Co- Integration test to check the long term association between exchange rate of US dollar in INR and gold prices in India and it further uses the Granger Causality Test to check the lead lag relationship between the variables & the study concluded that the relationship between gold prices and USD exchange rate has been impacted by recession in India & that exchange value of US Dollar is an important factor in fluctuations in gold prices in India.

Mashayekhi, Ara & Jafari (2013) studied to investigate and analyze the trend of gold prices over the past five years in Iran. The study's period refers to the ended five-year in December 2012. Vector auto regression model is used to analyze the results of the study. The results indicate that gold price is affected from exchange rates' fluctuations and gold global rate, it is also noteworthy to mention that the most important factors affecting the recent volatility in the Iran's gold market and the exchange rate is the economic sanctions which have been imposed against Iran.

Nisarga M, and Marisetty (2023) aimed to explore the various factors that significantly impact the price of gold in India. The study identified key factors influencing gold prices in India, such as variations in the price of crude oil, shifts in the BSE Sensex, exchange rates, inflation trends, and repo rates. These factors showed complex relationships with gold prices, frequently influenced by periods and market circumstances.

Ergül, & Karakas (2024) studied the hedging feature of gold against inflation by analyzing the factors affecting gold prices for the post-2013 period, including the tapering process in the United States. The study concluded that gold does provide a partial hedge against inflation as an investment tool, at least for the recent period. Furthermore, the analysis of Bitcoin's effect on gold prices starting in the second half of 2016 shows no statistically significant relationship.

Trabelsia, Gozgorc, Tiwarid, Hammoudehe, (2021) examined the relationship between the returns of gold and seven sectoral indices in the Bombay Stock Exchange (BSE) for the period from January 2000 to May 2018 and concludes that gold returns are significantly independent of the returns of the BSE sectoral indices. Besides, gold returns can help predict the future returns of the Consumer Durables and the Fast-Moving Consumer Goods indices as well as the Oil & Gas equity indices. Finally, the findings also show that gold hedges against the information technology stock index and serves as a robust portfolio diversification tool.

Bhunia & Pakira (2014) studied the impact of gold price and exchange rates on sensex in India for the period from January 2, 1991 to October 31, 2013 using daily data. Johansen cointegration test and Granger causality test have been designed. Johansen cointegration test result indicates that there exists a long-term relationship among the selected.

Anu (2022) has analyzed the impact of exchange rate and foreign exchange reserve on gold prices. The results of the analysis has shown that both the predictors have significant relationship with the outcome i.e. price of gold and further the model establishes a causal relationship between the selected variables

III. OBJECTIVES OF STUDY

The present research paper is based on the following objectives.

1. To study the relationship between the two macroeconomic variables – Gold price in India & Exchange rate (USD/INR).
2. To examine the impact of Gold price in India on Exchange rate (USD/INR).

Journal DOI: 10.36713/epra1013 | SJIF Impact Factor (2024): 8.431 ISSN: 2347-4378
EPRA International Journal of Economics, Business and Management Studies (EBMS)
Volume: 11 | Issue: 8 | August 2024 -Peer-Reviewed Journal

IV. RESEARCH METHODOLOGY

I. Data Collection

The study is basically empirical in nature based on secondary data only. The study is conducted for a period of 11 years & 7 months (139 months), ranging from 01/01/2013 to 02/08/2024. The necessary data are collected from different websites acknowledged at the end of the research paper.

II. Analytical Tools

The paper seeks to identify the relationship between the Gold price in India & Exchange rate (USD/INR). For this purpose, Karl Pearson Correlation Coefficient is used. Correlation Coefficient is a statistical tool used to study the extent to which the movement of the two variables is associated. The formula of Karl Pearson's Correlation Coefficient is given below.

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

Where x & y are the variables, x being the independent one & y being the dependent one & n denotes the number of observations.

The study also analyses the effect of Gold Price in India on Exchange rate (USD/INR). For this purpose, a linear regression model with Exchange rate as dependent variable & Gold price as independent variable is fitted. In other words, the researcher seeks to develop a linear regression model, where Gold price is independent variable & Exchange rate is dependent variable. The Linear regression analysis is a statistical technique used to evaluate the effects of one variable upon the other. The following linear regression model is used.

