Macroeconomic Determinants of Gold Prices : A Bounds Testing Approach

Arwinder Singh [1]
Navjot Kaur [2]

Abstract

Despite the demise of gold as a long-standing anchor in the international monetary system, it keeps on alluring its producers, consumers, investors, and speculators over the globe. India is the largest consumer and importer of gold in the world. The investment demand for gold is ascending in India since it is considered as a safe haven. Notwithstanding, high instability in gold prices brings up an issue on its supporting properties. Thus, an attempt was made to identify the macroeconomic determinants of gold prices in India. The study was set to examine the long run as well as short run relationship between gold prices and some macroeconomic variables like BSE Sensex, wholesale price index (WPI), and index of industrial production (IIP) as a proxy of gross domestic product, interest rates, Indian rupee - U.S. dollar exchange rate, and gold reserves of the country. Using the monthly data from April 1995 – March 2018, the relationship was explored empirically by using the autoregressive distributed lag model and error correction model. The ARDL results suggested that the long run cointegration between the prices of gold and the macroeconomic variables during the period of the study and gold reserves of RBI, BSE Sensex, WPI, exchange rate, and IIP were found to be significantly affecting the gold prices. However, interest rates were found to be statistically insignificant during the period of the study. The error correction term, which was negative and highly significant, confirmed the convergence to the long run equilibrium. The results of this study have important implications for the Indian economy and will be helpful for policy formulation.

Keywords : **ARDL, cointegration, gold, India, macroeconomic determinants**

JEL Classification : C22, G10, E10

Paper Submission Date : August 29, 2019 ; Paper sent back for Revision : January 24, 2020 ; Paper Acceptance Date : January 28, 2020

In spite of the fact that gold is no longer a long-standing anchor in the international monetary system, it keeps on alluring its producers, consumers, investors, and financial specialists over the globe (Kannan & Dhal, 2008). One of the essential attributes of gold is that it is not degradable, and it also acts as a medium of exchange and a store of value. Gold does not form the part of the country's liabilities, so there is no risk of default versus fiat currencies (Astrow, 2012). Further, it does not acquire any regular income in the form of interest, and buying gold does not establish venture, as it doesn't build the profitable limit of the economy also ; nonetheless, there is a well created world market for gold (Trivedi & Behera, 2012). Gold is the most preferred investment avenue as it is considered as a superior hedge against inflation and unrivalled fence against economic, political, or social crisis (Das, 2010 ; Michaud, Michaud, & Pulvermacher, 2006). It retains its true value during the time of war and crisis (Gaur & Bansal, 2010). It has additionally been considered as a risk-free resource contrasted with

[1] *Assistant Professor,* Department of Business Management and Commerce, Guru Nanak Dev University (GNDU - RC), Gurdaspur, Punjab. (E-mail : arwinder.gndu@gmail.com) ; ORCID ID : orcid.org/0000-0002-0361-605X
[2] *Research Scholar (Corresponding Author),* University School of Financial Studies, Guru Nanak Dev University, Amritsar, Punjab. (E-mail : navjott.g@gmail.com) ; ORCID ID : orcid.org/0000-0001-8364-5207

DOI : 10.17010/ijf/2020/v14i2/150554

other resource classes. Therefore, it helps in portfolio diversification by maintaining balance between soft and physical assets. Moreover, gold prices have recently expanded significantly quicker than the general value level, making it an alluring resource (Shakil, Mustapha, Tasnia & Saiti, 2018).

In India, gold has immense value to the general public as gems & jewellery consumption for embellishment and a noteworthy vehicle of riches collection by a vast number of low and middle income households in rustic and urban regions (Kannan & Dhal, 2008). The Indian gold market has undergone tremendous changes since 1991, when the gold market was liberalized by the Government of India. In fact, India is the world's biggest buyer of gold and the size of the market for physical as well as paper gold is increasing day by day (Reddy, 1996). FICCI and A. T. Kearney (2013) reported that the demand for gold bars and coins in India contributed to 25% of the world demand and the size of the market for gold bars and coins grew from 134 tonnes in 2005 to 312 tonnes in 2012. The demand for bars and coins has also increased substantially in addition to demand for jewellery, which indicates gold is considered as a secure investment alternative by Indians (Panda & Sethi, 2016).

