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# What Causes the Price of Gold to Fluctuate?

**Nishtha Sadana***

Shri Ram College of Commerce, Delhi School of Economics, Assistant Professor, Kamala Nehru College, University of Delhi, India

***Abstract – This analytical paper begins by ascertaining the story of gold and why it is considered as one of the most valuable metal since centuries. The various uses of gold are listed and discussion has been made about the beginning and doom of the gold standard. Further, various factors contributing towards the continuously escalating prices of gold in India have been explored. The period from 1985 to 2015, has been considered for the purpose of trend analysis to get a better idea of why gold prices fluctuate and each factor has been individually dealt with both in terms of the intuitive relationship and actuals.***

***Key words: Gold, Gold Standard, Inflation, Interest Rates, Value of Dollar, Government Reserves***

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## INTRODUCTION

Gold is one of the rarest precious metals that have enjoyed great attention since ancient times. It is one of the first metals to be discovered by man and till date continues to be one of the most treasured. While today the high worth of gold makes it so sought after, it did not start out that way. It was the intrinsic qualities of this metal which made it so popular among early human race; the lustre, sheen, malleability and resistance to tarnish being some of them. While the exact origin of the metal is unknown, it is widely known that gold was considered so pure that it was used to create ornaments not only for humans but also for deities and gods in all ancient civilizations.

Further, since it was lasting, easily smelted and had a unique density, it was used as standardised coins to replace barter system. It represented portability and permanence. With the industrial revolution, silver and gold were used as the standard exchange metals. The gold standard was introduced around the middle of the 19$^{th}$ century under which the standard unit of account of any currency was established based on a fixed quantity of gold. With the two world wars and scarcity of gold, many nations abandoned the gold standard as the basis of their monetary systems in the 20th century.

## WHAT MAKES GOLD SO IMPORTANT

In the modern world, gold still continues to be valued for its unique characteristics and scarcity. While majority of the gold production is used for jewellery (45%), another 45% being used for investments and remaining 10% for industrial uses. The various modern day uses of gold are listed below:

### (i) Jewellery

The use of gold in jewellery is not recent but rather it is rooted to old age traditions and heritage in many parts of the world. Owing to the same, the maximum amount of gold is thus consumed in the form of jewellery, with India, China and USA being the three largest markets for this form of metal jewellery. According to the world gold council, demand for jewellery accounted for 57% of gold demand, of which 60% comes from India and China. It is pertinent to note here this demand stems from the religious traditions and augmented demand for weddings.

### (ii) Investments

Gold is known to be an investment which hedges individuals from fluctuations in currency. Hence the next most important use of gold is investments. It can take the form of holding pure gold coins and bars or futures trading. Another recently growing use of gold as investments is gold exchange traded funds (ETFs) which are similar to a mutual fund where an investor makes investment in products that combine the flexibility of stock investment and the simplicity of gold investments. These Gold based ETFs are investments which derive their value from gold prices and invest in gold bullion. Also, since it follows the model of a mutual fund and investors can make smaller investments, it works out be economical as compared to investments in gold bullion. Thus, gold is a store of value and in the current scenario of growth with inflationary pressures; it is certainly a form of investment which people are looking at seriously.

**(iii) Industrial use**

Gold is an excellent conductor of electrical charges and is found in almost all mobile phones, televisions, global positioning systems and laptops. Another reason for using the same is that it remains corrosion free and does not tarnish. Although a small quantity of gold is used in each of these sophisticated electronic devices, the sheer number of such electronic devices is increasing in today's new age world of technology. A point to note is that such gold is not recycled and hence might eventually lead to depletion of this rich metal. Further, gold is used for dentistry fillings, crowns, bridges and orthodontic appliances.

**(iv) Medicinal Use**

Gold is also used in a number of healthcare related activities such as medicines for certain chronic degenerative problems, gold nanoparticles used in chemotherapy, medical equipment and implants.

**(v) Aerospace equipment**

Gold is used in aerospace equipment since it has another unique property of reflecting harmful radiations and maintaining temperature in a spaceship. Thus since the price of gold is not a consideration, gold is used widely in building the interiors of such equipment.

## LITERATURE REVIEW

Baber, Baber & Thomas (2013) have observed the large (approximately 900 percent) increase in the gold prices in India in the decade from 2002 to 2012. They have not only identified this increase but also tried to identify factors responsible namely international business, political and financial environment, market conditions, its induction in commodity market, buying behaviour of consumers, and inflation. Additionally, empirical analysis was conducted based on secondary data from various Indian databases maintained by the Reserve Bank of India (RBI). Prima facie, they observed a positive correlation between inflation, gold prices and prices of dollar. Further, Hotelling Squared t-test has been used and the relation between the three has been identified as statistically significant.