$y=a + bt$ _____(1)

Or, Exchange Rate = a + b (Gold price in India) _____ (2)

The data on Gold price in India & Exchange rate (USD/INR) is standardised i,e converted into standard normal distribution in the following way

$Z = \frac{y-\bar{y}}{\sigma}$ where Z denotes the standard normal variable, y denotes the original variable, $\bar{y}$ denotes the mean value of variable y & σ denotes the standard deviation of the variable Y.

V. DATA ANALYSIS

Correlation Analysis

As per the requirement of first objective, we have to study the relationship between two variables – Gold price in India & Exchange rate (USD/INR). To identify the degree of association between the two selected variables, the researcher has employed Karl Pearson's Correlation coefficient. Correlation coefficient is a statistical analysis done to identify the degree of relationship between two variables.

Table – 1: Correlation statistics

Correlations			
		Gold_Price	Exchange_Rate
Gold_Price	Pearson Correlation	1	.892**
	Sig. (2-tailed)		0.000
	N	3034	3021
Exchange_Rate	Pearson Correlation	.892**	1
	Sig. (2-tailed)	0.000	
	N	3021	3021
**. Correlation is significant at the 0.01 level (2-tailed).			

Based on the results obtained from the Correlation table as per Karl Pearson's correlation, exhibited in table 1, we can conclude that the degree of association between the selected variables is positive & is remarkably high, implying a strong relationship between the variables. This indicates that there exists a very high degree of positive association between the two variables – Gold price in India & Exchange rate (USD/INR). This implies that the Gold price in India has a positive impact on Exchange rate (USD/INR). In other words, as the Gold price in India rises, the Exchange rate (USD/INR) rises. The test of Correlation is significant at 1% level of significance.

Journal DOI: 10.36713/epra1013 | SJIF Impact Factor (2024): 8.431 ISSN: 2347-4378
EPRA International Journal of Economics, Business and Management Studies (EBMS)
Volume: 11 | Issue: 8 | August 2024 -Peer-Reviewed Journal

Linear Regression Statistics

Table 2: Model Summary

Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.892[a]	0.795	0.795	0.4526968	1.573
a. Predictors: (Constant), Gold_Price					
b. Dependent Variable: Exchange_Rate					

The analysis in Table 2 shows the strength of relationship between the two selected macroeconomic variables. R is the measure of Correlation coefficient between the two selected macroeconomic variables. R^2 is the Coefficient of determination, which implies the degree of variation in dependent variable as explained by the independent variable. The value of R^2 as obtained from the table is 0.795, which implies that the model is able to explain 79.5% of the variation. In other words 79.5% of variation in Exchange rate is explained by the independent variable Gold price in India. Durbin – Watson test value as obtained from the analysis is 1.573. The acceptable range is 1.5 to 2.5. A value of DW test higher than 2.5 implies the existence of negative auto correlation & a value lower than 1.5 implies existence of positive autocorrelation. Thus aa our DW value (1.573) falls within the acceptable of 1.5 to 2.5, we can conclude that our data is free from autocorrelation.

ANOVA

Table 3: ANOVA Table

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	2399.187	1	2399.187	11707.098	.000[b]
	Residual	618.697	3019	0.205		
	Total	3017.883	3020			
a. Dependent Variable: Exchange_Rate						
b. Predictors: (Constant), Gold_Price						

The ANOVA table evaluates the acceptability of the model from statistical perspective. The regression row shows the information about the variation accounted for by the model, while the residual row shows the information about the variation not accounted for by the model. The p value is less than 0.05 implying that the explanatory variable has a significant linear relationship with the response variable and the fitted linear model is valid.

Coefficients & Tests for Collinearity

Table 4: Coefficients

Coefficients[a]													
		Unstandardized Coefficients		**Standardized Coefficients**			**95.0% Confidence Interval for B**		**Correlations**			**Collinearity Statistics**	
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**	**Lower Bound**	**Upper Bound**	**Zero-order**	**Partial**	**Part**	**Tolerance**	**VIF**
1	(Constant)	24.648	0.228		108.126	0.000	24.201	25.095					
	Gold_Price	0.901	0.008	0.892	108.199	0.000	0.885	0.917	0.892	0.892	0.892	1.000	1.000

Table 4 shows the coefficient values for the model. Based on this table, the equation for linear regression can be formed as framed in equation (2),

Exchange Rate = 24.648 + 0.901 (Gold price in India)

The above equation indicates that a 1% change in gold price in India results in 9.01% change in Exchange rate (USD/INR) in the same direction.