There is a dire need of studying the concept of gold investment and factors that influence the price of gold in India. There is a plethora of research conducted on determinants of gold prices worldwide, focusing mostly on developed countries. However, there is lack of sufficient studies to examine the factors affecting gold prices in India. The results of this study will help analysts and policy makers to predict the movement of gold prices by tracking the changes in macroeconomic variables. This study will also be helpful for the investors to identify the fundamental factors that determine gold prices, and by focusing on them, investors will be benefitted while making their strategic decisions. Hence, the paper is focusing on the macroeconomic determinants of the gold prices in India.

Literature Review

Gold is considered as an important part of a portfolio owing to its hedging properties. However, its prices are highly volatile because of its sensitivity to the changes in the fundamentals of the economy as well as the future expectations. As gold prices are determined by several factors, numerous studies have been conducted to find out what determines gold prices in different countries. Many researchers (Allese, 2008 ; Baur & Lucey, 2010 ; Blose, 2010; Batten, Ciner, & Lucey, 2010 ; Capie et al., 2005 ; Vaidyanathan, 1999) investigated gold prices as well as their patterns and trends to identify the determinants of gold prices. The common factors that influence gold prices were found to be inflation, stock market fluctuations, exchange rate, national income, interest rates, gold reserves of the country, and business cycles (Gangopadhyay, Jangir, & Sensarma, 2016 ; Levin & Wright, 2006 ; Lampinen 2007).

One of the earlier studies in this field was conducted by Chua and Woodward (1982) and they examined the extent to which inflation influenced gold prices in six countries. They found that gold prices were influenced by inflation only in USA. Further, the same results were confirmed by various researchers like Ghosh, Levin, Macmillan, and Wright (2004) ; Levin and Wright (2006) ; Lampinen (2007) ; Blose (2010) ; and Wang (2012). In contrast to the above studies, Baur and Lucey (2010) found no relationship between inflation and gold prices. The results of the present study confirm that gold acts as an inflationary hedge in India, supported by the results of Gangopadhyay et al. (2016).

Baur and Lucey (2010) found that the stock market index had a negative relationship with gold prices, implying that gold acts as a portfolio diversifier. The study conducted by Wang (2012) found no evidence of any relationship between gold prices and stock returns as well as interest rates. Mishra (2019) found that the return volatility of gold in the Indian financial market was neutral. Lawrence (2003) examined the relationship of gold prices with macroeconomic variables like GDP, inflation, and interest rates and concluded that there was no

association between the price of gold and these variables. This result was consented by Lampinen (2007) saying that gold prices were not influenced by interest rates, but he presented the evidence for linkage between gold prices and inflation and credit risk.

Gold is considered as a hedge against dollar by implying a negative association between gold prices and the dollar exchange rate. In the present study also, a negative relationship has been found between them, and the same was previously evidenced for developed countries (Allese, 2008 ; Capie et al., 2005 ; Ghosh et al., 2004). Further, Trivedi and Behera (2012) and Gangopadhyay et al. (2016) found the evidence for linkages between gold prices and rupee - U.S. dollar exchange rate in India.

There is little research (Gangopadhyay et al., 2016 ; Trivedi & Behera, 2012) conducted in India focusing on the factors affecting the price of gold, and moreover, the effect of structural changes has not been captured. In the present study, an attempt has been made to examine the determinants of gold prices in India using monthly data on gold prices and some more macroeconomic factors by taking into account the effect of demonetisation and gold coin promotion by banks.

Objectives of the Study

The study aims to examine the macroeconomic determinants of the price of gold. Specifically, the study has been carried out with the following objectives :

(1) To investigate the long run relationship between gold prices and macroeconomic variables.

(2) To examine the short run relationship between gold prices and macroeconomic variables.

