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DO THE MACROECONOMIC FACTORS INFLUENCE THE VOLATILITY OF GOLD PRICE?: AN EMPIRICAL STUDY

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Abstract *The price of gold changes every day due to several reasons, such as economic factors, political factors, festival season, and the demand and supply needs of the consumers across the world. Among these factors, the change in gold price is majorly influenced by macroeconomic variables in India. With this backdrop, the study focuses on the influence of macroeconomic factors on the fluctuations in gold price in India. The study has chosen select macroeconomic variables on the basis of existing studies, namely wholesale price index (WPI), exchange rate (ER), unemployment rate (UR), long-term interest rate (LTIR), and S&P BSE SENSEX. This study takes monthly observations over a period of five years, from 1 January 2015 to 31 December 2019. Descriptive statistics is used to check accuracy and reliability of the data. Correlation analysis is used to find the relationship, and ordinary least square (OLS) method is applied to check the cause and effect of the macroeconomic variables on the gold price. The study empirically found that ER, WPI, UR, and S&P BSE SENSEX have a positive influence on the gold price, while LTIR has a negative influence.*

Keywords: *Gold Price, Exchange Rate, Wholesale Price Index, Long-Term Interest Rate, Unemployment Rate, S&P BSE SENSEX*

JEL: *G15, C50, E31, E2, E24, E22*

INTRODUCTION

It is said that since the ancient period, the yellow metal has been considered a sign of beauty, power, purity, success, tradition, and pride. In fact, gold was used as a currency before the fiat money was introduced. Gradually, gold was considered auspicious and the best investment in India. Moreover, it has always been a symbol of stability and wealth, as pointed out by Allese (2008). Due to the growing demand for gold, India became the largest consumer and importer of gold. India became the world's major buyer of gold and the magnitude of the market for the physical, as well as the paper, was in rise (Reddy, 1996). The demand for bullion and gold coins also augmented considerably, in addition to demand for jewellery, which indicated that gold was considered a safe investment alternative by Indians (Panda & Sethi, 2016). The price of gold extended quicker than the general level, making gold an attractive resource (Shakil, Mustapha, Tasnia & Saiti, 2018). Apart from this, gold delivers assistance in portfolio diversification by maintaining a balance between soft and physical assets. In fact, gold is considered an important part of a portfolio due to its hedging properties (Allese, 2008).

The Indian gold market predominantly has undergone incredible changes after the Indian government liberalised the economy since the 1991 economic crisis. The benefits and uses of gold spread across the Indian market. However, the Indian gold market always had an astounding growth rate in spite of the low income growth in the nation. As gold has a sentimental value in everyone's life, whether they are cultured or fashionable, it guarantees the existence of a demand for this commodity forever. As per the report in the Economic Times (May 06, 2019), the annual demand for gold is equivalent to around 25 per cent of the total physical demand worldwide. Owing to the constant increase in the price of gold and the high gold price movements, i.e., high volatility in the stock market, it makes investors perplexed while making decisions about investing in gold. This has given rise to analysing the movement of gold prices in the Indian economy.

SELECTION OF MACROECONOMIC VARIABLES

Macroeconomics is a branch of economics that studies how an overall economy performs when the market systems

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operate on a large scale. Macroeconomics studies wide phenomena, such as inflation, price levels, rate of economic growth, national income, gross domestic product (GDP), and changes in unemployment, and so on. Based on previous literatures, the following variables are selected for the study.

Exchange Rate (ER)

The value of a nation's currency is strongly linked to the value of its imports and exports. The relationship of gold and the USD vs. INR exchange rate is that gold is used as a hedge against the adverse exchange value of the dollar. As the dollar's exchange value decreases, it takes more dollars to purchase gold, which rises the value of gold. Therefore, gold prices have a negative relationship with the domestic currency, or in other words, gold prices bear a positive relationship with the exchange rate.

