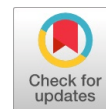


Forecasting The Demand for Gold in India: An Analysis of Historical Time-Series Data

Ajay Shukla, Shrasty Katiyar



Abstract: Gold has been an integral part of Indian culture and tradition for centuries. India is one of the largest consumers and importers of gold in the world, with gold demand primarily driven by weddings, festivals and religious ceremonies. In recent years, gold has also emerged as an investment asset class with people investing in gold for long-term gain and to hedge against inflation. Gold is also considered a safe-haven asset and is often used as a store of value during periods of economic and political uncertainty. Almost all central banks hold gold as a crucial part of their foreign exchange reserves. Hence, forecasting the demand for gold becomes essential for making informed investment decisions and for managing reserves by institutions. This study aims to forecast the demand for gold based on the recent trends and patterns of gold demand in India over the last five years (2017-2021). The researcher analysed historical data on gold from various sources and examined the trends over time. The study employed the linear trend analysis method to derive a linear equation that predicted future gold demand based on historical trends in gold demand. The results obtained through this research can be applied by investors, goldsmiths, and the government in various contexts, including investment and commodity trading, to inform their decisions and strategies.

Keywords: Gold, Demand, Forecast, Trend & Patterns, Linear Trend Analysis, India.

I. INTRODUCTION

Humankind has been fascinated by gold since its discovery. The rarity of gold among metals makes it one of the most precious metals in the world. With its Midas touch, gold has shaped history, science, literature and every other area of human endeavour. For instance, the pursuit of gold has led to many adventurous explorations, battles and invasions that have altered the course of history. Shining, malleable and straightforward to work with, gold has been hailed as the most attractive chemical element. For thousands of years, its alluring beauty has made it ideal for use in jewellery, coins, artwork and a variety of industrial applications. Since its provenance, gold is considered the crux of all economies. Gold is one of the earliest pure metals that human civilisation has used. Throughout history, gold has arguably been valued in more ways than any other metal, serving as a symbol of strength, beauty, purity, and prosperity in almost every aspect of modern society.

Gold has both government and private demand. In the era of the gold standard, the government's demand for gold was for monetary gold. But in the post-Gold Standard era, government gold demand became insignificant. However, the central banks of the countries keep a substantial amount of gold among themselves as a strategic asset. On the other hand, private demand for gold has become more extensive. Private demand can be further segmented based on various factors. One such criterion is an investment that includes gold bullion, bars, ETFs, etc. (Dubey & Hardia, 2014 [3])

Gold has significant cultural, social, and religious importance for Indians, leading them to the altar of gold, regardless of their financial and social standing. Another primary reason for the popularity of gold among Indians is that, unlike other investment instruments that leave paper trails, investment in gold is relatively simple and easily comprehensible for the illiterate and semi-literate people of India. (Kuriakose & Iyer, 2015 [2])

Consumers in India are willing to pay any amount for gold. This affinity for gold contradicts the law of supply and demand because people perceive it as a more valuable status symbol and worthy investment, rather than a luxury good. (S.Periyasamy, 2016 [4]).

In addition to its inherent beauty, gold is highly valued for its rarity, versatility, and simplicity, as well as its adaptability. Practically every aspect of contemporary life makes use of gold. As a matter of fact, by discretely allocating gold as a foundation asset in the portfolio which already includes diversified investments such as private equity, hedge funds, real estate, etc.; investors can have a noteworthy increment in their risk adjusted returns and preserve their capital more efficiently, especially in the times of political and financial turmoil. (Dr Sindhu, 2013 [1])

A. The utilisation of the World's most coveted metal-

In the modern world, gold is used for a myriad of applications. (Bullionbypost,2021[6]) Its numerous diverse qualities, some of which are unique to gold; make it one of the most sought metals in the world. (Mining for school, 2021 [7]) Traditionally, gold has been used to make coins, jewellery, and artworks, but in recent years it has also been employed in several unconventional fields:

- Jewellery:** Gold is a popular material for making jewellery due to its attractive appearance and durability. It is used to make rings, necklaces, bracelets, earrings, and many other types of jewellery.
- Investment:** Gold is widely regarded as a safe-haven asset, and many individuals invest in gold as a means to diversify their portfolios and mitigate economic and political uncertainties.

