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THE IMPACT OF CHANGES IN INFLATION RATE ON GOLD, SILVER, AND INTEREST RATES

AUTHORS

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ABSTRACT

A key economic concept, inflation is the continuous rise in prices of goods and services over time. Gold, silver, and interest rates are just a few of those financial instruments that inflation could significantly impact. Gold and silver are often considered hedges against inflation, as their value tends to rise during times of high inflation. Due to the rise in demand for these metals as investors look for ways to shield their money from the damaging impacts of inflation. The study's goal is to determine how changes in inflation rates will affect the prices of gold, silver, and interest rates. Gold is often considered a haven asset during times of economic turmoil.

The investigation is mainly exploratory in nature. Monthly data for the 10 years from 2012 to 2022 comprise the sample of data. As the data was collected on a monthly basis, a purposive and convenience sampling technique is used. The latest closure and the average of the current opening were taken into consideration when collecting secondary data for the study from multiple websites. With the aid of the statistical program JAMOVI, EViews, and Excel, correlation and regression have been utilized for the goal of data analysis. In general, the connection between interest rates, gold, silver, and inflation can be intricate and multifaceted. Before making any investment selections, investors should carefully analyse the current economic conditions.

Keywords: **Exchange rate, Commodity market, Currency value, Convenience sampling**

INTRODUCTION

A significant part of money and monetary policy history has been played by gold and silver. There are a lot of mediums of exchange that took risen since then. They are robust, comparatively transportable, widely accepted, and easily validated in contrast to many other diverse products. The valued precious metal gold continues to serve an important role as an accumulation of value during uncertain times. There are works done by Baur and Lacey (2010) and Baur and McDermott (2010) which address the role of gold as a haven. Strong support was discovered for a long-term, changing association between silver prices and different inflation indices. Sharma (2016) finds evidence that the CPI can forecast gold returns in several nations, including the UK and the USA. Our paper focuses on how if there is a change in the inflation rate, how will that impact on the gold, silver, and interest rates. We try to find the correlation between the variables using JAMOVI. This helps us to use the data as it is without any interruption or manipulation. While correlation coefficient models were used to investigate the relationship between the independent variables and the gold price, tools were used to investigate the impact of the variable on the gold price. Consequently, it is necessary to check to see if the prices of gold and silver over longer time horizons change in tandem with consumer prices. With these worries in mind, this study examines how these changes in inflation influence gold, silver, and interest rates.

LITERATURE REVIEW

The study was done by Alexandros Koulis and Constantinos Kyriakopoulos (2023) to determine the research which investigates the process of volatility transmission between the gold and silver markets over a long historical period. The authors begin by conducting a thorough analysis of the pertinent literature, which emphasizes the significance of comprehending how markets for precious metals are interdependent. Also, they go through the approaches frequently employed to quantify volatility transmission as well as its theoretical foundations. The London Bullion Market Association provided the study with the closing price data for gold and silver from January 2, 1975, and October 31, 2018. The Dynamic Conditional Correlation (DCC) model, which assesses the temporally varying correlation between the volatilities of gold and silver prices, and the Spillover Index, which assesses the degree of volatility spillover between gold and silver markets, are the two measures of volatility spillovers used in the study. The paper uses various robustness checks, such as different DCC model parameters and different volatility spillover measurement options, to evaluate the validity and dependability of the empirical findings. (Alexandros Koulis and Constantinos Kyriakopoulos, 2023)

Researchers Narinder Pal Singh and Navneet Joshi investigated the use of gold as an inflation-hedging investment (published in 2018). They have used data from 2011 to 2017—six years—to analyze the connection between gold and inflation. They tested Johansen's cointegration theory in order to investigate the long-term equilibrium between gold and inflation. They have employed the Wald test and the vector error correction model (VECM) to examine the long- and short-term causal relationships between gold and inflation. They concluded from this research that the gold and CPI series are cointegrated and exhibit long-run equilibrium. Only long-run causation exists between CPI and gold prices, according to the results of the VECM and Wald tests. (Narinder Pal Singh and Navneet Joshi, 2018)

The study was done to determine to understand the macroeconomic variables that affect the volatility of gold prices. The study uses six macroeconomic factors and daily gold price data pertaining to January 2000 to December 2015. An analysis is conducted using a multivariate GARCH model. A statistical tool called the GARCH model makes it possible to estimate volatility in a time series while taking heteroskedasticity into consideration. The stationarity of the time series data is also examined in the study using the Augmented Dickey-Fuller (ADF) test. The ADF test can be used to statistically determine if a time series is stationary or not. According to the study, interest rates and inflation have a favourable correlation with gold price volatility. This shows that the volatility of gold prices rises along with inflation and interest rates. On the other side, the study discovered that the volatility of gold prices is negatively correlated with exchange rates. This shows that the volatility of gold prices declines when exchange rates rise. The study also found that the volatility of gold prices is not greatly influenced by the state of the stock market, energy prices, or economic growth. (Sahaida Laily Md Hashim, Hamidah Ramlan, Nurul Huda Ahmad Razali and Nur Zaidah Mohd Nordin, 2017)