Inflation

When inflation increases, the value of currency goes down, and therefore, people tend to hold money in the form of gold. Thus, when inflation remains high over a longer period, gold becomes a tool to hedge against inflationary conditions. This pushes gold prices higher during the inflationary period (Das, 2010). Gold is considered to be the most important avenue to hedge against inflation, and is unmatched against economic, political, or social crisis (Gangopadhyay et al., 2016).

Long-Term Interest Rate

When interest rates increase, investors tend to switch to fixed-income bearing investments, as they yield a fixed return against investing in gold, as gold does not carry any such returns. Hence, the demand for gold slows down with the prices remaining flat, thus creating a negative relationship between gold and interest rates.

Unemployment Rate

The unemployment rate increases as economic activity slows down, and decreases when the economy improves. Hence, the unemployment rate should be positively linked to gold. Thaver and Lopez (2016) provide evidence that for every 1 per cent change in the unemployment rate, the price of gold increases by 4.7 per cent in the U.S. during 2008-2016.

BSE Sensex

The relationship between stock valuations and the gold price is another widely discussed relationship. Gold prices and the Indian stock prices have a negative relationship, in the sense that gold prices move against stock prices. Baur and Lucey's (2010) study also supports that as gold is a portfolio diversifier, its prices are not affected by the financial market crisis. Hence, there exists an inverse relationship between Sensex and gold prices.

REVIEW OF LITERATURE

Erdoğdu (2017) aimed to investigate various macroeconomic factors affecting the gold prices in the US market. Dow Jones Index, the US exchange rate, silver price, interest rate, oil price, and inflation rate were considered for the study. Monthly data from January 2003 to June 2016 were examined and the GARCH model was implemented. The study shows the highest negative relationship between gold prices and the US exchange rate, and a positive relationship between gold prices, silver prices, and oil prices. Raju and Marathe (2016) studied the impact of gold price variations in India, China, and the USA, and found a co-integration between the inflation and gold prices; however, there is a short-term relationship between them. Muhammad Khairul Amar Bin Sukri et al. (2015) considered the various macroeconomic factors and their impact on gold prices in Malaysia. The finding states that the relationship between Malaysian GDP and gold prices were positively correlated, and that of inflation rate was negatively correlated.

Hashim et al. (2017) tried to analyse various macroeconomic variables that affect the volatility and price movements of gold. The timeframe for the study was 20 years (January 1996 to December 2015) and the data was collected from the largest consuming gold countries, like India, China, the United States, Turkey, and Saudi Arabia. Gold prices, GDP, oil prices, exchange rate, interest rate, and inflation are the variables considered for the study. The results show that there is a positive correlation between crude oil prices, real interest, and gold prices, and a negative correlation between other variables. The regression result shows that except exchange rate, other independent variables have a significant impact on the price of gold.

Bishnoi (2014) examined the critical factors affecting the gold prices using statistical techniques like ordinary least square, White's test, and weighted least square. The results showed that gold prices are positively inclined to the US dollar and crude oil prices, but negatively correlated with rate of inflation and long-run interest rates. Sindhu's (2013) paper focused on factors like exchange rate, inflation rate, repo rate, and crude oil prices; each variable was measured individually with the price of gold. The findings show an inverse relation between the US dollar and gold prices; crude oil prices have an impact on the gold prices. There is

an interdependence between repo rates and gold prices and inflation rates are dependent and positively correlated.

Bapna et al. (2012) observed the changes in the various economic factors and their impact on the price of gold. The study period was ten years, from 2002 to 2011; quarterly data was collected. Variables like growth rate, exchange rate, interest rate, inflation rate, NIFTY, SENSEX, foreign reserves, fiscal deficit, and GDP were considered for the study. Tools like unit root test, regression analysis, and Ganger causality were used to examine the data. The findings reveal that exchange rate, fiscal deficit, forex reserve, and inflation rate have a significant impact on gold prices; on the other hand, growth rate, GDP, Sensex, and Nifty have a low impact on gold prices independently. Gold prices do not affect the exchange rate, BSE Sensex, NSE Index, forex reserves, and fiscal deficit. It does, however, affect interest rate and inflation.