Data Description and Research Methodology

The present study is based on secondary data. Considering the past literature and the nature of gold market in India, some macroeconomic variables have been selected such as GDP, inflation, interest rates, stock market index, exchange rate, and gold reserves held by RBI. The gold prices in ₹ per 10 grams as provided by Reserve Bank of India are taken. Index of industrial production (IIP) has been used as a proxy of gross domestic product and wholesale price index (LWPI) has been taken as a measure of inflation. Data for the same were sourced from the Office of the Economic Adviser of India. The data for 3-month treasury bills interest rates (INT), Indian rupee - U.S. dollar exchange rate (LEX), gold reserves held by RBI (GRBI) were taken from the Reserve Bank of India and the stock market index data of BSE Sensex (LBSE) were collected from the Bombay Stock Exchange.

Table 1. Descriptive Statistics of the Macroeconomic Variables

	LGP	*LBSE*	*LOG_WPI*	*IIP*	*GRBI*	*LEX*	*INT*
Mean	4.019	3.966	1.868	75.825	587.262	1.677	7.316
Std. Dev.	0.336	0.361	0.143	29.941	519.145	0.082	2.051
Skewness	0.236	–0.024	–0.056	0.169	0.605	0.240	0.577
Kurtosis	1.366	1.398	1.601	1.571	1.564	2.528	3.662
Jarque-Bera	33.250	29.519	22.648	24.789	40.539	5.220	20.361
Probability	0.000	0.000	0.000	0.000	0.000	0.073	0.000
Observations	276	276	276	276	276	276	276

The monthly time series data spanning from April 1995 – March 2018 were used for the study. The descriptive statistics of all the macroeconomic variables are provided in Table 1.

The dependent variable - gold prices (LGP) as well as the independent variables are taken in the logarithmic form except the interest rate, index of industrial production, and gold reserves held by RBI.

The functional relation of gold prices with macroeconomic variables is presented in the form of the following equation (1) :

$$LGP = LBSE + LWPI + IIP + GBRI + LEX + INT + \theta \quad \text{..... (1)}$$

where, the log of gold prices is the dependent variable and there are six independent variables, that is, log of BSE Sensex (*LBSE*), log of wholesale price index (*LWPI*), index of industrial production (*IIP*), gold reserves held by RBI (*GRBI*), log of exchange rate (*LEX*), 3-month treasury bill interest rate (*INT*), and represents dummy variables.

The brief description of the selected macroeconomic variables has been given in Table 2.

BSE Sensex is taken as a proxy of substitute asset class and as a measure of performance of equity. In the periods of financial turmoil, gold acts as a safe haven. Its prices move against the stock market.

The rate of inflation is another independent variable. The consumer price index is taken as a measure of monthly inflation. As gold is considered as an inflation hedge, a positive relationship is expected.

Index of industrial production is taken as a proxy of gross domestic product, which is a measure of economic growth. With growth of the economy, purchasing power of people increases, which leads to high demand for gold, resulting in rise of gold prices in the economy.

India's foreign exchange are kept in the form of foreign currency, that is, US -$ as well as gold. The gold reserves held by RBI is also taken as an independent variable to study the relationship.

Gold is traded globally denominated in US $; so, exchange rate of US $ to Indian rupees is considered as an independent variable. However, a negative relationship has been hypothesized between gold prices and exchange rate.

Table 2. Description of Selected Macroeconomic Variables

Variable	Description	Unit	Data Source
LGP	Log of monthly gold prices in India.	Prices in Rupees per 10 grams.	*Handbook of Statistics on Indian Economy*
LBSE	Log of BSE-Sensex.	Log of monthly average index.	Website of BSE India
LWPI	Log of wholesale price index.	Monthly average price index .	Office of Economic Adviser
LEX	Log of exchange rate of US $ to Indian rupees.	Log of monthly average rate.	Monthly RBI Bulletin
IIP	Index of industrial production.	Log of monthly average index.	Office of Economic Adviser
GRBI	Gold reserves held by Reserve Bank of India.	Monthly average prices in Rupees billion.	*Handbook of Statistics on Indian Economy*
INT	Interest rates of 3-months T-bill.	Monthly average rate.	*Handbook of Statistics on Indian Economy*
D2005M08	Dummy for extensive promotion of gold coins by banks.		
D2016M11	Dummy for demonetisation.		

