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A Study on Impact of Inflation on Nifty Index and Gold Price

Shruthi P. R [a], Vigneshkumar M [b]

[a] *Assistant Professor, Sri Krishna Adithya College of Arts and Science, Coimbatore-641042, India*
[b] *Student, Sri Krishna Adithya College of Arts and Science, Coimbatore-641042, India*

A B S T R A C T

The main Objective of this study is to compare the annual change of inflation with the stock indices and gold prices. Trend analysis and comparative analysis is employed to establish relationship among the change in Inflation to the change in stock indices and to change in gold prices. The study concludes that change in Inflation have a direct relationship with changes in gold prices and have a mixed relationship with stock indices in India

Keywords: Inflation, Nifty stock Indices, Gold prices

1. Introduction

Inflation is the rate of increase in prices over a given period of time. This study compares the annual change of inflation with the stock indices and gold prices. The data relating to inflation rate, stock indices and gold prices for 5 years are been used in this study. The main purpose of this study is to establish the effect of inflation on the stock indices and gold prices.

1.1 Objectives of the study

1. The main purpose of this study is to establish the effect of inflation on the stock indices and gold prices.
2. To compare the interdependence between inflation with the stock indices and gold prices.
3. To predict the value of changes in rates of the variables in the upcoming years.
4. To analyze the causes for the change in rates of the selected variables.
5. To define the nature of relationship of between the variables.

1.2 Statement of problem

In an inflationary environment, unevenly rising prices is inevitably which reduce the purchasing power of some consumers, and this erosion of real income is the single biggest cost of inflation. Inflation can also distort purchasing power over time for recipients and payers of fixed interest rates. Inflation raises prices, lowering the purchasing power of assets and also increase the purchasing power of some assets. Inflation also lowers the values of pensions, savings, and Treasury notes.

1.3 Scope of the Study

1) The scope of this study extends only to the Indian region.

2) The study limits its scope only to the analysis of Stock indices and Gold prices with Inflation.

3) The study analyzes the causes of the changes of selected variables and its interdependence.

1.4 Limitations of the study

- This study analysis the data relating to a particular geographical location i.e., India.
- The reliability of the results of this study are based on the fairness of the data provided in the concerned websites.
- The study uses the secondary data for analysis and interpretation.

2. Review of Literature

1. (Vijay Shankar Pandey, 2019) “Predictive efficiency of ARIMA and ANN models: a case analysis of nifty fifty in Indian stock market” attempted to identify superior combinations in ARIMA model as well as ANN model for predicting Indian Stock Market namely NSE Nifty fifty using daily data of ten year period. Through the simultaneous use of AAE, RMSE, MAPE and MSPE statistical tools, the predictive accuracy of ARIMA and ANN model has been compared. It is concluded that though neutral network have better predictive capability in case of long span of time and nonlinear volatile series as of Indian stock market index NSE.

2. (Ana Caolina Garriga, 2019) “More Effective Than we Thought: Centr e Than we Thought: Central Bank al Bank Independence and Inflation in Developing Countries” is made from the period of 1980 to 2103. The study examined the effect of legal central bank independence on inflation in developing countries. It suggested that central bank independence is an effective tool to control inflation, the evidence is still limited, particularly for developing countries. Predicted values of inflation rate for democracies and autocracies, with fixed and flexible exchange rates. It concluded that results and implications from the study contribute to the discussion on the effects of granting independence to central banks and using a very broad sample of developing countries, it provided strong evidence that legal protection to central banks for the conduction of monetary policy is associated with lower inflation in developing countries.

3. (Ankit verma, 2020) “A Comparative Study of Relationship of Gold Etfs With Indian Capital Market Index And Exchange Rate” empirically investigated the causal relationship of 3 Gold ETFs traded on NSE with Market Index (Nifty 200) and with the Exchange rate (USD to INR). An attempt has been made to study whether the relationship between variable change during the period of crisis. The period considered for the study is from January 2010 to September 2020 and this has been considered in 2 parts; the full period and during COVID-19 driven crises period. Techniques of time series analysis have been used to measure the causal relationship between the variables. The paper also tried to capture the performance trend of Gold ETFs in comparison to a stock market index and movement in the Exchange rate. Granger causality test applied on both the sub-periods provide reasonable evidence that indicates the existence of unidirectional causality running from INDEX and 3 Gold ETFs in the study during the crisis.