Mani & Vuyyuri have attempted to bring out the importance of gold through empirical analysis of gold price determination by conducting a multiple regression analysis with price of gold as the dependent variable and the following independent variable:

- Expected Inflation
- Expected Interest Rates
- Foreign Exchange Rate
- Stock Market Performance
- Price of Silver
- Lagged Gold Price (LG); and
- Dummy variable to capture Qualitative Variables like impact of liberalization, FERA, FEMA

The results of the model were as expected and the model was able to explain the movement of gold prices. The movement of the gold prices is affected to a large extent by lagged prices of gold as it was perceived to be an investment. Further close, substitutes like silver also impacted the price of gold. The results also indicate that stocks are not perceived as an alternative to gold. Also, gold continues to be a safe haven.

Aggarwal, R. & Soenen, L. A. (1988) have attempted to study the present condition of gold market. They have highlighted that the Indian government has not stepped back from hoarding gold endlessly, putting the economy in danger. To study the recent gold market the gold prices, demand for gold and import situation of gold has been analysed. It was concluded that even though the rising prices of gold and demand for gold lead to a new investment market in the economy, it also widens trade gaps which lead to the smugglers market in the economy, since the international price level is much less than the domestic price level. Thus, they have focused on need for increased government intervention to keep the price of gold in check by managing the demand and supply in the country.

Kim & Dilts (2011) have investigated the relationship between the value of the dollar and the prices of two commodities, gold and oil. They have used monthly data from January of 1970 through July of 2008 for the purpose of testing the relationship. Based on the study, the empirical results showed that the hypothesis of no causal relation between the value of the dollar and the prices of gold and oil is not supported by the evidence. Infact, there are causal relations between each of the prices, and there is a negative relation between the value of the dollar and the price of each of the commodities, as predicted by standard economic theory. Further, consistent with the predictions of classical economic theory, there was a positive statistical association between the prices of gold and oil. The implication is that gold and oil still continue to represent safe havens from fluctuations in the value of the dollar.

## OBJECTIVES OF THE STUDY

The major objectives of the study are:-

1. To discuss all uses of gold – both personal, investment and industrial

2. To discuss the gold standard and its collapse

3. To determines the factors impacting the prices of gold specifically in case of India

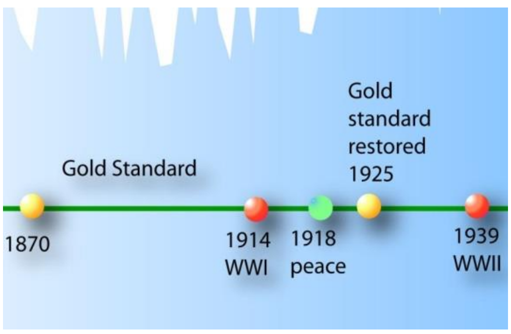
4. To use empirical analysis to understand the fluctuations in gold prices

## GOLD STANDARD

The United States introduced the gold standard in 1834 where the price of gold was fixed at $20.67 per ounce; this remained in existence until 1933. Other major countries joined the gold standard in the 1870s. More specifically, the period from 1880 to 1914 is known as the *classical gold standard*.

The gold standard was a monetary system where any country's entire currency or paper money had a value directly linked to gold. With the gold standard, countries agreed to convert paper money into a fixed amount of gold and used a fixed price for gold at which they bought and sold gold. In turn, this fixed price was used to determine the value of the currency. For example, if the U.K. set the price of gold at £300 an ounce, the value of the pound sterling would be 1/300th of an ounce of gold.

With the great depression and onset of the World War I, states were living in a state of threat and uncertainty, hence in order to safeguard their gold reserves, they moved away from a fixed exchange rate system which involved a fixed exchange rate pegged against the price of gold. Hence it was first abandoned in 1914. In order to fiancé massive military expenditures, all countries resorted to printing of more money leading to inflation. All economies were stricken with very high prices and unstable economic circumstances. Post WWI, many countries returned to the gold standard. However, the period that followed witnessed major devaluation of currencies by all countries and thus it became uncertain how much gold a currency could buy. This continuing unpredictability led to a surge in the demand for gold since people now preferred to hold gold instead of various currencies. This entire ambivalence put immense pressures on countries' gold reserves, forcing them to suspend the gold standard. Thus, by the beginning of the Second World War, gold standard was completely dead.