The 3-months T - bill average monthly yield is taken as a proxy for interest rate in India. As the interest rate rises, demand for gold falls, and investors buy treasuries by selling gold and vice-versa. So, a negative relationship is expected between these two variables.

A set of dummy variables are included to capture the unmeasured determinants of the price of gold. The dummies are included on the basis of statistical criteria using break point unit root test which shows two breaks, that is, 2005 and 2016. The dummy for 2005 accounts for increase in number of bank outlets offering gold coins and associated promotion as well as a strong economy which leads to sudden increase in the demand for gold (World Gold Council, 2008). The dummy for 2016 aims at capturing the effect of demonetisation (World Gold Council, 2018). The Statistical Package EViews 10.0 has been used for implementation of econometric techniques and analysis.

↳ **Econometrics Techniques Used :** Autoregressive distributed lag model developed by Pesaran, Shin, and Smith (2001) has been used to analyze the relationship among the variables. It is the dynamic unrestricted model which takes into consideration the lags of all dependent and independent variables (Ghouse, Khan, & Rehman, 2018). It starts from a general and large dynamic model and then progressively reduces its mass by altering the variables by imposing linear and non-linear restrictions, thereby tackling the problems of misspecification and autocorrelation (Charemza & Deadman, 1992).

In order to determine the relationship between the non-stationary series, various techniques such as Engle and Granger's (1987) autoregressive distributed lag (ARDL) cointegration or bounds test (Pesaran et al., 2001) and Johansen and Juselius's (1990) cointegration techniques are available. However, many time series are stationary only after differencing, which implies loss of information. It is possible to retrieve the relevant information which is lost due to differencing by using cointegration. The Engle and Granger (1987) cointegration investigation isn't appropriate in case of series that are integrated of different orders (i.e, one series is $I(1)$ and other one is $I(0)$, while in Johansen and Juselius (1990) and ARDL cointegration technique, it is applicable. Further, the ARDL cointegration method is used in deciding the long run relationship between the series which are integrated of different orders (Pesaran et al., 2001). Thus, it does not require to test for unit roots in case of the ARDL model.

ARDL bounds testing is more appropriate in case of finite sample studies and is applicable where the variables are purely $I(0)$ or purely $I(1)$ or mixture of $I(0)$ and $I(1)$. However, it crashes in case of $I(2)$ variables. Thus, to check the order of integration, two unit root tests, that is, Augmented Dickey - Fuller test (1979) and Phillips and Perron test (1988) have been applied. Lastly, cumulative of recursive residuals (CUSUM) and the CUSUM of square (CUSUMQ) tests proposed by Brown, Durbin, and Evans (1975) have been applied to test the robustness of the results. CUSUM test, which is based on the cumulative sum of recursive residuals, finds the instability of parameter if the cumulative sum goes outside the areas between the two critical lines. It is used to test the constancy of the coefficients of the model. CUSUM test for structural change can be applied to cointegrating regression residuals.

Empirical Analysis and Results

(1) Unit Root Test : The unit root test has been conducted first to know the order of integration of the variables as the ARDL model crashes in case the variables are integrated of second order, that is, $I(2)$. Therefore, order of integration is examined by the Augmented Dickey - Fuller (ADF) test and Phillips and Perron (PP) test and results are reported in Table 3.

The unit root test results clearly indicate that all variables are stationary at first difference except INT and IIP. The PP test confirms IIP stationarity at level, while it is stationary at first difference according to the ADF test.