The study was done by Ali Anari and James Kolari (2016) to determine the relationship between interest rates, inflation rates, and their dynamics. The author uses monthly data was used from January 1953 to December 2003. The author examines the connection between interest rates and inflation rates in the US using a time-series econometric model. They specifically employ a Vector Autoregression (VAR) model, a statistical method for investigating the changing dynamic relationship between numerous variables. The Federal Funds rate, which measures short-term interest rates, and the CPI are two variables he considers in his model (a measure of inflation). They investigate theories using a variety of statistical tests to assess the validity of his model. In order to determine if changes in one variable (such as inflation) may anticipate changes in the other variable (such as interest rates) over time, he also performs a Granger causality test. The research methodology enables him to explore the relationship between two variables in a systematic and in-depth manner using a strong econometric model and a huge dataset spanning several decades. The research highlights the complicated and dynamic nature of the link between interest rates and inflation rates. (Ali Anari and James Kolari, 2016)

The study was done by Samveg Patel (2012) to determine to investigate the impact of the various macroeconomic determinants on the performance of the Indian stock markets, which includes the data acquired about the monthly data pertaining to January 2000 to December 2016. The author used the ADF test and the Johansen cointegration test to establish whether there is a long-term relationship between the variables and whether they are stationary. The direction of causality between the variables is examined using the Granger causality test. The OLS regression approach is also used and calculates the effects of macroeconomic factors on stock market performance. The research employs the regression models. It is possible to undertake a complete assessment of macroeconomic issues that affect the performance of the Indian stock market since the study uses quantitative research methods. The major findings include, that the performance of the stock market is significantly impacted negatively by inflation. A causal link between FII inflows and stock market performance and stock market performance and inflation is also shown by the analysis. (Samveg Patel, 2012)

The study was done by Taylor and Francis (2008) to determine and assess the application and performance of inflation targeting in India. The authors discover that while inflation targeting has been effectively implemented in several rich and developing nations, it has encountered several difficulties in India. The existence of supply-side shocks (such as increases in food or oil prices) that might cause short-term inflationary pressures that are out of the control of monetary policy is one of the primary concerns. The authors conduct a thorough analysis of reports, working papers, and research publications on inflation in India. To locate pertinent publications and reports, they consult several databases, including JSTOR, EconLit, and Google Scholar. The RBI Annual Reports, monetary policy pronouncements, and other official publications are also used by the writers to acquire information about the implementation of inflation in India. To give empirical support for the effect of inflation targeting in India, the authors also evaluate data on interest rates, inflation, and other macroeconomic factors. According to the report, even though it has been successful in bringing down inflation in the country, there are still some obstacles standing in the way of accomplishing the twin goals of price stability and economic growth. (Taylor and Francis, 2008)

The long-term hedging capacity of gold and silver prices against other measurements of the consumer price index has been explored by authors G. Bampinasa and T. Panagiotidis (published on 2007), considering the UK and the US with data spanning from 1791

to 2010. For this investigation, they used both a time-invariant and a time-varying cointegration methodology. They discovered that there is no long-run link between silver and any of the price metrics when using the time-invariant technique. There is substantial evidence for a time-varying long-run relationship between silver prices and the alternative inflation measures for the UK, but weaker evidence (if any) was discovered for the US when the adjustment is permitted to be nonlinear. (G. Bampinasa and T. Panagiotidis, 2007)

In a paper released in September 2005, author Laurence E. Blose investigated the impact of changes in inflation predictions on the spot price of gold. The theory guiding the hypothesized relationship has been empirically tested for this investigation. They discovered that the carrying cost theory and the speculating hypothesis both predicted that higher inflation expectations would result in higher interest rates and immediate changes in gold prices. The cost of holding gold changes with changes in inflationary expectations (i.e., unexpected changes in the CPI), according to research that also looked at the relationship between unexpected changes in the CPI and changes in bond yields. (Laurence E. Blose, 2005)

In order to resolve an apparent conflict between short-run and long-run movements in the price of gold, the authors Dipak Gosh, Eric J. Levin, Peter Macmillan, and Robert E. Wright (published in the year 2002 January) conducted a test of cointegration regression using monthly gold price data from 1976-1999, a period of 24 years. They utilised the theoretical model's axiomatic proposition for this study. They discovered that short-term fluctuations in gold's price are compatible with gold's price growing over time with the general rate of inflation. They determined that gold can be used as a long-term inflation hedge by studying 24 years of data. (Dipak Gosh, Eric J. Levin, Peter Macmillan, and Robert E. Wright, 2002)

The integration relationship between the price of gold and time has been investigated by authors Brian M. Lucey, Susan Sunila Sharma, and Samuel A. Vigne for temporal variation. Using data from 40 years and 3 nations—the USA, the UK, and Japan. They have used a rigorous test for time variation in this study and have since extracted time-varying cointegration connections. They discovered that one cannot empirically claim that gold is cointegrated with inflation when considering the time-varying character of their observations. Although it might not do so soon, gold did provide protection for the United Kingdom against an increase in the rate of inflation and the amount of money in circulation. Additionally, the PPI and the money supply do not cointegrate with gold in Japan. (Brian M. Lucey, Susan Sunila Sharma, and Samuel A)

OBJECTIVES

The objective of the study on the impact of changes in inflation rate on gold, silver, and interest rates is to seek the answers to the following questions:

1. Identify the historical trends and patterns between inflation and gold, silver, and interest rates, and analyze how they have evolved over time.
2. Evaluate the empirical evidence on the impact of inflation on gold, silver, and interest rates, and assess the robustness and validity of the findings.