4. (Roopa, 2020) “Impact of monetary policy instruments on inflation from 2010 to 2019” analyzed the kind of inflation measure being taken by RBI for monetary policy, to study the ability of the central bank to predict inflation for a stable monetary policy, to study the interrelationship among selected macro-economic variables and to understand whether there is any significant relationship between money supply and inflation. The study was conducted from the period of 2010 to 2019. For the purpose of analysis data was collected from secondary sources namely various research and websites. Most of the secondary data was collected from rbi.org.in. RBI uses various monetary instruments like bank rate, repo rate, reverse repo rate, CRR and SLR to achieve its objective of ensuring financial stability and controlling inflation in India. The study concluded that there is significant relationship between inflation and money supply and both are positively correlated which implies that when there is increase in inflation money supply also increases. Similarly it is also evident from the study that all the instruments of monetary policy are positively correlated with inflation and money supply.

5. (Amrendra Pandey, 2021) “Evaluation of the inflation forecsting process of the Reserve Bank of India: A Text Analysis Approach” evaluated the monetary policy of the Reserve Bank of India (RBI) based on an investigation of the policy statements. The analysis based on text mining of the central bank’s monetary policy statements seeks to unravel the information considered by the central bank and the processes followed in making its inflation forecasts. The RBI adopted (Scaling Inflation Forecast, Scaling Inflation Forecast, Qualitative Textual Analysis) to predict information. The research revealed that the policy makers scrutinized voluminous economic, financial, and sectoral data as well as economic indicators to gauge and forecast the macroeconomic outlook.

6. (Barry Eichengreen, 2021) “Inflation Targeting in India An Interim Assessment” provided an assessment of India’s inflation targeting regime and the paper argues that the rules and understandings governing inflation-targeting regimes come with escape clauses allowing central banks to shelve their inflation targets temporarily, under specific circumstances satisfied by the Covid-19 pandemic. The paper disclosed inflation-targeting central banks were able to respond more forcefully to the Covid-19 crisis, consistent with the idea that inflation expectations were better anchored, providing more policy room for maneuver. The RBI contended that traditional monetary policy instruments, such as bank rate and open market operations, proved inadequate for regulating credit growth, money supply, and inflation owing to fiscal dominance. The credit planning is done with the help of cash reserve ratio (CRR) and statutory liquidity ratio (SLR). It concluded that inflation has become better anchored increases in actual inflation do less to excite inflation expectations, indicative of improved anti-inflation credibility.

7. (Sami Ben Jabeur, 2021) “Forecasting gold price with the XGBoost algorithm and SHAP interaction values” proposed an innovative approach to accurately forecast gold price movements and to interpret predictions. First, it had compared six machine learning models. These models include two very recent methods: the eXtreme Gradient Boosting (XGBoost) and CatBoost. The empirical findings indicated the superiority of XGBoost over other advanced machine learning models. Second, it proposed Shapley additive explanations (SHAP) in order to help policy makers to interpret the predictions of complex machine learning models and to examine the importance of various features that affect gold prices. The results of the study illustrated that the utilization of XGBoost along with SHAP approach could provide a significant boost in increasing the gold price forecasting performance.

8. (Pradeepta kumar sarangi, 2021) “Machine Learning Based Hybrid Model for Gold Price Prediction in India” intended to analyse the effectiveness of a machine learning based hybrid model in predicting the future price of gold. Artificial Neural Network (ANN) based on Particle Swarm Optimization (ANN-PSO) model has been tested on monthly gold price in India for the period of January 2012 to June 2021. Researchers apply a number of statistical and machine learning techniques to predict the future expected return of investment on gold. However, accuracy in prediction is still a challenging task

due to the volatility in the market affecting parameters. The experimental results of the study investigated that the ANN-PSO model is capable of predicting the future gold price with high accuracy.