Seemuang and Rompreert (2013) explored the relationship among various macroeconomic variables and gold prices in the context of the USA and found that a change in the US dollar index is a perfect factor that explains the movement of gold values. Movement of gold price and percentage of change of the US dollar index have minor effects on each other. However, Toraman et al. (2011) in their study found that there exists the highest negative correlation between gold prices and the US exchange rate, and there is a positive correlation between gold prices and oil prices.

Raju and Marathe (2016), in order to study the impact and relationship of crude prices, inflation rate, and exchange rates on the prices of gold in three different countries, namely India, China, and the USA, collected 20 years of data from January 1996 to December 2015 and used techniques like ADF unit root analysis, VAR, Johansen co-integration test, and Ganger causality test. They found that crude oil prices have a short-term relationship with gold prices in India, China, and the USA. In addition, there is a bidirectional causality in India and the USA.

Trivedi and Behera (2012) estimated the coefficients of the long-run relationship and the results conferred that exchange rate and the world gold prices have, respectively, a negative and positive relationship; both are significant at the 1 per cent level. The real GDP, interest rate, and equity prices variables are statistically insignificant. Consequently, the results of the long-run relationship establish that exchange rate and world gold prices are the key determining factors of gold prices in India. Further, signs of the short-run dynamic impact have been found to be consistent with long-run coefficients; error correction term is negative and significant, inferring convergence to the long-run equilibrium path. Further, in the recent study carried out by Singh and Kaur (2020), the ADRL results suggested that the long-run cointegration between the prices of gold and the macroeconomic variables, and the exchange rate, gold reserves of RBI, BSE Sensex, IIP, and WPI were found to significantly affect the gold prices. However, interest rate was found to be statistically insignificant. Yelamanchili (2020) has empirically examined the return innovation distribution using the GARCH model, which has both symmetric and asymmetric models, where in the study it was observed that there is a long horizon and high frequency daily returns in NIFTY. Further, various formulas such as Gaussian distribution, GED distribution, and t-distribution are used to estimate the multiple GARCH, GJRGARCH, EGARCH, and APARCH models through 5,971 daily observations. A recent study was conducted by Mahadevan (2021), who found that 74 per cent of sample companies apply derivatives to hedge currency exposure. In fact, forward contract is a major instrument applied in companies for the hedging process, of which 70 per cent employed forward contracts as a hedging tool to manage currency exposure. Besides, a combination of options, swaps, and futures are also used by companies. Further, the study identified that the revenues and extent of internalisation had a positive association on the likelihood of companies adopting derivatives to hedge risk.

Shanmugam and Madathil (2019) have studied the introduction of gold option futures, which is fundamental in hedging risk related to gold price changes. In this study, tests such as Augmented Dickey Fuller test and linear regressions are adopted. Finally, it indicates that there is an attractiveness in the gold derivative market. Besides, this paper specifies the major benefits of option contracts in the exchange traded and derivative instruments. The study by Baek et al. (2018) examined the United States and Korean futures markets in price discovery of gold. In this research, it was found that the Chicago Mercantile Exchange's gold futures market positively impacted Korea Exchange's gold futures. Kumar (2018) explored the evidence of price discovery in the currency market in which four emerging currencies were used, i.e., Indian Rupee, U.S. dollar, South African rand, and Brazilian real. In fact, the study indicated strong evidence in the currency market as far as price discovery is concerned. Further, in India and South Africa, the spot market consistently led the futures market. In the United States and Brazil, future needs led the spot market. The study by G. K. (2018) analysed the price discovery function in the National Commodity & Derivatives Exchange Limited market. Dyhrberg (2016) researched volatility of gold, bitcoin, and dollar by incorporating the GARCH models. Here, the study indicates that there are numerous similarities in dollar and gold, in which hedging capabilities is the medium of exchange. Further, this study depicts that bitcoin may be adopted in risk management in futures. Furthermore, bitcoin