RESEARCH QUESTIONS

1. What connection exists between the variables?
2. What impact do inflation have on the variables?
3. What has been the past relationship between all the variables?
4. Does inflation represent the only element influencing the prices of gold, silver, and the exchange rate?

CHALLENGES

Changes in inflation rates, gold prices, silver prices, and interest rates can have significant impacts on the economy, financial markets, and individuals' financial decisions. Some of the challenges are –

Inflation Rates: The rate at which the cost of goods and services increases over time is known as inflation. Increased inflation results in a decline in the currency's purchasing power, which lowers the value of money. Because they are frequently used as a hedge against inflation, gold and silver prices might benefit from inflation. High interest rates, on the other hand, can result from high inflation rates and have a negative effect on the economy by making borrowing more expensive for both individuals and companies.

Gold Prices: Inflation, interest rates, supply and demand, and other factors frequently have an impact on gold prices. In general, gold prices climb when interest rates are low as investors look for alternate investments. However, if interest rates increase, gold prices could decline as investors switch to more lucrative investments. A lack of physical gold or a rise in demand for jewelry or industrial purposes are two more factors that might affect gold prices. Supply and demand fluctuations can also affect gold prices.

Silver Prices: Like gold, inflation, interest rates, and supply and demand considerations all have an impact on silver prices. But there are many industrial uses for silver, including in solar energy and electronics. Therefore, variations in the demand for these goods may also influence silver prices.

Interest Rates: The economy and financial markets may be significantly impacted by interest rates. Higher borrowing costs for people and businesses may result from higher interest rates, which may cause spending cuts and a slowdown in economic expansion.

Higher interest rates, nevertheless, can also draw in foreign capital and boost the currency's worth. Low-interest rates, on the other hand, might encourage borrowing and spending but can also cause inflation.

Predicting market movements and making wise investment decisions based on existing trends are some issues brought on by these shifts. Additionally, if interest rates or inflation rates rise too quickly, people and businesses may find it difficult to adapt to shifting economic conditions and may experience financial troubles. When making financial decisions in a market that is unpredictable, it's critical for people to be informed and seek professional guidance.

RESEARCH METHODOLOGY

The study is done to know the effect of the inflation rate on gold silver and exchange rates. Descriptive research is applied for the study, with the characteristics of prices/values and volatility of the prices/values of Gold, Silver, exchange rate, and inflation rate. The sample consists of monthly data for 10 years from 2013 to 2023.

The study is on determining the impact of changes in the inflation rates on the gold, silver, and interest rates using the tools like Jarque-Bera (JB) Test, Correlation, and linear regression.

EViews

Most time-based econometric analysis is done using a Windows tool named EViews (Econometric Views). It was created by Quantitative Micro Software (QMS), which is presently a part of IHS. In March 1994, Rendition 1.0, which replaced MicroTSP, was made available. EViews use a Windows GUI and blends worksheet and relational database capabilities with the standard functions available in statistics applications. In addition, the programming language used has a limited level of object orientation. The TSP programming environment and language were created by Robert Hall in 1965.

Jarque – Bera Test

The Jarque-Bera Test, a type of Lagrange multiplier test, is a test for normality. The assumption of normality is one that many statistical tests, like the t test and the F test, make. To establish normality, the Jarque-Bera test is frequently performed before to one of these examinations. The JB figure can be used to test the hypothesis that the data are from an even distribution because, if the data are from a normal distribution, it asymptotically has a chi-squared distribution with two degrees of freedom. The combined hypothesis of zero skewness and zero excess kurtosis is the null hypothesis. The anticipated skewness and excess kurtosis of samples from a normal distribution are 0 for the former and 3 for the latter. Any departure from this raises the JB statistic, as demonstrated by the definition of JB. It is frequently used because other normality tests are problematic when n is large (for example, Shapiro-Wilk is unreliable with n bigger than 2,000). In order to determine whether a normal distribution is present, the test precisely evaluates the data's skewness and kurtosis.

Correlation

A correlation is a statistical technique that measures the relationship between two variables. The pattern and strength of the association between the variables are made clear. The correlation coefficient, frequently symbolised by the letter "r," ranges from -1 to 1.

Because they can reveal a predicted relationship that can be used in practise, correlations are helpful. The relationship between electricity demand and weather, for instance, may cause an electrical company to supply less power on a mild day. Given that people use more power to heat or cool their homes during harsh weather, there is a causal relationship in this scenario. Correlation does not imply causation, however generally speaking, and the appearance of a correlation does not prove the existence of a causal relationship. When the correlation coefficient is 1, which indicates an ideal positive correlation, the variables move in perfect synchronicity. The second variable increases at the same steady rate as the first. When the correlation coefficient is precisely zero, or -1, the variables move in opposite directions. As one variable increases, the reduction rate becomes constant. A correlation value of 0 shows that the variables do not have a linear relationship to one another. In other words, there is no predicted pattern to the two variables changes.