9. (NEGI, 2021) In “RBI should look beyond Infation targeting and adopt”, annual data on bank credit and GDP growth spanning from FY 1970-71 to 2019-20 had been taken from NSO website and the Annual reports published by the RBI over a period of time. The paper adopted a Flexible inflation targeting regime to target CPI inflation in 2016 as the primary objective of the Monetary Policy. The paper strived to explain the relationship between credit growth and GDP growth in the Indian Economy and hence recommend that the Monetary Policy Committee should also adopt a Credit targeting regime along with the already existing Flexible inflation targeting framework. The RBI adopted unit root test and Co-integration test to calculate the inflation rate. The variables used in the paper are ADF -Fisher, PP -Fisher test, and OLS. The study concluded that Indian banks should also adopt global standards while granting loans and restrain themselves to give loans to low credit worthy borrowers.

10. (Devendra Pratap Singh, 2022) “Taking Cognisance of Households’ Inflation Expectations in India” studied the characteristics of inflation expectations in developed and emerging market economies and also concentrated on two of the other main objectives of capturing inflation expectations. while the literature provided studies on forecasting inflation using inflation expectations and it attempted to find a relationship between households’ inflation expectations and their future savings pattern. They calculated inflation in various phases like very high, moderating, low and stable inflation. The paper concluded with the help of chi-square test statistic using qualitative responses of households and performs a robustness check to re-confirm that the expectations are mainly influenced by food products and other non-food commodities.

3. Research Methodology

Research methodology is a way of explaining how a researcher intends to carry out their research. It's a logical, systematic plan to resolve a research problem. A methodology details a researcher's approach to the research to ensure reliable, valid results that address their aims and objectives. It encompasses what data they're going to collect and where from, as well as how it's being collected and analyzed.

3.1. Data Collection

Secondary data

The Secondary data is the data collected already or existing already in different sources like internet, articles and books. Secondary data is used in this study.

- Annual changes in inflation rates are taken from **Macrotrends.net**
- Annual changes in the stock indices are taken from **in.tradingview.com**
- Annual changes in the gold prices are taken from **in.tradingview.com**

3.2. Period of Study

The period of study is ranging from 2018-2022 (5 years).

3.3. Area of the study

The area of this study is Indian region.

3.4. Variables

1) Percentage of annual change of Inflation rates.

2) Percentage of annual change in stock indices.

3) Percentage of annual change in gold prices.

3.5. Tools and Techniques

1) TREND ANALYSIS

Trend analysis involves the collection of information from multiple time periods and plotting the information on a horizontal line for further review. The intent of this analysis is to spot actionable patterns in the presented information. Trend analysis is a strategy used in making future predictions based on historical data. It allows to compare data points over a given period of time and identify uptrends, downtrends, and stagnation.

Types of trend analysis

Upward trend:

An uptrend or an upward trend means that your data points are increasing.

Downward trend:

On the opposite side, a downward trend indicates the decreasing value of your variable.

Horizontal trend:

Finally, the horizontal line indicates stagnation. In other words, the prices, or any other metrics, are not going up or down. Rather, they are stagnant.

2) COMPARATIVE ANALYSIS

Comparative analysis is the process of comparing items to one another and distinguishing their similarities and differences. The goal of comparative analysis is to search for similarity and variance among units of analysis. Comparative research commonly involves the description and explanation of similarities and differences of conditions or outcomes among large-scale social units, usually regions, nations, societies, and cultures.

IMPORTANCE OF COMPARATIVE ANALYSIS:

- Identify strengths and weaknesses
- Decision making
- Improved performance

4. Analysis and Interpretation

4.1 Variable Description

Table 4.1.1 – Changes in Inflation Rates

INFLATION		
YEAR	**INFLATION RATE**	**ANNUAL CHANGE**
2018	3.94	0.61
2019	3.73	-0.21
2020	6.62	2.89
2021	5.13	-1.49
2022	6.7	1.57

INTERPRETATION:

The Table 4.1.1 have the values of Inflation rate and its percentage of annual change. The reason for decrease in inflation rate in the year 2017-2018 was increase in oil prices, increase in food prices, increase in demand and increase in import duties. Increase in inflation rate has in the year 2018 – 2019 due to higher fuel price, increase in government spending and increase in food prices. The Inflation rate has increased in the year 2019-2020 due to lower fuel price and decrease in demand. The inflation shows a decreasing range in the year 2020-2021 because of covid -19 pandemic which increased the global commodity prices and government's monetary and fiscal policies. The Inflation rate in the year 2021-2022 showed an increasing rate due to change in fuel prices, increase in food prices, increase in demand and supply chain disruptions.