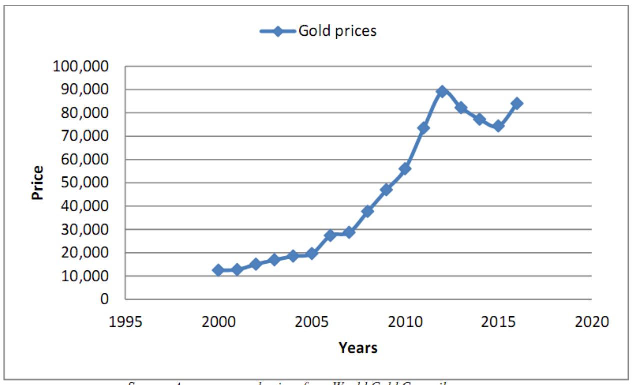

*Source: Lowa state university, department of economics*

However, gold as a commodity did not lose its importance completely as it was vital to Bretton Woods system of exchange rate determination under the Bretton Woods Agreement of 1944. All major western countries like United States, Britain, France and Germany maintained a fixed value for their currencies against the US dollar. The US dollar however remained pegged to gold at $ 35 per oz of gold. In the late 1960s, the peg came under pressure and was abandoned in 1968 and finally was dismantled formally in 1971.

The gold standard is hence not currently used by any government and was discontinued by all countries including US and UK. The gold standard was completely replaced by fiat money. The term 'fiat money' is used to describe currency that is used because of a government's order or based on the faith in government and hence is accepted as a means of payment. In the present day context, gold is used in a number of ways which have been detailed above. In the next section however, we look at the factors affecting the prices of gold and subsequently conduct an empirical analysis.

### Increasing gold prices

There has been a sharp increase in the prices of gold since over a decade now in case of India. In this case, it is pertinent to note that India is one the biggest gold consuming country in the world however most of the gold is imported and not produced domestically. The data used is secondary data for the period from 2000 to 2016 and has been obtained from World Gold Council.




*Source: Average annual prices from World Gold Council*

**Figure 1: Trend of gold prices**

Based on this graphical representation and data analysis, it is easy to point out the following observations:

(a) There has been a spike in the prices in 2006 and 2008

(b) Also, the gold price has experienced deflation during 2013-2015

Thus, in order to better understand these fluctuations in gold prices specifically in case of India, it is important to first understand the factors which govern such fluctuations and ultimately determine the price of gold.

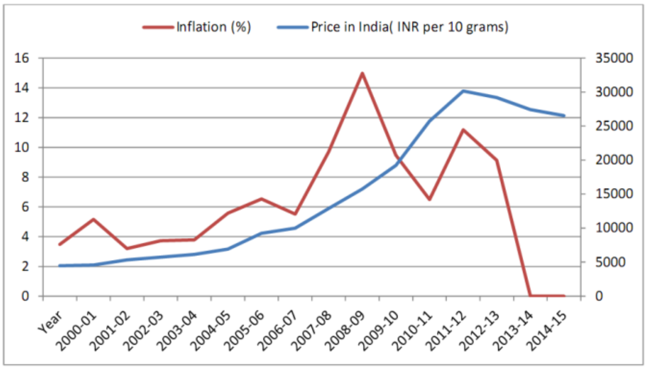
## FACTORS THAT AFFECT GOLD PRICES

Like any commodity, the price of gold is determined by forces of demand and supply. Since gold has multiple uses, the price too is determined by interplay of various factors. The major ones have been discussed below:

### (i) Inflation

During inflationary conditions in any economy when the value a currency holds starts going down, people start shifting towards traditional forms of holding wealth. While currency values might fluctuate, the value of gold typically tends to be more stable in the long run. Thus, the demand for gold and hence the prices increase during times of inflation.

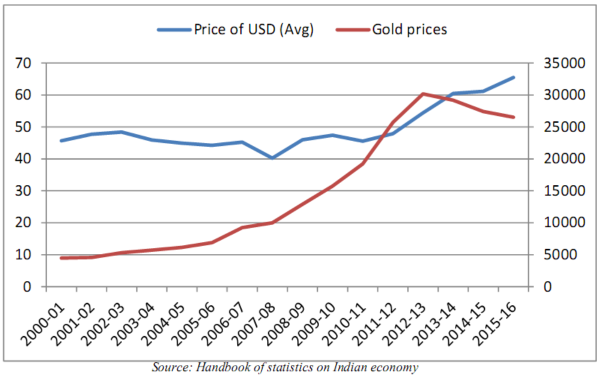
This inference can be tested below. It supports the hypothesis that as India experienced inflation post the global financial crisis in 2007-08, the demand for gold as an investment asset went up leading to an immediate hike in its price.