Linear Regression

By utilising linear regression, it is possible to statistically model the relationship between a dependent variable and one or more independent variables. It looks for the linear equation that most closely predicts the values of the dependent variable given the values of the independent variable or variables. One independent variable and one dependent variable make up basic linear regression. A straight line is used to illustrate how the variables are related to one another. Based on the provided data, the linear regression model calculates the slope (the rate of change) and the intercept (the starting point) of this line.

A simple linear regression model's equation is frequently shown as:

$Y = \beta_0 + \beta_1 X + \varepsilon$

where,

- The dependent variable, or the one being predicted, is Y.
- The dependent variable is predicted by the independent variable, X.
- A one-unit shift in X results in a slope of 1, or 1.

- The incorrect word, refers to the unexplainable Y variant.

HYPOTHESIS

HYPOTHESIS 1

H0 – The data does not follow normality.

H1 – The data follows normality.

HYPOTHESIS 2

H0 – There is no correlation.

H1 – There is a correlation.

HYPOTHESIS 3

H0 – There is no significant impact of changes in inflation on the gold, silver, and interest rates.

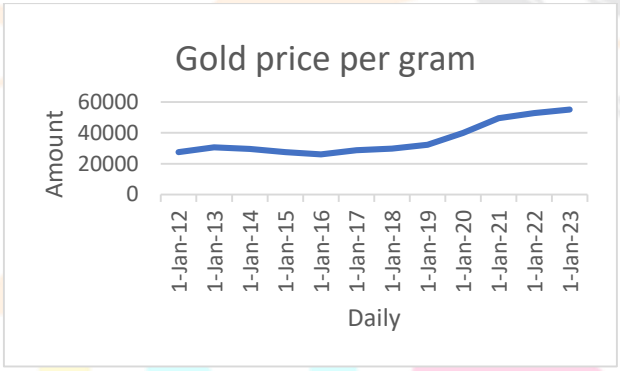
H1 – There is a significant impact of changes in inflation on the gold, silver, and interest rates.

THEORETICAL BACKGROUND OF THE STUDY

GOLD

The financial systems of all cultures have utilized gold in a distinctive way. Gold has the effect that extends far beyond its uses in industry, unlike almost every other commodity. Above-ground gold is only available in a finite amount. It is challenging to locate gold reserves, and mining for the metal requires a lot of money and effort. The desire for financial instruments that invest in gold as well as supply and demand dynamics as well as central bank policies are some of the primary factors that have an impact on the price of gold on a regular basis.

Graph 1A: Prices of gold



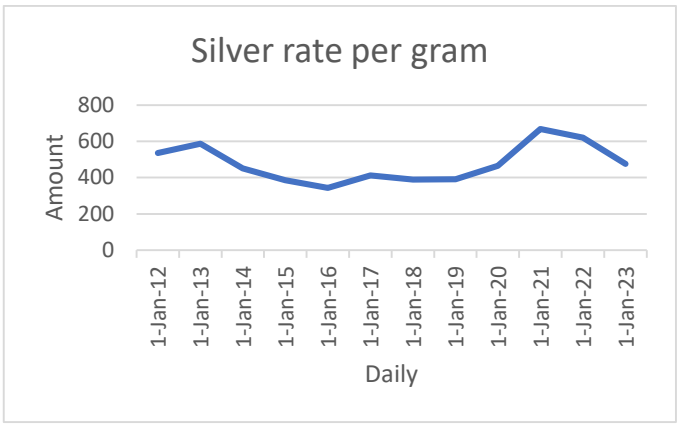
Inference:

The data shows that the price of gold has experienced both ups and downs over the years. These figures represent the price on a specific day and may not reflect the overall trend of gold prices throughout the year. Generally, there is an upward trend in the prices from 2012 to 2023. The price started at 27,597.8 in 2012 and reached 55,240.7 in 2023. This indicates an increase in the prices of gold over the 11-year period. Despite the overall upward trend, there are fluctuations in the price of gold. For example, in 2013, there was an increase in the price compared to the previous year, while in 2015 and 2016, there was a decrease in the price compared to the previous years. These fluctuations highlight the volatility of the gold market.

SILVER

Silver is a bright white metal with several unique qualities. It is supple, elastic, and exquisitely glossy. In addition to being highly reflective, silver also has excellent electrical conductivity. And it eliminates bacteria. Silver investment benefits: Silver can reduce portfolio risk, and rising economies are more likely to trust hard assets like silver than they are to trust flat currencies.

Graph 1B: Prices of silver



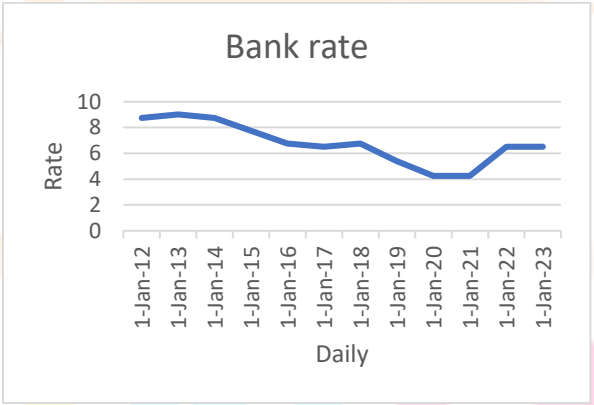
Inference:

There is both an upward and downward trend in the amount of silver. It went up as high as 667.8465 in the year 2021 and the least of 342.8725 in the year 2016. It is observed that from 2013 to 2016 there is a fall in the price of silver and we can observe an increase in trend from 2018 to 2021.