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- c) **Electronics:** Gold is an excellent conductor of electricity and is used in a variety of electronic devices, such as computers, cell phones, and televisions.
 - d) **Dentistry:** Gold has been used in dentistry for many years to make dental crowns, bridges, and other dental restorations.
 - e) **Medicine:** Gold nanoparticles are being studied for their potential use in targeted drug delivery and cancer treatment. Gold is also used in some medical implants, such as pacemakers.
 - f) **Currency:** Gold has been used as a form of currency for thousands of years and is still used in some countries as a form of currency or as a backing for paper currency.
 - g) **Art:** Gold leaf is used in many forms of art, including painting, sculpture, and architecture.
 - h) **Aerospace:** Gold is used in some aerospace applications due to its excellent thermal and electrical conductivity, as well as its corrosion resistance.
- Overall, gold is a highly versatile and valuable metal with a wide range of applications across various fields.

II. RESEARCH METHODOLOGY

Demand forecasting is a process that predicts future demand for a product or commodity based on historical data and trends. The expected demand can only be reliable if the forecast is made systematically and scientifically. To ensure the reliability of the estimates made, the researcher will follow the OTMCR Approach:

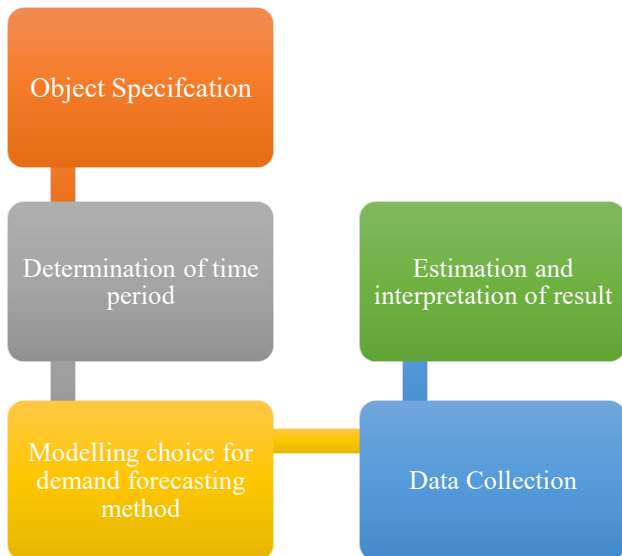


Figure 1: Research Approach

A. Objectives-

This study aims to forecast the demand for gold based on the recent trends and patterns of gold demand in India over the last five years (2017-2021).

B. Period

The researcher attempts to predict the demand for gold over the next five years (2022-2027) based on historical data from the last five years (2017-2021).

C. Method of demand forecast:

The researcher will use a statistical method to forecast the demand for gold in India. The estimates made using statistical methods are relatively more reliable than other methods of demand forecasting, as they utilise historical time series data in which the element of subjectivity is minimised. (Dwivedi, D.N. 2016 [8])

There are various kinds of statistical methods used for demand forecasting:

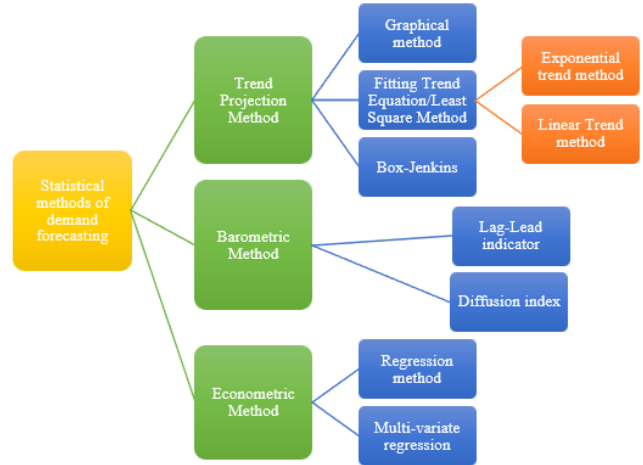


Figure 2: Kinds of statistical methods of demand forecasting

D. Tools & techniques:

The researcher employed the linear trend method to forecast the demand for gold in India. The reason is the rising trend in demand for gold over the last five years. e. from the year (2017-2021).

E. Data and the source of data-

This study is purely based on secondary data. To forecast future trends and patterns of gold demand in India, data were collected from various secondary sources, including journals, books, newspapers, and articles.

The primary data sources of the study are the reports of the World Gold Council and the Indian Bullion Market.