Chart 4.1.1 – BAR GRAPH – Changes in Inflation rates

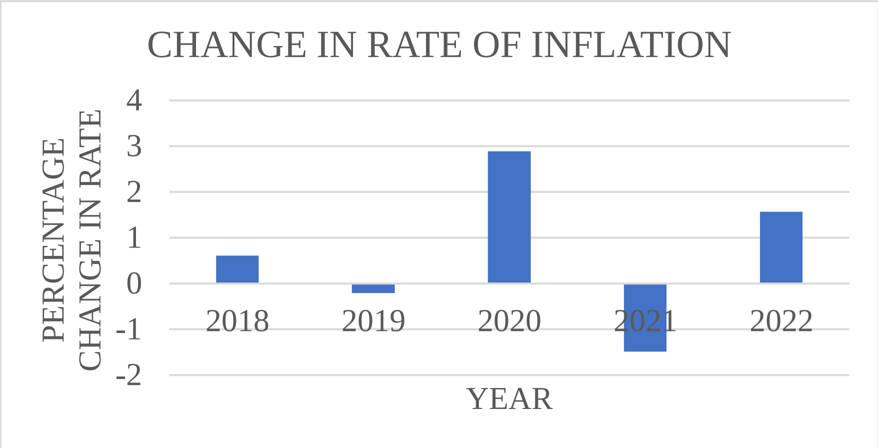
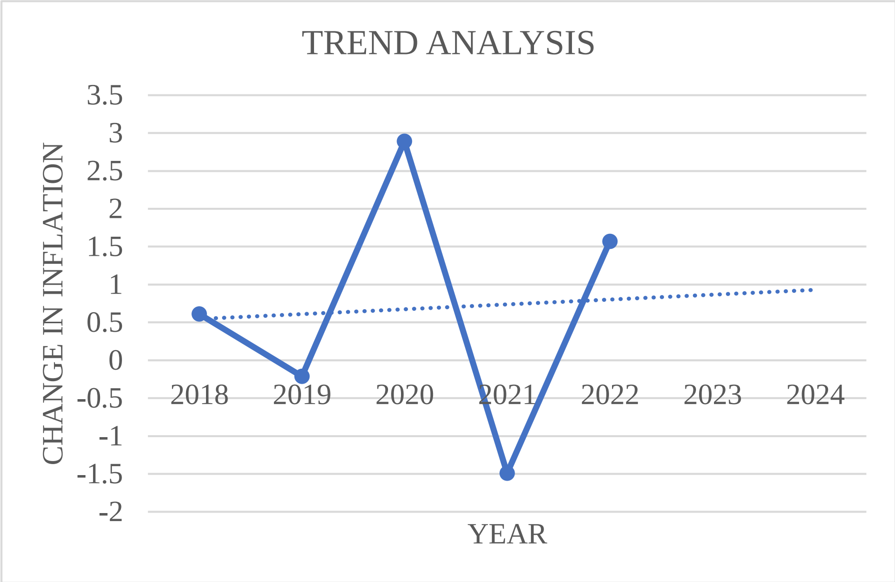

CHANGE IN RATE OF INFLATION
PERCENTAGE CHANGE IN RATE
4
3
2
1
0
-1
-2
2018
2019
2020
2021
2022
YEAR

Chart 4.1.2 – Trend analysis for change in Inflation



INTERPREATATION

In the year 2018-2019 the rate of change in inflation is -0.21% and showed a decreasing trend. Increased change of 2.89% in the inflation rate in the year 2019-2020 brings boom in the trend line. Decreased change in the rate of inflation having -1.49 in the year 2020-2021 brings the trend line to decline. 1.57 hike in the change in inflation rate in the year 2021-2022 again improve the trendline towards peak. The trend line analysis predicts that the inflation will have a gradual increasing trend in the upcoming two years.