BANK INTEREST RATE

Bank interest rates are the percentages that banks and other financial institutions offer as returns on deposits or as interest rates on loans. These rates have a huge impact on people's and businesses' borrowing, saving, and investing choices, as well as the market. Interest rates are frequently significantly influenced by central banks and monetary authorities. To govern the economy, bring in inflation, and promote economic growth, they employ instruments like monetary policy. They can affect the cost of borrowing across the entire economy by changing important interest rates, like benchmark rate.

Graph 1C: Percentage of bank rate



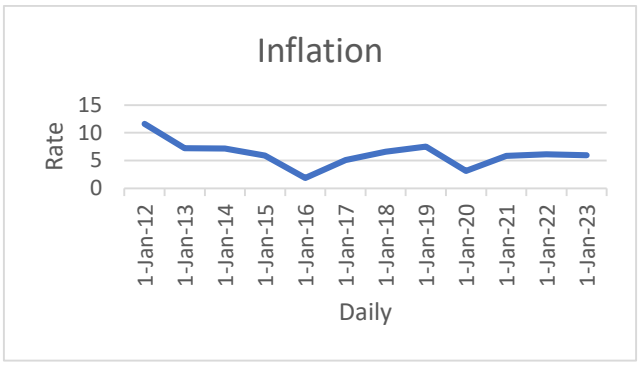
Inference:

Looking at the historical records, we can observe some fluctuations in the bank rate over time. In 2012, the bank rate stood at 8.75%. It increased to 9% in 2013 but then dropped back to 8.75% in 2014. In 2015, there was a further decrease to 7.75%. The downward trend continued as the bank rate reached 6.75% in 2016 it declined to 6.5% in 2017. There was a little increase back to 6.75% in 2018. The year 2019 saw a decrease in bank rate, dropping to 5.4%. This decrease was likely aimed at stimulating economic activity. In 2020 and 2021, the bank rate remained stable at 4.25%, indicating a period of monetary policy continuity. However, in 2022 and 2023, there was an increase, bringing the bank rate back to 6.5%

INFLATION

Inflation is the overall rise in a country's cost of goods and services over a specific period. It represents a currency's falling purchasing power because fewer goods and services can be bought with each unit of money. Inflation is frequently calculated as a percentage change using a price index, such as the Consumer Price Index or the Producer Price Index.

Graph 1D: Rate of Inflation



Inference:

In 2012, the inflation rate stood at 11.6162%, indicating a significant rise in prices. In the following years, the inflation rate gradually decreased, reaching 7.2398% in 2013 and remaining relatively stable at around 7% in 2014 and 2015. However, in 2016, there was a notable drop in the inflation rate to 1.8587%, suggesting a slower rate of price growth.

ANALYSIS

HYPOTHESIS 1

H0 – The data does not follow normality.

H1 – The data does follow normality.

Below are the inferences of test results of the Normality Test carried out on Gold, Silver, Bank rate, and inflation.

GOLD

Inference:

The assumption of normality in the data is tested using the Jarque-Bera test statistic of 22.89237. Strong evidence exists against the null hypothesis of normality by the associated probability of 0.000011, which is quite low. This shows that the data considerably deviates from the normal distribution.

SILVER:

Inference:

In this instance, the null hypothesis of normality is strongly refuted by the low probability value of 0.000491. This indicates that a normal distribution of the data is considerably violated by the data. Higher values denote a bigger deviation from normality in the Jarque-Bera test statistic, which quantifies the deviation from normality itself. The test's findings lead us to conclude that the supplied data does not follow a normal distribution.

INTEREST RATE

Inference:

When compared to conventional significance levels (such as 0.05 or 0.01), the probability value in this example of 0.068652 suggests a substantially higher probability. Even while the likelihood is not very low, it does point to some evidence that the null hypothesis of normality is false. The evidence is not as strong as it would be if the probability were lower, though. Higher values indicate a bigger deviation from normality, according to the Jarque-Bera test statistic of 5.357397.

INFLATION

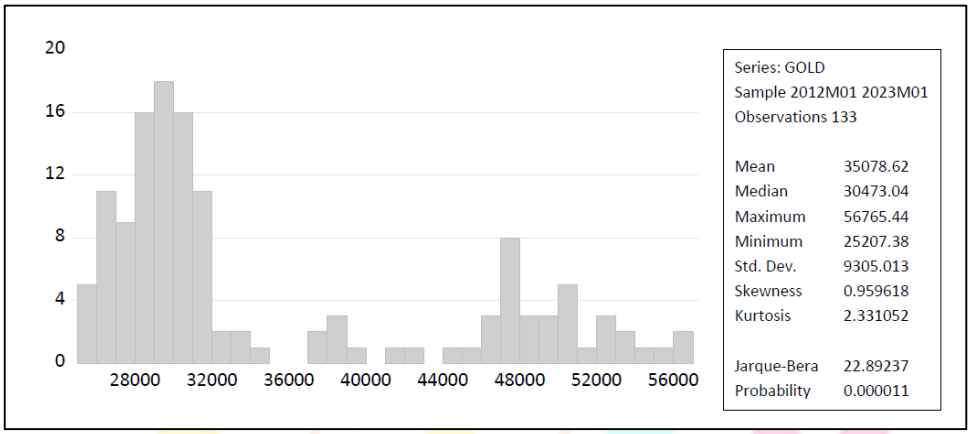
Inference:

The probability value of 0.000281, which is extremely low, provides strong evidence against the null hypothesis of normalcy. This suggests a large departure from the normal distribution of the data. It is extremely unlikely that the observed departures from normality are brought about by chance with such a low likelihood.