Table 3. Results of Unit Root Test

Variables	LEVEL				FIRST DIFFERENCE			
	ADF Test		PP Test		ADF Test		PP Test	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept	Intercept	Trend and Intercept	Intercept	Trend and Intercept
LGP	0.2551	–1.9163	0.1797	–1.9541	–15.1271	–15.138	–15.1007	–15.111
	(0.9755)	(0.6433)	(0.9709)	(0.6231)	(0.000)*	(0.000)*	(0.000)*	(0.000)*
LBSE	–1.1790	–0.8968	–1.43133	–0.0289	–11.3076	–11.361	–11.1805	–11.138
	(0.6842)	(0.9537)	(0.5669)	(0.9965)	(0.000)*	(0.000)*	(0.000)*	(0.000)*
LWPI	–1.5513	–2.2903	–1.4917	–2.1289	12.1671	–12.158	–12.1671	–12.159
	(0.5061)	(0.4374)	(0.5365)	(0.5269)	(0.000)*	(0.000)*	(0.000) *	(0.000)*
IIP	0.7992	–2.3676	0.5458	–8.5326	–3.99467	–4.1639	–53.2241	–59.439
	(0.9939)	(0.3957)	(0.988)	(0.000)*	(0.002) *	(0.005) *	(0.000) *	(0.000)*
LEX	0.11334	–1.7802	0.1220	–0.1775	–16.7014	–16.733	–16.7015	–16.7330
	(0.9663)	(0.7119)	(0.9669)	(0.7142)	(0.000)*	(0.000)*	(0.000)*	(0.000)*
GRBI	–0.5301	–2.5082	–0.4243	–2.53778	–13.1588	–13.137	–13.1564	–13.1356
	(0.8818)	(0.3240)	(0.9017)	(0.3097)	(0.000)*	(0.000)*	(0.000)*	(0.000)*
INT	–2.768	–2.6142	–2.653	–2.5584	–12.524	–12.550	–14.314	–14.3170
	(0.064)***	(0.2743)	(0.083)***	(0.2999)	(0.000) *	(0.000)*	(0.000)*	(0.000)*

Note. (***), (**) and (*) indicate significant at 10%, 5%, and 1% levels, respectively.

ADF Test - Augmented Dickey - Fuller Test and PP Test - Phillips and Perron Test.

However, INT is stationary at level in both cases. Thus, the variables : LGP, LWPI, GRBI, LEX, and LBSE are integrated of order one *I* (1), while IIP and INT are *I* (0). When the variables are mixture of *I*(0) and *I*(1) and no variable is integrated of order 2 [*I*(2)], the most appropriate technique to test the cointegration among the variables is the autoregressive distributed lag model.

(2) ARDL Bounds Test : The ARDL model follows two steps, that is, first to find optimum lag length and second to estimate the Wald bounds test for cointegration. Further, the error correction model (ECM) of ARDL model is estimated for short run results.

The maximum lag length of 2 has been selected on the basis of the Schwarz Bayesian criteria. The results from the ARDL bounds test are reported in Table 4. The results of the Wald bounds test for cointegration show that the calculated *F*-statistics is 4.417090, which is higher than the upper bound value at the 1% level of significance. The null hypothesis of no cointegration is rejected, suggesting the existence of a long run relationship among the dependent variable (LGP) and the independent variables.

Table 4. Bound Test for Cointegration

Dependent Variable	*F* - Statistics	Outcome
***F* (*LGP/LBSE, LWPI, IIP, GRBI, LEX, INT*)**	4.417090 *	**Cointegration**
Critical values at 1% level	Lower bound	Upper bound
	2.79	4.1

Note. *Significant at 1% level.

Having found the long run relationship between gold prices and macroeconomic variables using the bounds test, the log-run and short-run coefficients of the variables have been estimated (Pesaran et al., 2001).The estimated long-run coefficients of the variables are given in Table 5.

The results of ARDL bounds test show that log of BSE-Sensex (LBSE), log of WPI (LWPI), index of industrial production (IIP), gold reserves held by RBI (GRBI), and log of exchange rate (LEX) are the main determinants of gold prices in India. LWPI, IIP, and GRBI have a positive impact on the gold prices and are statistically significant at the 5% level. However, LBSE and LEX have a negative relationship with gold prices, which is statistically significant at the 10% level, which is consistent with the findings of Gangopadhyay et al. (2016). Joshi (2011), in his study, also found a negative relationship between exchange rate and gold prices. INT comes out to be statistically insignificant during the period of the study, a finding which is consistent with the results of Lawrence (2003), Lampinen (2007), Trivedi and Behera (2012), and Wang (2012).The results show that LGP and LWPI move in the same direction as a positive association has been found between both, implying that gold is a safe investment acting as an inflation hedge (Shakil et al., 2018 ; Wang, 2012). The dummy variables are also significant, the inclusion of which picks up the effect of policy changes in 2005 and 2016 on gold prices.