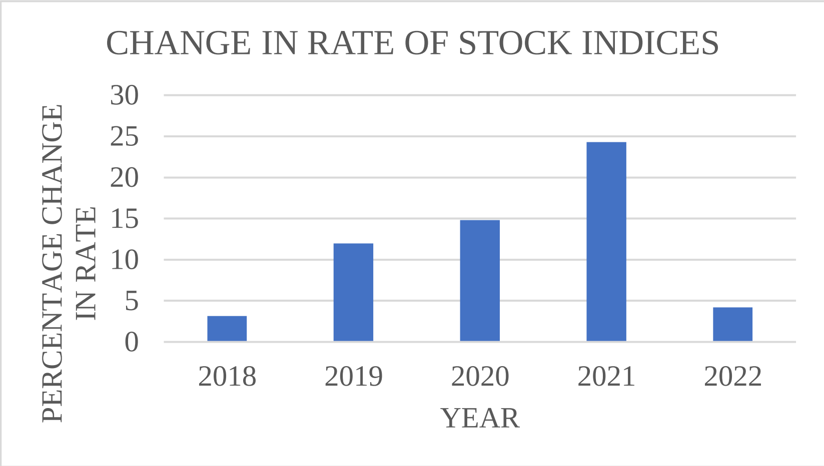
Table 4.1.2 – Annual Change in rate of Nifty Stock Index

Year	Opening Price	Closing Price	Change in Value	Change in Rate
2018	10528	10861	333	3.162993921
2019	10876	12180	1304	11.9897021
2020	12186	13993	1807	14.82849171
2021	13974	17367	3393	24.28080721
2022	17373	18104	731	4.207678582