*Source: Price of gold in India: Handbook of statistics on Indian economy, 2016 and inflation: inflation.eu (worldwide inflation data)*

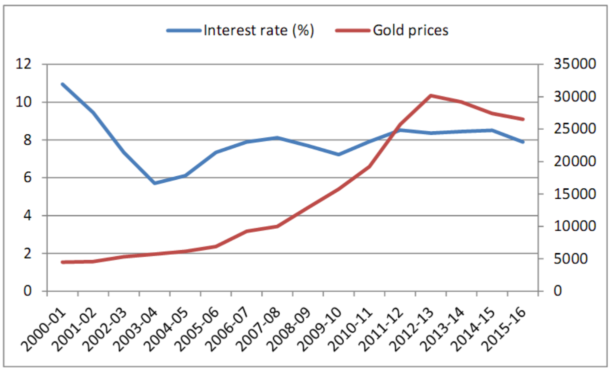
### (ii) Value of US dollar

US dollar as a currency holds the greatest amount of acceptability worldwide which makes it the currency in which most countries hold their reserves. We also know that conventionally, countries have been holding their reserves in gold. Thus, based on this, the price of gold and strength of dollar have an inverse relationship. If the dollar becomes strong, the demand for dollar will rise, which would mean that people would prefer to hold dollar and hence the demand for gold will reduce. This will also have a negative impact on the price of gold.




### (iii) Interest rates

As the interest rate on alternate forms of holding wealth such as treasury bills and term deposits change, it creates an impact on the price of gold in the market. Since gold as an asset does not earn any interest, when the interest on such financial instruments increase, the demand for gold decreases. Conversely, lower interest rate increases the demand and eventually the price of gold.

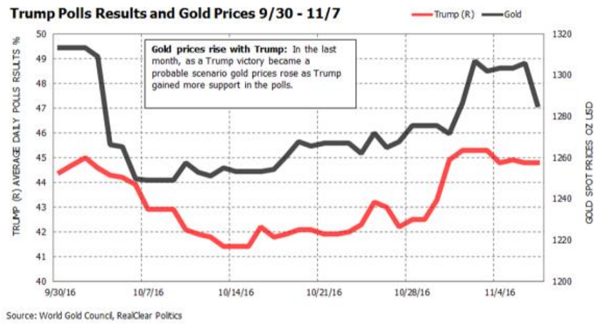



*Source: Hanbook of statistics on India economy, RBI, 2016. For the purpose of interest rates, interest rates on central government securities have been considered*

### (iv) World economic scenario

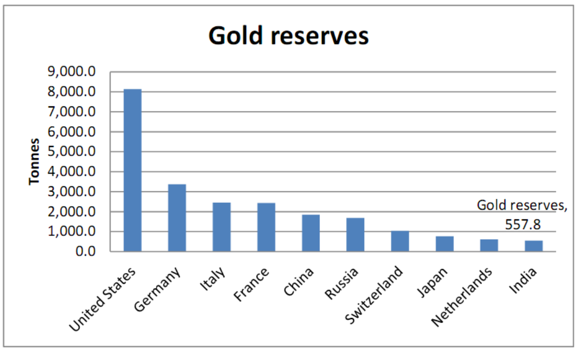
Similar to times of inflation, people lose confidence in current government and the fiduciary currency issued by them; hence in times of global crisis, demand for gold goes up putting an upward pressure on prices.

According to a recent article by J. Rotbart & Co. discussed that gain in Donald Trump's poll results was having an upward impact on gold prices. His victory was leading to skittish concerns, and this uncertainty was manifesting into increased gold prices. Thus, any kind of uncertainty in the global economy causes an upsurge in gold prices. Similarly, India sudden demonetization started with a rush to buying gold and eventual cash crunch led to a complete standstill for the gold business.




### (v) Government reserves

Even today, a number of countries like United States of America, France, Germany, Italy etc hold bulk of their reserves in gold. At times when these countries start buying more gold to strengthen their reserve base, the price of gold goes up. The data on official world holdings of gold holdings shows that many countries still continue to hold most of their reserves in gold – US with 75%, Germany with 69.4%, Italy with 68.3% and France with 64.2% of their respective reserves are the countries with top reserves of gold.