is the instrument between the gold and the dollar when you think about the portfolio and financial market. A similar study was conducted by Nguyen and Walther (2018) in which they examined the time varying volatility patterns of gold, platinum, silver, and crude oil, and a possible factor that drives long-term volatility components, using the GARCH-MIDAS approach to investigate the part played by financial variables. Findings indicate that there is need for segregating the short-term and long-term components in forecasting the commodity volatility. Further, the long-term volatility of the commodities in futures had a significant impact by global economic factors, sentiment, and consumers' preference on the product, economic policies, and industrial production.

The study conducted by Batten and Luce (2010) inspects the volatility in the gold futures market in the Chicago board of trade, in which various tests were carried out to analyse the volatility and the relationship between intra-day and inter-day fluctuations in the gold price. Here, the observation made was that the Garman Klass volatility estimator had explained the new perceptions that were observed between inter-day and intra-day volatility. Finally, the GARCH test result indicated that volatility is positively interrelated with volume of trading. Selvan (2021), in his study, indicated a bidirectional relationship between Indian spot market and futures market. Both markets play a key role in price disc-overy in India. In this study, it was concluded that macroeconomic variables affect the gold price. Further, intra-day strategy significantly impacts the futures market. Both the markets act more efficiently and have a quick response. Hence, both markets play a leading role in the price discovery process in India. The futures market's information flow to the spot market shows the price discovery process happening in the futures market trade. Further, the macroeconomic variables affect gold price; and intra-day pricing impacts the futures market. Besides, the number of volume trading also affects price volatility in gold. Lastly, the long-run relationship between gold prices is positive, whereas in the short run there is deviation between gold and other variables due to inflation, credit risk, exchange rate, and so on. Torki et al. (2021) studied the effect of inflation, oil price, and liquidity on volatility of futures price of gold in Iran, with the monthly time series data using GARCH mid as the model, during 2009-2017, and incorporated to allow direct input of data at different frequencies in the short-term and long-term fluctuations in the market. Khani et al. (2021) indicated the preliminary analysis of features, namely COVID-19 and other market tickers, for improvising the forecasting model against market fluctuations. Here, the study selected gold price as the base for forecasting; however, this can be replaced by other markets. Various models, such as the convolutional neural networks, vector sequence, and associated datasets, were incorporated, resulting in vector sequence output, with a mean square error of 0.0006, 0.0008 and 0.002 on validating for 1, 2, and 30 days of predictions in advance, respectively, which were outperforming.

RESEARCH GAP

There is an abundance of research conducted on factors affecting the gold prices worldwide, focusing mainly on the developed economies, although there is a lack of adequate studies to inspect the determinants of gold price in India. In the earlier studies, unemployment rate was not considered a variable to determine the gold price. With this in mind, the study finds the influence of unemployment rate, along with other macroeconomic variables, on fluctuations in gold price. This study will be helpful for investors to understand the factors that determine the gold prices and assist them in taking pre-emptive decisions.

The study fulfils the research gap by answering the following research questions.

- Is there a relationship between the select macro economic variables and movement of gold price?
- To what extent do the select macroeconomic variables influence the movement of gold price?

OBJECTIVES

The study has three main objectives. The first is to understand the factors influencing the fluctuations in gold price by reviewing the existing studies in India as well as overseas. The second is to establish the relationship between select macroeconomic variables and the gold price. Finally, the study investigates the cause and effect relationship between the select macroeconomic variables and gold price in India.

HYPOTHESES

H_1 – There is a significant relationship between macroeconomic variables and gold prices.

H_2 – There is a significant influence of exchange rate on gold price.

H_3 – There is a significant influence of inflation rate on gold price.