(3) Error Correction Model : The short run dynamic behaviour of the variable around its equilibrium level has been estimated by the error correction model. The results of the error correction model are presented in Table 6.

Table 5. Estimated Long-Run Coefficients Using ARDL Bounds Test

ARDL (1, 4, 0, 0, 1, 4, 2)		Dependent Variable - *LGP*		
Regressors	**Coefficient**	**Standard Error**	***T*-Statistic**	**Probability**
LBSE	–0.321006	0.181290	–1.770671	0.0779***
LWPI	0.811020	0.389498	2.082219	0.0384**
IIP	0.006794	0.003160	2.150377	0.0325**
GRBI	0.000180	8.07E-05	2.236670	0.0262**
LEX	–0.441163	0.239489	–1.842106	0.0667***
INT	0.005534	0.006137	0.901787	0.3681
C	0.318720	0.095720	3.329714	0.0010*

Note. *, ** , and *** denote statistical significance at 1%, 5%, and 10% levels, respectively.

Table 6. Error Correction Model Results for Selected ARDL Model

ARDL (1, 4, 0, 0, 1, 4, 2)		Dependent Variable- *LGP*		
Regressors	**Coefficient**	**Standard Error**	***T*-Ratio**	**Probability**
Δ***LBSE***	0.053003	0.028834	1.838216	0.0673***
Δ***GRBI***	0.000248	1.89E-05	13.15406	0.0000*
Δ***LEX***	0.264145	0.108569	2.432971	0.0157**
Δ***INT(–1)***	–0.002621	0.001496	–1.751953	0.0811***
Δ***C***	0.318720	0.056206	5.670550	0.0000
ECM(–1)	–0.084280	0.014971	–5.629620	0.0000
Adjusted R^2	0.480798	**S.E. of regression**		0.010747
***F*-statistic**	11.03819*	**RSS**		0.028415
DW-statistic	1.98			

Note. *, **, and *** denote statistical significance at 1%, 5%, and 10% levels, respectively and Δ means differenced variables.

The error correction term is found to be statistically significant at the 1% level, implying that there is convergence to long-run equilibrium path whenever there is any deviation from long-run equilibrium in the short-run. However, the coefficient of error correction term is –0.8, which shows that approximately 8% of the deviation in the gold prices from the long-run equilibrium level is corrected in the next month, implying slow reversion - a finding supported by Levin and Wright (2006). GRBI, LEX, and BSE have a significant positive impact on gold prices, with statistical significance at 1%, 5%, and 10%, respectively ; whereas, one month lagged INT has a negative impact on the gold prices in the short run also, which is statistically significant at the 10% level. Exchange rate has a significant negative relationship with gold (Allese, 2008).

No significant relationship is found between gold prices and WPI in the short run. The results are consistent with the findings of Batten et al. (2010), Lawrence (2003), Baur and Lucey (2010), and Blose (2010). Gold prices are not related to interest rate, which is supported by Lawerence (2003) and Wang (2012).

The error correction equation is given as follows :