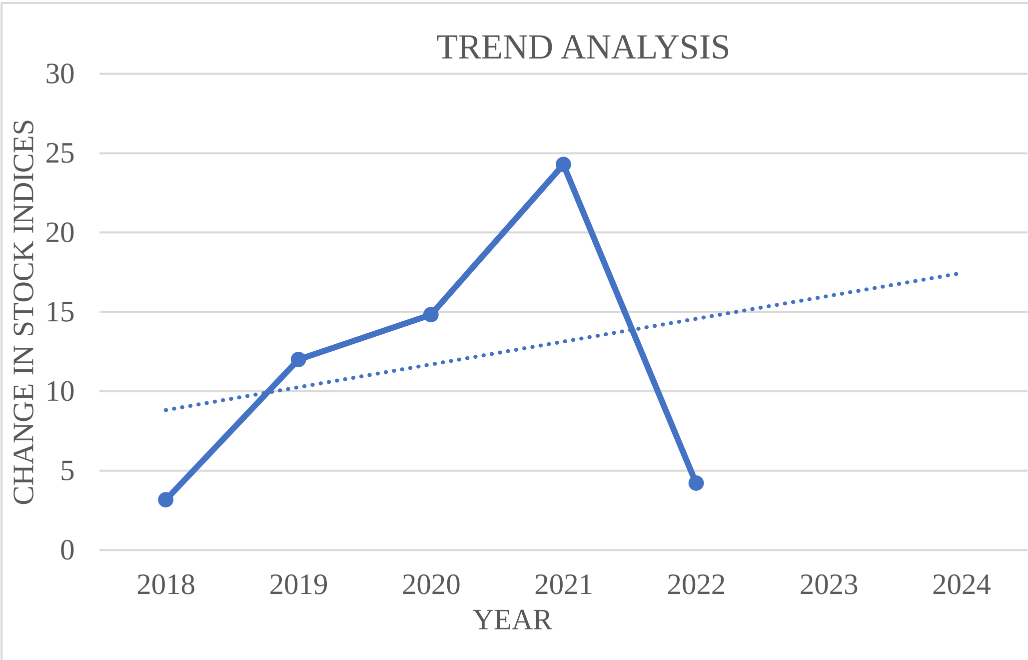
INTERPRETATION

The annual rate of change in stock indices are arrived by taking the difference of opening and closing of nifty indices for a particular year. The changes in the nifty stock index is based on combination of several factors including global economic conditions, domestic economic indicators corporate earnings and political developments. The reasons for increase in the value of indices in the year 2018-2019 were US and China trade war, High inflation, strong corporate earnings by the companies being listed. The increase in the stock indices in the year 2019-2020 due to Covid-19 pandemic, better performance of the individual companies, government policy changes on tax reforms. The increase in stock indices in the year 2020-2021 because of strong corporate earnings, global economic recovery from pandemic and government reforms on production linked incentive scheme for various sectors. The decrease in stock indices in the year 2021-2022 due to US, China trade tensions, the rise in crude oil prices and US elections.

Chart 4.1.3– BAR GRAPH - Annual Change in rate of Nifty Stock Index



4.1.4 – Trend analysis of Nifty stock Index



INTERPRETATION

In the year 2018-2019 the change in stock indices is 11.99 % and showed a increasing trend. Increased change of 14.83 % in the stock indices in the year 2019-2020 brings boom in the trend line. Increased change in the stock indices having 24.28% in the year 2020-2021 brings the trend line to incline. 4.21% decline in the change in stock indices in the year 2021-2022 brings down the trendline. The trend analysis predicts that the nifty stock index may have a gradual increasing trend in the upcoming two years.

Table 4.1.3 – Annual change in Gold prices

Calculation of Percentage of change in Gold Prices				
Year	**Opening Price**	**Closing Price**	**Change in Value**	**Change in Rate**
2018	29121	31413	2292	7.870608839
2019	31413	39147	7734	24.6203801
2020	39093	50126	11033	28.22244392

2021	50126	48044	-2082	-4.153533097
2022	48090	55007	6917	14.3834477

INTERPRETATION

The changes in gold rate will occur because of the global economic conditions, interest rates, inflation, currency exchange rates and government policies. The reasons behind the rate of increase in gold price in the year 2018-2019 were demand for gold, low interest rate in other investments and high inflation. The increase in the rate of change in gold prices in the year 2019-2020 because of covid-19 pandemic, fluctuations in the USD and INR exchange rate and geo political tensions between major world powers. The decrease in the rate of change of gold prices in the year 2020-2021 due to pandemic that had decreased the occurrence of festivals and weddings which reduced the demand for gold. In the year 2021-2022 the rate of change of gold prices showed an increase because of demand and supply of gold in India, economic conditions such as inflation, interest rates and currency fluctuation can affect the price of gold and political instability, conflicts and wars.