H_4 – There is a significant influence of interest rate on gold price.

H_5 – There is a significant influence of unemployment rate on gold price.

H_6 – There is a significant influence of BSE SENSEX on gold price.

RESEARCH METHODOLOGY

The study is descriptive and analytical in nature. To determine the fluctuations in gold price, the study has chosen select macroeconomic variables based on the existing studies. Gold price is considered the endogenous variable; the exogenous variables are wholesale price index (WPI), which is a proxy of inflation, exchange rate (US$ vs. INR), long-term interest rate, unemployment rate, and S&P BSE SENSEX. The study used monthly observations on the abovementioned variables for a period of five years, starting from 1 January 2015 to 31 December 2019.

Table 1: Description of Selected Variables

Variables	Description	Unit	Source
ER	Exchange Rate (INR vs. US$)	Monthly Average Rate	Reserve Bank of India
WPI	Wholesale Price Index	Monthly Price Index	Office of Economic Adviser
LTIR	Long-Term Interest Rate (10 years Govt. Bond)	Monthly Average Rate in Per cent	Handbook of Statistics on Indian Economy
UR	Unemployment Rate	Monthly Rate in Per cent	Reserve Bank of India
S&P BSE SENSEX	Sensitivity Index	Monthly Average Closing Index	Bombay Stock Exchange (BSE)
GP	Gold Price	Gold Price Per Troy Ounce	Handbook of Statistics on Indian Economy

The study applied descriptive statistics to check the reliability and accuracy of the time series data. Correlation analysis is done to establish the relationship between the variables. Regression analysis was employed to check the cause and effect between the macroeconomic variables and gold price. The following is the model specification of the ordinary least square method.

$$\text{Gold Price} = \alpha + \beta_1 (\text{ER}) + \beta_2 (\text{WPI}) + \beta_3 (\text{LTIR}) + \beta_4 (\text{UR}) + \beta_5 (\text{S\&P BSE SENSEX}) + u_t \quad (1)$$

DATA ANALYSIS AND INTERPRETATION

To check the influence of macroeconomic factors on the volatility of gold prices, the study established the ordinary least square method. However, it is necessary to do a pre-estimation test, i.e., stationarity or non stationarity of the time series data, before proceeding to any econometric model. Hence, the study incorporated the Philips-Perron test (1988). The equation is as follows:

$$\Delta Y_t = \alpha + \gamma Y_{t-1} + e_t \quad (2)$$

Where, Y_t signifies a daily market return, α is a constant, γ is the coefficient of Y_{t-1}, and e_t is the error term. The following hypothesis has been framed to check that there is a presence of unit root test in the time series data.

Unit Root Test

H_0 – Unit root problem in time series data (i.e., $\delta = 0$)

H_1 – No unit root problem in time series data (i.e., $\delta < 0$)

Table 2: Results of Phillips-Perron Test

Variables	At Level (With Trend and Intercept)		First Difference (With Trend and Intercept)		Inference
	T-Statistics	Probability	T-Statistics	Probability	
ER	−1.4902	0.5316	−6.2598	0.0000*	Stationary
WPI	−1.6907	0.4306	−4.4630	0.0000*	Stationary
LTIR	−2.2016	0.2079	−10.4230	0.0000*	Stationary
UR	−1.4640	0.5447	−11.6325	0.0000*	Stationary
S&P BSE SENSEX	−7.8010	0.0000*	−38.2038	0.0000*	Stationary
GP	−6.2547	0.0000*	−19.6877	0.0000*	Stationary

* Indicates significance at 1 per cent level.
Source: Author Calculations.

Table 2 demonstrates the results of the Phillips-Perron test. The result confirms that the null hypothesis is rejected at 1 per cent level ($p > 0.01$), as the test statistics is more negative, thus proving that the selected series is found to be stationary after converting into the first difference, i.e., the order of integration is *I(I)*, except S&P BSE SENSEX and GP. First differenced series has been taken together for estimating the correlation and ordinary least square method.