Below are the results of the Normality Test carried out on Gold, Silver, Bank rate, and inflation.

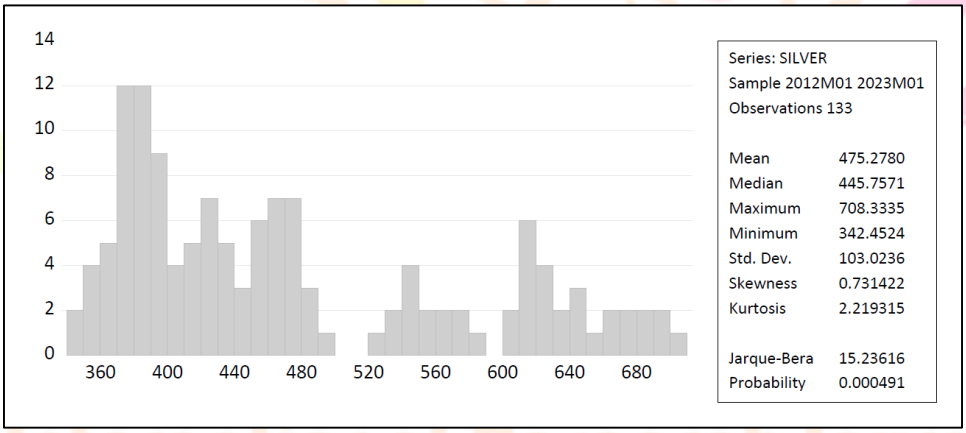
Graph 2A: Normality test of gold

GOLD:



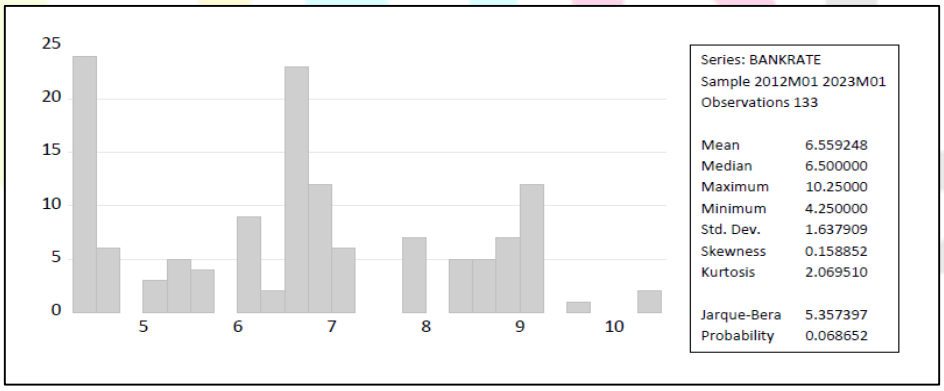
Graph 2B: Normality test of silver

SILVER:



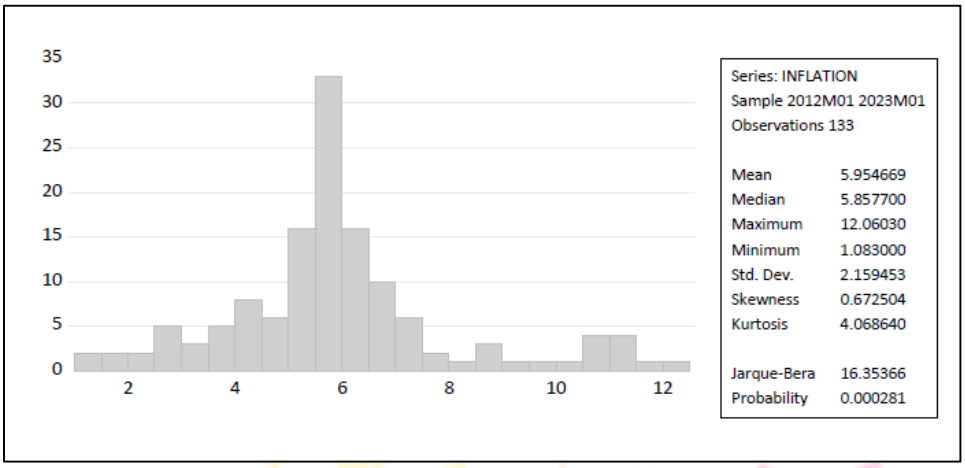
Graph 2C: Normality test of Interest rate