Chart 4.1.5 – BAR GRAPH - Annual change in Gold prices

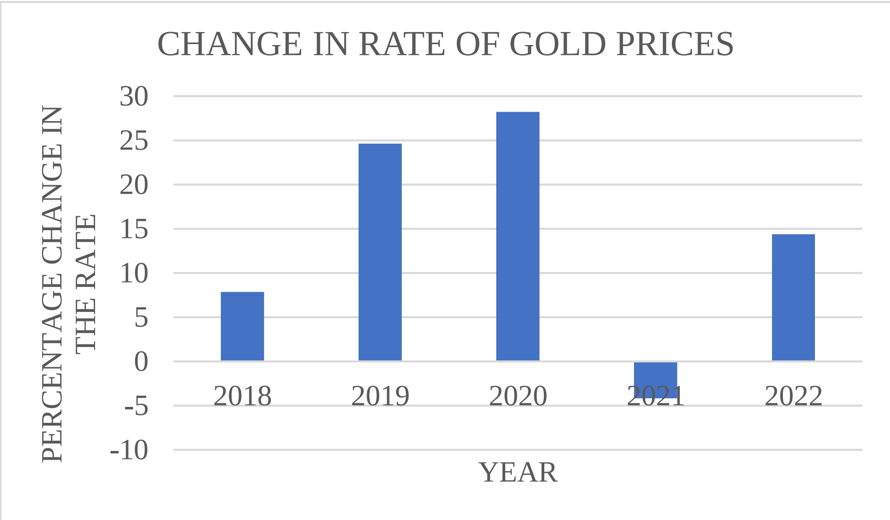


Chart 4.1.6 – Trend analysis of Change in Gold prices

INTERPRETATION

In the year 2018-2019 the rate of change in gold prices is 24.62% and showed a increasing trend. Increased change of 28.22% in the gold prices in the year 2019-2020 brings boom in the trend line. Decreased change in the gold prices of -4.15% in the year 2020-2021 brings the trend line to decline. 14.38% hike in the change in gold prices in the year 2021-2022 again improve the trendline towards peak. The trend line predicts that the changes in gold prices will show a gradual decreasing trend in the upcoming two years.

4.2 COMPARATIVE ANALYSIS

Table 4.2.1 – Comparative Analysis of Changes in Inflation with Nifty Stock Index

Comparative analysis of inflation and Nifty stock index		
Year	**Change in Inflation**	**Change in stock Indices**
2018	0.61	3.162993921
2019	-0.21	11.9897021
2020	2.89	14.82849171
2021	-1.49	24.28080721
2022	1.57	4.207678582

INTERPRETATION

The table 4.2.1 compares the rate of change in inflation with the rate of change in stock indices. In the year 2018-2019 when the rate of change in inflation decreases the rate of change in stock indices increased. In the year 2019-2020 when the rate of change in inflation showed an increase the rate of change in stock indices also showed an increase. In the year 2020-2021 when the rate of change in inflation decreases the change in the rate of stock indices showed a huge increase. In the year 2021-2022 when the rate of change in inflation increases the rate of change in stock indices showed a decrease. From the comparative study the change in the rate of inflation showed both direct and inverse relationship (mixed relationship) with the change in the rate of stock indices. It is clearly implied from the study that Inflation does not affect stock indices as much as the change in the inflation rates.

Chart 4.2.1 – BAR GRAPH – Comparison of changes in Inflation with Nifty stock index