Testing of Hypothesis

The null hypothesis & alternative hypothesis, with respect to the selected macroeconomic variables – Gold Price & Exchange Rate (USD/INR) can be framed as follows.

H_0: Gold price in India & Exchange rate (USD/INR) are independent

H_1: Gold price in India & Exchange rate (USD/INR) are dependent

The p value of Gold price in India as shown in table 4 is 0.000 less than 0.05 so null hypothesis is rejected and it is concluded that Gold price in India & Exchange rate (USD/INR) are dependent.

VI. CONCLUSION

The two macroeconomic variables selected for the study are Gold price in India & Exchange rate (USD/INR) have a significant impact on Indian economy. The study was carried out for a period of 11 years & 7 months, considering the daily data of Gold price in India & Exchange rate. The Correlation study revealed that both the macroeconomic variables have a strong positive relationship between them. The Coefficient of determination (R^2) denotes that 79.5% variation in the dependent variable (Exchange rate) is explained by the model that is developed. The value of Durbin Watson test also rules out the existence of autocorrelation in the data. The p value (0.000) from ANOVA table which is less than 0.05 implies that the explanatory variable has a significant linear relationship with the response variable and the fitted linear regression model is valid.

Therefore, the study concludes that the selected macroeconomic variables are strongly associated with each other & a tenable regression model is developed with a very high degree of Coefficient of determination. Further the validity of the developed model is also justified by the p value from ANOVA table.

REFERENCES

1. *Andre, A. G., Bernard, J., & Damodar, S. (2018). Journalism and Management Practices Anveshana's. In International Journal of Research in Regional Studies, Law, Social Sciences (Vol. 3, Issue 11). Law, Social. www.anveshanaindia.com*
2. *Ergül, Ö., & Karakaş, T. (2024). Analysis of the relationship of gold prices with inflation and bitcoin in the post-tapering period. Borsa Istanbul Review, 24(4), 797–805. https://doi.org/10.1016/j.bir.2024.04.009*
3. *Marisetty, N. (n.d.). A STUDY ON VARIOUS FACTORS IMPACT ON THE GOLD PRICE IN INDIA. https://ssrn.com/abstract=4587897*
4. *Mashayekhi, B., Sadr Ara, M., & Jafari, A. (2013). Gold Price and Exchange Rate Volatility: Effects of Economic Sanctions. INTERNATIONAL JOURNAL OF MANAGEMENT & INFORMATION TECHNOLOGY, 4(1), 121–127. https://doi.org/10.24297/ijmit.v4i1.807*
5. *Nair, G. K., Choudhary, N., & Purohit, H. (2015). The Relationship between Gold Prices and Exchange Value of US Dollar in India. EMAJ: Emerging Markets Journal, 5(1), 17–25. https://doi.org/10.5195/emaj.2015.66*
6. *Tanin, T. I., Sarker, A., & Brooks, R. (2021). Do currency exchange rates impact gold prices? New evidence from the ongoing COVID-19 period. International Review of Financial Analysis, 77. https://doi.org/10.1016/j.irfa.2021.101868*
7. *Trabelsi, N., Gozgor, G., Tiwari, A. K., & Hammoudeh, S. (2021). Effects of Price of Gold on Bombay Stock Exchange Sectoral Indices: New Evidence for Portfolio Risk Management. Research in International Business and Finance, 55. https://doi.org/10.1016/j.ribaf.2020.101316*
8. *Anu, D. (2022). Impact of exchange rate and foreign exchange gold reserve on prices of gold. International Journal of Innovative Research in Engineering & Management, 9(6), 31–35. https://doi.org/10.55524/ijirem.2022.9.6.5*
9. *Bhunia, A., & Pakira, S. (2014). INVESTIGATING THE IMPACT OF GOLD PRICE AND EXCHANGE RATES ON SENSEX: AN EVIDENCE OF INDIA.*
10. *FICCI 1. Demand, Supply and the Economic Contribution of Gold https://www.gjc.org.in/pdf/Why_India_Needs_a_Gold_Policy.pdf*
11. *Bhatt, S. GoldTrends: Understanding Gold's Role in a Shifting Economic Landscape linkedin.com/pulse/goldtrends-understanding-golds-role-shifting-economic-bhatt-ph-d--oqk1f*