Table 3: Descriptive Statistics

Variables	Mean	Std. Deviation	Minimum	Maximum
ER	67.0355	2.8669	61.991	73.561
WPI	4.1776	1.2004	1.540	7.350
UR	7.0110	1.7486	3.37	9.74
LTIR	7.3639	0.4839	6.305	8.094
S&P BSE SENSEX	31890.3	4991.35	23002.00	41253.74
GP	84986.88	8764.48	71639.46	107755.20

Table 3 explains the descriptive statistics of all measured variables. It is observed that ER has the highest mean score and S.D (Mean = 67.03; S.D = 2.86), followed by UR (Mean = 7.01; S.D = 1.74) and WPI (Mean = 4.17; S.D = 1.20). LTIR has a high mean score, with less variation (Mean = 7.36, S.D = 0.48). The average monthly closing index value of S&P BSE SENSEX and GP was 31890.3 and 84986.88 with S.D of 4991.35 and 8764.48, respectively. Columns 3 and 4 explain the minimum and maximum, which indicates that the minimum ER is Rs. 61.991 and maximum is Rs. 73.561, followed by WPI (Min. = 1.540; Max. = 7.35 per cent), UR (Min. = 3.37; Max. = 9.74 per cent), LTIR (Min. = 6.30; Max. = 8.09 per cent), S&P BSE SENSEX (Min. = 23002; Max. = 41253.74), and GP (Min. = 71639.46; Max. = 107755.20).

Table 4: Correlation Matrix

Variables	ER	WPI	UR	LTIR	S&P BSE SENSEX	GP
ER	1	-	-	-	-	-
WPI	−0.23	1	-	-	-	-
UR	0.0634	0.504**	1	-	-	-
LTIR	−0.12	0.378**	0.403**	1	-	-
S&P BSE SENSEX	0.571**	−0.300*	−0.351**	−0.235	1	-
GP	0.711**	−0.094**	−0.079**	−0.471**	0.747**	1

Note: **Correlation is significant at the 0.001 level (2-tailed), *Correlation is significant at the 0.05 level (2-tailed).

The relationship between gold price and the macroeconomic variables has been analysed through correlation analysis, which is displayed in Table 4. The outcome shows that the GP has a significant and positive relationship with ER ($r = 0.711$; $p < 0.01$), followed by S&P BSE SENSEX ($r = 0.747$; $p < 0.01$). It can be inferred that increase in the ER and S&P BSE SENSEX may lead to an increase the GP. The results are similar to the analysis carried out by Sharma (2018), which indicates that the individual effect of exchange rates, BSE Sensex, personal disposable income, and crude oil prices on gold prices is positive and significant.

In addition, the study found that GP has a negative and significant relationship with WPI ($r = -0.094$; $p < 0.01$), UR ($r = -0.079$; $p < 0.01$), and LTIR ($r = -0.471$; $p < 0.01$). It could be inferred that a decrease in the rate of WPI, UR, and LTIR will lead to an increase in the GP. The results are similar to the ones in the study conducted Sharma (2018), where the individual impact of inflation and interest rates on gold prices is negative and insignificant. Hence, the study proved H_1.

Table 5: Ordinary Least Square Method

Endogenous Variable	Exogenous Variable	B	T-Stat	P Value	F-Stat	R^2	DW
Gold Price	Constant	0.895	1.404	0.000**	1.735 (0.000)	0.86	1.52
	ER	0.832	5.958	0.000**			
	WPI	0.823	4.246	0.000**			
	UR	0.793	1.944	0.057*			
	LTIR	−0.929	−1.961	0.000**			
	S&P BSE SENSEX	0.943	7.745	0.000**			

Note: **Correlation is significant at the 0.001 level (2-tailed), *Correlation is significant at the 0.05 level (2-tailed).

$$\text{Gold Price} = 0.895 + 0.832\ (\text{ER}) + 0.823\ (\text{WPI}) - 0.929\ (\text{LTIR}) + 0.793\ (\text{UR}) + 0.943\ (\text{S\&P BSE SENSEX}) + u_t$$

Table 5 depicts the analysis of the ordinary least square method to check the influence of gold price on macroeconomic variables. The overall model explains about 0.86 per cent, represented by the coefficient of determination (R^2). It indicates that 86 per cent changes in the gold price are explained by variations in the ER, WPI, UR, LTIR, and S&P BSE SENSEX.