### (vi) Demand in jewellery and industry

Since the primary demand for gold comes from use in jewellery and some part from industrial use, the demand in these sectors are major driving forces behind the price of gold in the economy. India and China remain the largest consumers of gold jewellery in the world (World Gold Council). It is important to understand that the relationship between factors that determine gold price and gold price is not unilateral. In 2016, Indian annual jewellery demand fell to a 7 year low amid strikes, regulation and high gold prices.Indian annual jewellery demand ended 2016 down by 22% after a year of upheaval in the gold industry Likewise in China too supply constraints pushed the jewellery demand down vis-à-vis 2015.

| Tonnes | 2015 | 2016 | YOY Growth |
|---|---|---|---|
| World | 2,388.60 | 2,041.60 | -15% |
| India | 662.3 | 514 | -22% |
| China | 753.4 | 629 | -17% |

*Source: World Gold Council*

## RESEARCH METHODOLOGY

Based on the aforementioned prima facie analysis of the various factors which are known to have an impact of the gold price movement, a regression analysis was conducted to estimate the relationship between the variables:

*Dependent variable*

Price of gold in India

*Independent variables*

- Inflation in India[1]
- Value of USD in terms of INR[2]
- Interest rate[3]

*Regression analysis*

The model has been tested for the period of 1985-86 to 2014-15 using Microsoft excel. The following model was tested based on simple linear regression:

$$Ln\,(Gold\,price) = \alpha_0 + \alpha_1 Ln(Inflation) + \alpha_2 Ln(Value$$

The results are as follows:

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.833515 |
| R Square | 0.694747 |
| Adjusted R Square | 0.659526 |
| Standard Error | 0.44879 |
| Observations | 30 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 3 | 11.918646 | 3.9728819 | 19.725093 | 7.0762E-07 |
| Residual | 26 | 5.2367271 | 0.2014126 | | |
| Total | 29 | 17.155373 | | | |

| | *Coefficients* | *SE* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 5.977 | 1.462 | 4.088 | 0.000 | 2.972 | 8.983 | 2.972 | 8.983 |
| Ln(inflation) | 0.352 | 0.130 | 2.714 | 0.012 | 0.085 | 0.618 | 0.085 | 0.618 |
| ln(USD) | 1.126 | 0.210 | 5.368 | 0.000 | 0.695 | 1.557 | 0.695 | 1.557 |
| ln(interest rate) | -0.832 | 0.398 | -2.088 | 0.047 | -1.650 | -0.013 | -1.650 | -0.013 |

Based on the above analysis the following inferences can be drawn:

- The equation can be represented as follows

$$Ln\,(Gold\,price) = 5.97 + 0.352\,Ln(Inflation) + 1.126\,Ln(Value\ of\ USD) - 0.832\,Ln(Int\,rate) + \epsilon_{it}$$

[1]Source: Inflation.eu
[2]Source: RBI handbook of statistics, 2016
[3]Source: RBI handbook of statistics, 2016

- The p value for each term tests the null hypothesis that the coefficient if equal to zero ie the independent variable has no effect on the dependent variable. A low p value i.e. less than 0.05 indicates that you can reject the null hypothesis.
- Thus, in the instant case we notice that all p values are less than 0.05and thus their values are significant.
- Thus, we keep all variables in the regression model to determine the fluctuations of gold prices.
- Also, since coefficient of variation ie R square is 0.694747, it sufficiently explains the variation in the price of gold attributed to changes in the independent variables ie approximately 69% movement of gold prices is explained by the listed variables

## CONCLUSION

This analytical paper studies the various factors contributing towards the continuously escalating prices of gold in India. From period 1985 to 2015, we adopted trend analysis which provides us the relevant picture of movement of Indian domestic gold prices and each factor has been individually dealt with both in terms of the intuitive relationship and actuals. Further, regression model was constructed and results displayed the expected hypothesis. From the point of view of advance research, a similar analysis can be conducted for countries that lie in the top 10 ranking as regards the consumers of gold and any discrepancies can be studied in greater detail to help better forecasting of gold prices since it continues to be one of the safe haven investments across individuals and governments'.

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**Corresponding Author**

**Nishtha Sadana***

Shri Ram College of Commerce, Delhi School of Economics, Assistant Professor, Kamala Nehru College, University of Delhi, India

**E-Mail – dhawannishtha@gmail.com**