INTEREST RATE



Graph 2D: Normality test of Inflation

INFLATION



DESCRIPTIVE STATISTICS

Table 1: Results of the descriptive statistics

Descriptives

	Gold	Silver	Bankrate	Inflation
N	102	102	102	102
Missing	0	0	0	0
Mean	36693	478	6.33	5.72
Median	30624	446	6.50	5.85
Standard deviation	9990	106	1.62	0.897
Minimum	25539	353	4.25	3.69
Maximum	56765	708	9.00	7.67

Inference:

For the Gold variable, there are 102 data points, and no missing values. The mean (average) value of gold is 36,693, with a median (middle value) of 30,624. The data are relatively variable, as indicated by the standard deviation of 9,990. The dataset's range of gold prices is shown by the values 25,539 at the lowest end and 56,765 at the highest. There are additional 102 data points with no missing values for the Silver variable. Silver has a mean value of 478 and a median value of 446. The silver price has a moderate level of unpredictability, as indicated by the standard deviation of 106. 353 is the lowest and 708 is the highest value. For the Bankrate variable, there are several data points with no missing values. With a median of 6.50, the mean bank rate is 6.33. The SD is 1.62, which indicates that bank interest rates might vary. The lowest and maximum bank rates are 4.25 and 9.00, respectively. The 102 data points in the Inflation variable also have no missing values. With a median of 5.85, the inflation rate is 5.72 on average. The standard deviation is 0.897, which shows that inflation rates have little variation. 3.69 is the lowest inflation rate and 7.67 is the highest.

These descriptive statistics give a broad summary of each variable's central tendency, variability, and range. They aid in condensing the features of the data and comparing the variables in the dataset and drawing conclusions.

HYPOTHESIS 2

H0 – No correlation is found between the variables.

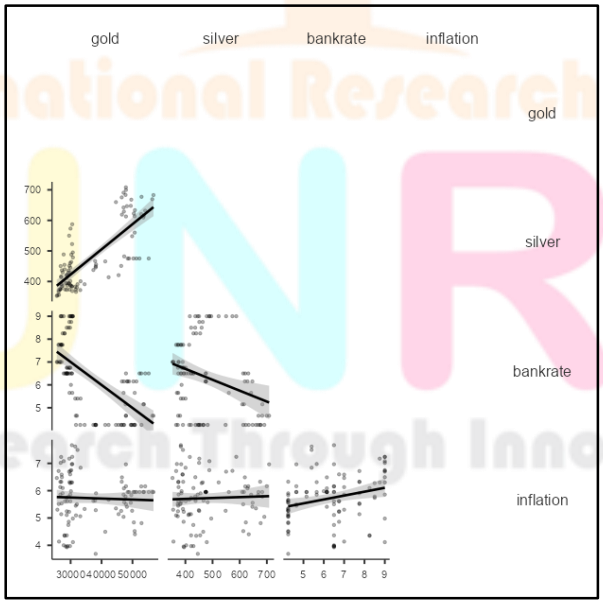
H1 – Correlation is found between the variables.

Table 2: Correlation matrix of Gold, silver, Bankrate and Inflation

Correlation Matrix

		Gold	Silver	Bankrate	Inflation
Gold	Pearson's r	—			
	p-value	—			
Silver	Pearson's r	0.778	—		
	p-value	< .001	—		
Bankrate	Pearson's r	-0.618	-0.311	—	
	p-value	< .001	0.001	—	
Inflation	Pearson's r	-0.042	0.038	0.258	—
	p-value	0.675	0.703	0.009	—

Graph 3: Plot of correlation matrix



Inference:

1. Gold and Inflation: With a correlation coefficient of -0.042, gold and inflation have a very slender negative relationship. This demonstrates that there is no meaningful connection between changes in inflation and variations in the price of gold. Since this correlation is not statistically significant, the p-value is 0.675.

2. Silver and Inflation: With a correlation coefficient of 0.038, there is a very slight positive link between silver and inflation. As a result, it concludes that there is no meaningful connection between changes in the price of silver and those in inflation. Since this correlation is not statistically significant, the p-value is 0.703.
3. Bankrate and Inflation: With a correlation coefficient of 0.258, Bankrate and Inflation are somewhat positively correlated. There may be a correlation between greater inflation rates and higher bank interest rates. Since this correlation has a p-value of 0.009, it is statistically significant.
4. Gold and Silver: With a correlation coefficient of 0.778, Gold and Silver are strongly positively correlated. This shows that the price of silver tends to rise in tandem with the price of gold. The statistical significance of this link is indicated by the p-value, which is less than 0.001.
5. Gold and Bankrate: With a correlation coefficient of -0.618, Gold and Bankrate have a moderately negative relationship. This implies that the bank interest rate tends to decline when the price of gold rises. The statistical significance of this link is indicated by the p-value, which is less than 0.001.
6. Silver and Bankrate: With a correlation coefficient of -0.311, there is just a slight negative link between Silver and Bankrate. This implies that, despite the weak link, the bank interest rate tends to decrease as the price of silver rises. Since this correlation has a p-value of 0.001, it is statistically significant.

Correlations only measure the strength and direction of linear relationships between variables. Other factors and variables may also influence the relationships observed.

HYPOTHESIS 3

H0 – There is no impact of inflation on the gold, silver, and interest rates.

H1 – There is an impact of inflation on the gold, silver, and interest rates.