The positive or negative impact of each exogenous variable on the endogenous variable is explained by the beta coefficient (B). ER, WPI, UR, and S&P BSE SENSEX have a positive and significant impact on GP, while GP is negatively influenced by LTIR. It could be inferred that with a 1 per cent change in the ER, WPI, UR, and S&P BSE SENSEX, the GP will increase by 0.832, 0.823, 0.793, and 0.943 per cent, respectively. In addition, with a 1 per cent change in the LTIR, the GP will fall by 0.929 per cent. Similar results have been identified in the study conducted by Gnanendra (2018). It has been observed that gold has a significant relationship with SENSEX, interest rates, and exchange rates. Hence, the study proved H_2, H_3, H_4, H_5, and H_6.

Test statistics (t) value of all exogenous variables is more than 1.96 and 2.58; therefore, all the variables are statistically significant at 1 and 5 per cent, respectively. In addition, all the exogenous variables have a jointly significant impact on the endogenous variable, which is indicated by Fisher statistics ($F = 1{,}735$; $p < 0.000$). This model avoids the spurious regression which is been identified through the Durbin Watson test ($DW > R^2$).

CONCLUSION

India is one of the leading consumer markets for gold across the globe, with the precious metal making up a substantial portion of our total imports. People of India believe that gold is a safe investment, which in turn increases demand in the market. Further, study shows that the trend of the gold price in India has been ascending since 1964. The price of gold has augmented from Rs. 63.25 in 1964 to Rs. 35,220.00 (24 karat per 10 grammes) in 2019. Further, an attempt is made to study the determinants of gold price fluctuations in India, with selected macroeconomic variables. Taking monthly observations of five years, the study empirically provides evidence that gold price has a positive and significant relationship with exchange rate and S&P BSE SENSEX, and a negative and significant relationship with wholesale price index, unemployment rate, and long-term interest rate. In addition, the study proved that the fluctuations in gold price are positively influenced by the exchange rate, wholesale price index, unemployment rate, and S&P BSE SENSEX, while negatively influenced by long-term interest rates, during the study period.

RESEARCH IMPLICATIONS

The results imply that since the gold prices and stock market valuation have an inverse relationship, the investors can move towards gold in times of instability in the financial market. In short, gold can act as an edge in portfolio. In addition, as gold serves as a risk barrier against the fluctuations in exchange rate, it can act as an investment alternative. Further, the increase in demand for gold leads to higher imports. The government is trying to reduce the attraction towards gold by framing different kinds of policies; this is difficult as gold is considered a safe investment and portfolio diversifier. Hence, alternative approaches should be used to reduce imports. The government should try to bring about an awareness and promote paper gold and encourage investors to invest in gold mutual funds, sovereign gold bonds, gold exchange traded funds, and so on, with hassle-free regulations, thus giving the investor a wider portfolio with similar impressions.

LIMITATIONS AND SCOPE FOR FUTURE RESEARCH

The study is limited to five years, starting from 1 January 2015 to 31 December 2019. Further, the study can be extended for a longer duration, to check the influence in the long run. The study is restricted to only five macroeconomic factors to determine the change in gold price. There are other factors influencing the fluctuations in gold price; in addition, the researcher conducted study of fluctuations in gold price during COVID-19. Hence, inclusion of more variables in future research will be helpful in improving the model.

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