Table-1: Demand for gold

(in tonnes)

Year	Demand for Gold (Y)
2017	4278.2
2018	4449
2019	4344
2020	3658.8
2021	4021.8
Total	20751.8

(Source: World Gold Council [5])

III. ESTIMATION AND INTERPRETATION OF RESULTS

When the historical time series data reveals a rising trend, the following straight-line equation is formulated-

$$Y = a + bx$$

Where Y is the demand for gold

X Time (Year)

a, b Constant



(The parameter b gives the measure of the annual increase in the demand for gold in India over the years, i.e., time)
The coefficients a and b are estimated by solving the following two equations, which are based on the principle of the least squares method-

$$\sum Y = na + b\sum x \quad \dots(i)$$

$$\sum Yx = a\sum x + b\sum x^2 \quad \dots(ii)$$

Table 2: Estimation of trend equation

Year	Demand for Gold (Y)	Time (X)		X ²	XY
2017	4278.2	1		1	4278.2
2018	4449	2		4	8898
2019	4344	3		9	13032
2020	3658.8	4		16	14635.2
2021	4021.8	5		25	20109
Total	20751.8	15		55	60952.4

$$\sum Y = na + b\sum x \quad \dots(i)$$

$$5a + 15b = 20751.8$$

$$\sum Yx = a\sum x + b\sum x^2 \quad \dots(ii)$$

$$15a + 55b = 60952.4$$

To solve the above equations, the constant value three is used to multiply equation (i):

$$(5a + 15b = 20751.8) \times 3$$

$$= 15a + 45b = 62255.4 \quad \dots(iii)$$

To calculate the value of parameter b, equation (iii) is to be subtracted from equation (i):

$$15a + 55b = 60952.4$$

$$(-) 15a + 45b = 62255.4$$

$$\hline -10b = -1303$$

$$b = 130.3$$

By putting the value of the b parameter (130.3) in equation (i), the value of parameter a is calculated as 3759.46.

Using the values of the parameters, a & b, in the equation $Y = a + bx$, where "x" is the year to be forecasted, we get the trend equation as

$$Y = 3759.46 + 130.3x$$

Having estimated the parameters of the trend equation, the forecast of the demand trend of gold for the next five years, i.e., from 2022 to 2027, has been calculated as follows-

Table 3: Demand forecast by using the linear trend method

Year	2022	2023	2024	2025	2026	2027
Predicted Demand for Gold	4541.26	4671.56	4801.86	4932.16	5062.46	5192.46

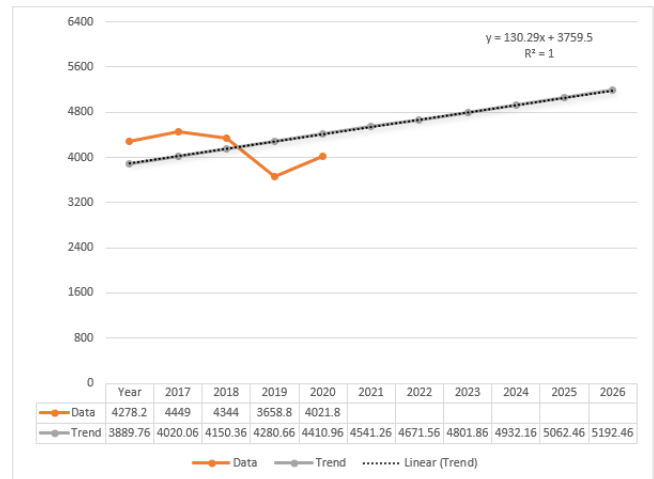


Figure 3: Trend projection using the graphical method

Table 4: Trend Projection in tabular format

(In tonnes)

Year	Actual Demand	Trend
2017	4278.2	3889.76
2018	4449.0	4020.06
2019	4344	4150.36
2020	3658.8	4280.66
2021	4021.8	4410.96
2022	-	4541.26
2023	-	4671.56
2024	-	4801.86
2025	-	4932.16
2026	-	5062.46
2027	-	5192.46

The study's results indicated that gold demand has been increasing over time, with a steady upward trend observed in the historical data, accompanied by occasional dips and spikes. The linear trend analysis method predicted that the rising trend would continue, with gold demand expected to increase in the future.

The research results can be utilised by investors, traders, and other stakeholders to inform their decisions regarding gold investments and related activities.

IV. CONCLUSION

Based on historical data trends, the demand trend for gold appears optimistic for the future. As mentioned earlier, gold has been regarded as a safe-haven asset during periods of economic uncertainty and political instability. Additionally, gold is utilised in various industrial applications and plays a crucial role in the electronics industry. However, it is also of vital importance to understand that the demand for gold is influenced by several other factors, such as central bank policies, interest rates, stock market fluctuations, and inflation rates, which are subject to frequent changes. Therefore, while historical trends suggest that the demand for gold may increase shortly, it is difficult to predict with certainty. Overall, it is essential to monitor economic and political developments that may affect the demand for gold in India. This can help investors make informed decisions about investing in gold.

DECLARATION

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Availability of Data and Material/ Data Access Statement	Not relevant.
Authors Contributions	All authors have equal participation in this article.

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