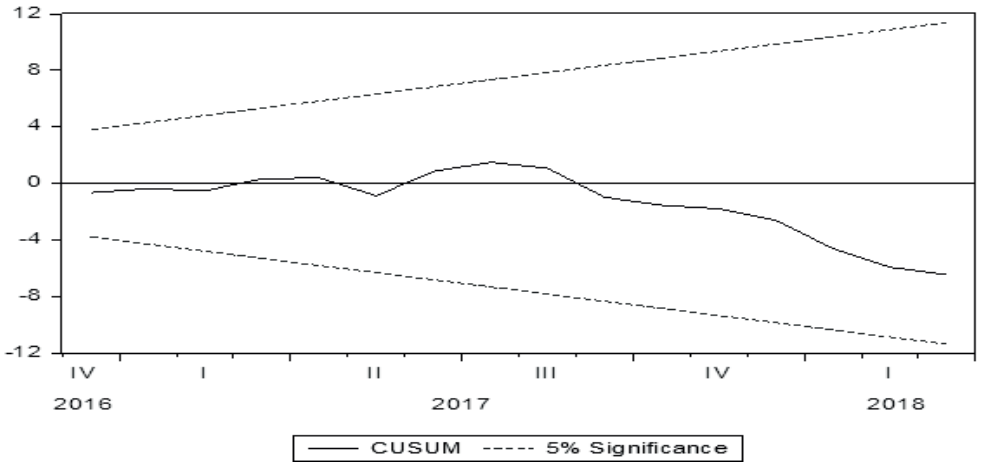
$$EC = LGP - (-0.3210 * LBSE + 0.8110 * LWPI + 0.0068 * IIP + 0.0002 * GRBI - 0.4412 * LEX + 0.0055 * INT) \quad \text{.....(2)}$$

The adjusted R^2 of the model is 48%, which is satisfactory implying that the variables account for 48% of the variance in gold prices and the model is a good fit. DW statistics are also near 2, implying no autocorrelation.

The results of the study are consistent with the findings of Lawrence (2003), Lampinen (2007), Joshi (2011), Trivedi and Behera (2012), Wang (2012) and Gangopadhyay et al. (2016), showing that the changes in stock prices, inflation, national income, national gold reserves, and exchange rate lead to significant changes in the price of gold in India.This shows that rise in national income and surge in inflation leads to increase in demand for gold, which would eventually reflect in appreciation of the prices of gold in India ; whereas, declining stock prices and depreciating dollar would lead to higher demand for gold, which ultimately puts upward pressure on prices of gold as investors consider gold as a safe haven.

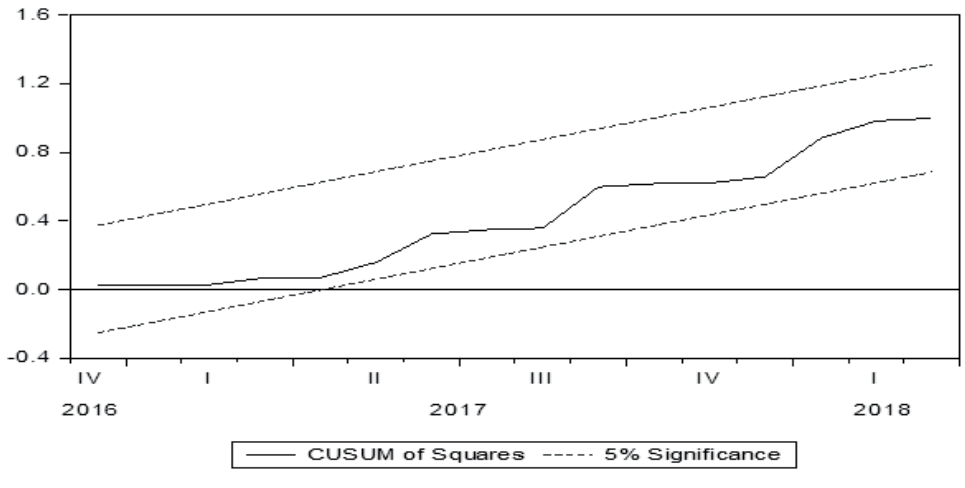
(4) Test of Stability : The robustness of the ARDL model is investigated with the help of diagnostic tests and stability tests. The model passes the diagnostics test of serial correlation, functional misspecification, and non-normal error after inclusion of dummies.

Figure 1. Plot of Cumulative Sum of Recursive Residuals



The cumulative sum of recursive residuals (CUSUM) and CUSUM of square (CUSUMQ) tests proposed by Brown et al. (1975) have been applied to assess the stability of the parameters of the model (as shown in Figure 1 and Figure 2). Pesaran et al. (2001) suggested checking parameter constancy applying CUSUM and CUSUMQ tests over the sample, and if parameters were not constant, the model should be modified. As the plots are between the critical boundaries of 5% level of significance, it confirms that the model is stable and well specified. This implies that the given short run and long run parameters have a significant impact on the gold prices in case of India.