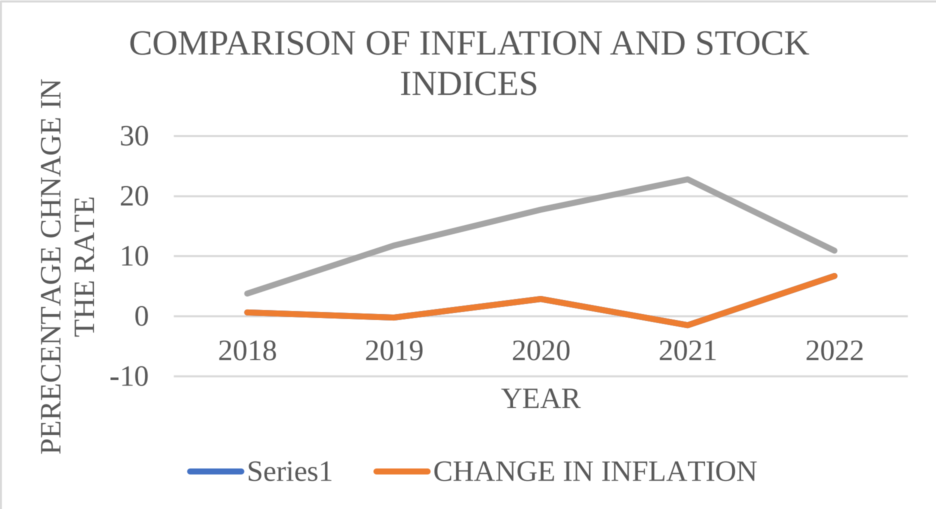


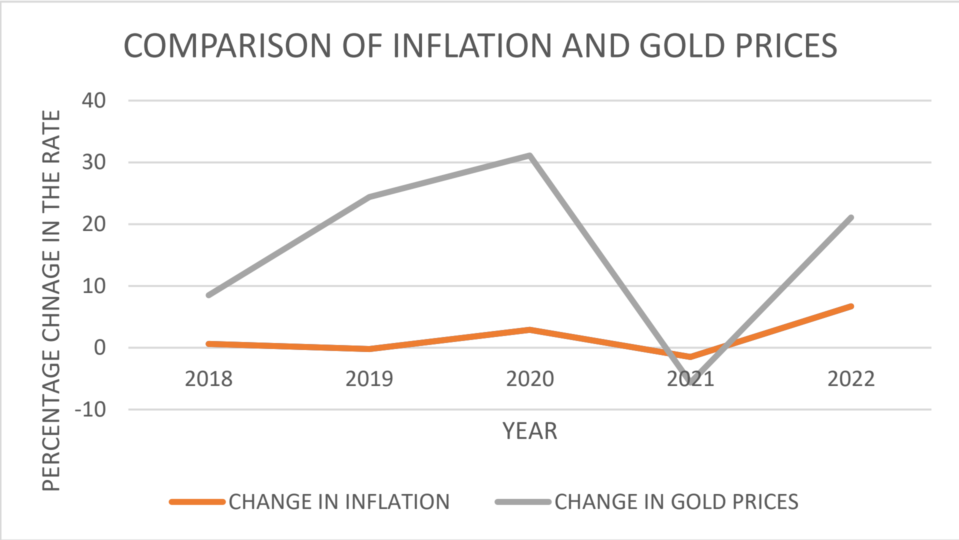
Table 4.2.2 – Comparative analysis of Change in Inflation and Change in Gold Prices

Year	Change in Inflation	Change in Gold Prices
2018	0.61	7.870608839
2019	-0.21	24.6203801
2020	2.89	28.22244392
2021	-1.49	-4.153533097
2022	1.57	14.3834477

INTERPRETATION

The table 4.2.2 compares the rate of change in inflation with the rate of change in gold prices. In the year 2018-2019 when the rate of change in inflation decreases the rate of change in gold prices increased. In the year 2019-2020 when the rate of change in inflation showed an increase the rate of change in gold prices also showed an increase. In the year 2020-2021 when the rate of change in inflation decreases the change in the rate of gold prices also decreased. In the year 2021-2022 when the rate of change in inflation increases the rate of change in gold prices also increased. The comparative analysis reveals that the inflation and gold prices have direct relationship. The change in inflation will directly impact the gold prices i.e., when inflation rises the gold price will also increase and when the inflation decreases, the gold price will also decrease.

Chart 4.2.2 – BAR GRAPH – Comparison of changes in Inflation with Gold prices



5. Findings, Suggestions and Conclusion

5.1 Findings:

- With reference to table 4.1.1 the change in the Inflation rates and the reason for such changes are found.
- With reference to chart 4.1.2 the trendline analysis predicts that the inflation will have a gradual increasing in the upcoming two years
- The percentage of changes in the Nifty Stock Index during the study period are arrived and the background for such changes are found.
- With reference to diagram 4.1.4 the trendline analysis predicts that the nifty stock index will have a gradual increasing trend in the upcoming two years.
- The percentage of changes in the gold prices during the period of study are arrived and the causes for such changes are found.
- With reference to the diagram 4.1.6 the trendline analysis predicts that the change in gold prices will show a gradual decreasing trend in the upcoming two years.
- Comparative analysis between the change in inflation and change in stock indices revealed that Inflation does not affect stock indices as much as the change in the inflation rates.
- Comparative analysis between the change in inflation and change in gold prices revealed that the change in Inflation will directly impact the gold price i.e., when inflation rises, the gold prices will also increase and when the inflation decreases, the gold price will also decrease.

5.2 Suggestions

The study revealed a direct relationship between the Inflation and Gold prices. It is suggested that not to purchase the gold during the time of high Inflation. It is advisable to invest in gold during the time of low inflation rates, this will increase the return on investment from the gold. Investing in securities even during the high inflation sometimes it will affect the return on investment from the securities. Hence investing in securities should be highly scrutinized.

5.3 Conclusion

The study concludes that the change in inflation will have a direct impact on the change of gold prices. There is a mixed relationship (both direct and inverse) between the inflation and nifty stock index. The Nifty indices shows an increasing trend in the future and the gold prices shows a decreasing trend in the upcoming years which indicates that investing in Nifty is more reliable and profitable for the investors.

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