LINEAR REGRESSION

1) Gold and Inflation

Table 3A: Results of linear regression between gold and inflation

OUTPUT AS FOLLOWS

Regression Statistics	
Multiple R	0.065071132
R SQUARE	0.004234252
Adjusted R Square	-0.003367013
Standard Error	9320.665237
Observations	133

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	48393235.58	48393235.58	0.557046	0.45679
Residual	131	11380598860	86874800.45		
Total	132	11428992095			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	36748.24285	2378.559144	15.44979151	2.65E-31
inflation	-280.3894077	375.6783633	-0.746354954	0.45679

Inference:

The value 36748.24285 is the intercept coefficient. This is an estimate of what the gold rate would be at 0% inflation. The t-statistic for the intercept is 15.44979151, and the p-value is 2.65E-31, which is extremely small. The intercept is clearly different from zero,

as seen by this. The variable "inflation" has a coefficient of -280.3894077. This illustrates the anticipated change in the dependent variable for a rise of a unit in the inflation variable while holding all other variables constant. For a one-unit increase in the inflation variable, it here indicates the projected change in the gold rate. Nevertheless, the coefficient's t-statistic of -0.746354954 and p-value of 0.45679 indicate that it is not statistically significant. This implies that there is weak support for a linear link between gold and the inflation variable. The non-significant coefficient and p-value of the data reveal inflation variable does not affect gold in a statistically significant way. The dependent variable in this regression model may be better predicted by other factors and variables.

2) Silver and Inflation

Table 3B: Results of linear regression between silver and inflation.

OUTPUT AS FOLLOWS

Regression Statistics	
Multiple R	0.286942875
R Square	0.082336213
Adjusted R Square	0.075331146
Standard Error	99.06719125
Observations	133

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	115355.4963	115355.4963	11.75381	0.000812
Residual	131	1285674.398	9814.308382		
Total	132	1401029.894			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	393.761422	25.28115404	15.5752946	1.33E-31
inflation	13.68952626	3.99299828	3.428382708	0.000812

Inference:

The value 393.761422 is the intercept coefficient. This is the estimated price of silver at a time of no inflation. When the inflation variable is 0, it here indicates the expected value of the silver rate. With a t-statistic of 15.5752946, and a p-value of 1.33E-31, the intercept is statistically significant. The intercept is clearly different from zero, as seen by this. The term "inflation" has a coefficient of 13.68952626. Other factors held constant; this reflects the projected differences in the silver rate for a one-unit increase in the inflation variable. For a one-unit increase in the inflation variable, it here indicates the projected change in the silver rate. With a modest p-value of 0.000812 and a t-statistic of 3.428382708, the coefficient is statistically significant. This shows that the inflation variable and the dependent variable, or Silver, have a strong linear relationship.

3) Bank Rate and Inflation

Table 3A: Results of linear regression between Bank rate and inflation

OUTPUT AS FOLLOWS

Regression Statistics	
Multiple R	0.383753401
R Square	0.147266673
Adjusted R Square	0.140757258

Standard Error	1.51826558
Observations	133

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	52.15044597	52.15044597	22.62364	5.12E-06
Residual	131	301.9720788	2.305130373		
Total	132	354.1225248			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	4.82601921	0.38744922	12.45587539	5.59E-24
inflation	0.291070563	0.061195152	4.756431721	5.12E-06

Inference:

It is 4.82601921, the intercept coefficient. This is an estimate of what the bank rate would be at zero inflation. When the inflation variable is 0, it indicates the estimated value of the dependent variable in this situation. With a t-statistic of 12.45587539 and an extraordinarily modest p-value of 5.59E-24, the intercept is statistically significant. The intercept is clearly different from zero, as seen by this. The variable "inflation" has a coefficient of 0.291070563. This is the anticipated change in the bank rate for a one-unit increase in the inflation when all other variables remain constant. It denotes the expected change in the bank rate for an increase of one unit in the inflation variable in this case.

FINDINGS

1. The findings of the test for normality indicate that the data set for gold, silver, interest rates, and inflation is not normally distributed.
2. According to the linear regression model, gold is unaffected by inflation.
3. It is also determined that an impact was found of inflation on silver rates.
4. There is also a lot of solid evidence for a linear relationship between interest rates and inflation.
5. Gold and silver have a very high positive association.
6. Interest rates and inflation have a moderately positive link.
7. According to the correlation matrix, there is very little evidence of a relationship between the prices of gold and silver and inflation.
8. According to the linear regression test, the association between gold and bank rate is rather negative.

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CONCLUSION

In this paper, the impact of changes in inflation rate on the gold, silver, and interest rates has been determined. The study uses the data which is collected from the year 2012 to 2022. The Jarque – Bera test reveals that the data series of the entire data does not follow normality. The association between the inflation variable and interest rates is strongly supported by the research. Gold and Silver have a very good link with one another.

Interest rates and inflation have a moderately positive link. Both Gold and inflation as well as Silver and inflation exhibit a very weak negative link, according to the correlation matrix.

It should a lot of unknowable factors that affect how gold, silver, and interest rates vary in relation to changes in the inflation rate. According to the results of the linear regression test, Gold and Bankrate have a moderately negative association.

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