Figure 2. Plot of Cumulative Sum of Squares of Recursive Residuals



Conclusion

India is the world's biggest buyer of gold and represented around 32% of yearly worldwide gold buy in 2010. The purpose of the study is to identify macroeconomic determinants of gold prices in India. It is found that gold prices have a significant long run relationship with stock prices, inflation rate, index of industrial production, gold reserves held by RBI, exchange rate, and interest rate. Stock prices, inflation rate, index of industrial production, gold reserves held by RBI, and exchange rate are the main determinants of gold prices in India. Gold prices of India and stock prices have a negative relationship, thereby meaning that gold prices move against stock prices. Thus, gold is a portfolio diversifier as its prices are not affected by the financial market crisis.

Gold also acts as a hedge against declining dollar as the results depict a negative relationship between the gold returns and rupee - U.S. dollar exchange rate. Further, the price of gold is positively associated with the index of industrial production and inflation. The results show that higher the growth of the domestic production, higher will be the demand of gold resulting in increase in gold prices in India.

Research Implications

The study focuses on the factors influencing the price of gold in India. The results imply that since the gold prices and stock market move in the opposite direction, it acts as a portfolio hedge. It acts as a safe haven and investors can incline to gold in times of volatility in the financial market. Further, gold has served as a hedge against fluctuation in the foreign exchange value of the dollar and when the U.S. dollar starts to losing its value in the

market, gold acts as an alternative investment source to store value. The results of this study also depict that gold acts as a superior inflation hedge as it moves in the same direction with the WPI over the last two decades in India. Thus, from the perspective of an investor, adding gold in the investment portfolio in some percentage is beneficial as it may help to reduce the risk in the event of financial turmoil and rising inflation.

However, increasing demand for gold (particularly the physical gold), which is met by gold imports in India, leads to burgeoning current account deficit of India. The policies framed by the government to curb the import of gold may be futile, as gold is a useful portfolio and inflation hedge. Thus, it is suggested that policies that directly address the problem of inflation may be helpful. Also, alternative investment opportunities should be provided by the government in order to bring down the gold imports. The promotion of paper gold with relaxed regulations can prove to be beneficial.

Limitations of the Study and Scope for Further Research

The study uses the secondary data obtained from various sources and the limitations associated with the secondary data apply to the study. Further, the study is limited to a period of 23 years starting from April 1995 – March 2018 due to non availability of monthly data on some variables prior to this period. The research can be conducted over a longer period taking into consideration the structural changes of 1990s and investigating their impact on the price of gold in India. The study has further scope as more variables can be added to improve the model.

Authors' Contribution

Dr. Arwinder Singh conceived the idea to conduct the empirical study on gold prices and developed qualitative and quantitative design for the study. Navjot Kaur reviewed the available literature on the basis of extracted research papers with high repute on the factors affecting the gold prices and selected the macroeconomic factors influencing the gold prices relevant to the study design. Dr. Arwinder Singh verified the analytical methods to be applied to study the macroeconomic determinants of the price of gold and supervised the study. The data collection from the secondary sources for the selected sample period and numerical computations were done by Navjot Kaur using Eviews 10.0 and Navjot Kaur wrote the manuscript in consultation with the co-author.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter or materials discussed in this manuscript.

Funding Acknowledgement

The authors received no financial support for the research, authorship, and/or for the publication of this article.

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About the Authors

Dr. Arwinder Singh is an Assistant Professor in Department of Business Management and Commerce at Guru Nanak Dev University, RC Gurdaspur. He has 15 years of teaching experience. His areas of interest are Internet stock trading, financial literacy, FIIs, and capital inflows. He has published several research papers in national and international journals. Dr. Singh has authored a book on Internet stock trading.

Navjot Kaur is a Research Scholar at University School of Financial Studies, Guru Nanak Dev University, Amritsar. Her area of research is gold investment under the supervision of Dr. Arwinder Singh. She has 3 years of teaching experience. She has presented various papers at national and international conferences in India.