Novel approach for Correlation of Stock Market and Inflation using OLS Regression Model

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***Abstract*: Stock market is a marketplace for stock to trade, where stocks are bought and sold of listed companies in stock market. Stock prices are determined by company performance and can fluctuate based on a number of factors, including economic conditions, industry trends, and company-specific news. One of the most important factors which can affect the stock market is Inflation. A measure of inflation is the rate at which the overall level of prices for goods and services rises, lowering one's buying power. Inflation is usually measured using the Consumer Price Index (CPI).** **This is a collection of items and services that individuals often use at home.** **This study uses the Ordinary Least Square (OLS) Regression approach to understand and analyse the impact of inflation on the stock market. It studies the effect on Indian Stock market (NIFTY 100) and CPI.**

***Keywords--* Consumer Price Index (CPI), NIFTY 100, Inflation, Indian Stock Market, OLS.**

I. INTRODUCTION

The Indian stock market has expanded dramatically in recent years, and it is now the seventh biggest in the world by market capitalisation. India has a rapidly growing economy and is recognized as one of the major emerging markets, Stock market is prime indicator to know the economic condition of a country. Study of correlation of Inflation and stock market in Indian perspective is important because India is an emerging market and study can be on market can bring valuable insights for the policy makers, domestic and international investors. Researching the Indian stock market also provides insight into the economic and political factors that influence market performance. This will also help us understand other emerging markets.

This study investigates the relation between India stock market return, Consumer Price Index (CPI). The CPI is a degree of the common alternate over the years withinside the rate purchasers pay for a basket of products and services. Shopping carts are usually described by authorities’ statistical groups and are supposed to represent common customer purchases. CPI is used as a degree of inflation as it suggests adjustments withinside the fee of dwelling over the years. The Nifty 100 is a stock market index composed of the top 100 companies listed by market capitalization on the NSE India. The index is considered a barometer for the Indian stock market and serves as a benchmark for the performance of the Indian stock market. The Nifty 100 is calculated using the float market capitalization weighted method. In other words, an index level reflects the sum of the market values ​​of all stocks in the index for a given base period. The index is reviewed and readjusted semi-annually, with companies added or removed based on market capitalization and liquidity. India as an emerging market has several attractive features for investors such as a growing and growing population, a growing middle class and a rapidly developing economy.

The Indian stock market has shown strong performance in recent years, with the benchmark S&P, BSE Sensex, NSE Nifty Index hitting new all-time highs. Please note, however, that investing in emerging markets, including India, may be riskier than in developed markets due to factors such as political instability, currency fluctuations, and undeveloped legal systems. In addition, the share market of India is also exposed to internal macroeconomic factors such as high inflation, high fiscal deficits and low savings rates that can affect the market. Equity market performance in developing countries can be more volatile and riskier than in developed countries due to factors such as political instability, currency fluctuations and underdeveloped legal systems. However, it can also offer higher returns as economic growth can accelerate.

In this paper we put forth an attempt to correlate inflation data and Indian stock market using Ordinary Least Square Model. An OLS regression model is used to analyse the relationship between a dependent variable (in this case the Indian stock market) and one or more independent variables (in this case inflation).

II. LITRTURE REVIEW

Many researchers have done various studies on how macroeconomic variables affect equities market return. Reference [1] studied Investigating the time variability of the relationship between share market returns and inflation in South Africa using Fully Modified Ordinary Least Square Method. The study implies that South African market have acted as a consistent inflation hedge, although this relationship has been volatile over time and structural collapse must be taken into account.

Reference [2] studied the effect of marketplace chance on inventory returns. The studies pattern for this paper is the shares of numerous groups blanketed in his CROBEX10 index at the Zagreb Stock Exchange. This study demonstrates the existence of a mathematically based relationship between the beta coefficient and stock price changes. The beta coefficient measures how sensitive a stock is to changes in risk premium caused by outside variables, such as changes in the market's index as a whole.

Reference [3] studied the Fishers hypothesis, which claims that the nominal interest rate, which is the interest rate that is not adjusted for inflation, is equal to the real interest rate, which is the interest rate that is adjusted for inflation, plus the anticipated rate of inflation. The following is a mathematical formulation for the Fisher effect:

I = R + pi

where I is the nominal interest rate, R is the real interest rate, and pi is the expected inflation rate.

These findings have the conclusion that global fiscal authorities are often incapable of control inflation by lowering interest rates. Another argument is that the main factors influencing these nations' long-term rate of inflation are not currency growth.

Reference [4] studied about Korean Stock market KOSPI and with Korean inflation data i.e., Consumer Price Index (CPI) and industrial production data also added in this study. SVAR model was used to verify the correlation between KOSPI and CPI, Industrial Production. This study concludes that, if inflation is caused by supply side, then it has negative effect on stock market, but if inflation is caused by demand side, then there is a positive effect on stock market.

Reference [5] studied about Nigerian Stock market and it was one of the initial studies that was conducted which also considered the Covid-19 data and correlated with daily Stock Market Return (SMR) and inflation data released by National Bureau of Statistics (NBS). The Covid-19 daily cases data was fetched from Center for Disease Control Nigeria (NCDC). The model which was used was GARCH model which is a nonlinear regression model. This study concludes that there was a negative shock as Covid-19 cases raised.

Reference [6] studied on V4 countries which includes Czech Republic, Hungary, Poland, and Slovakia. Pooled OLS model was used to correlate inflation and stock market data of V4 countries. This study concluded with negative effect of inflation on stock market.

Reference [7] studied the India stock market and inflation, the stock market data was fetched from BSE SENSEX and inflation data was taken from Consumer Price Index published by RBI. VAR model was taken into consideration to correlation CPI and BSE SENSEX, this studied implies that there is a negative effect of inflation on Indian Stock market.

Reference [8] studied on Ghana Stock market and Inflation data. This study was important to note because it was done when several banks were collapsing in Ghana and there was a rise in equity market. ARDL model was used to correlate the Stock market and inflation data. This studied says that there is a negative impact of inflation on stock market, but the Foreign Direct Investment (FDI) and inflation has the positive correlation. This says that it will be helpful for the Ghana as a country for development.

Reference [9] studied the impact of Brexit on the global uncertainty. Linear regression model was used, and Volatility index (VIX) was used which records the data of volatility in the market. This study firmly concludes that there was a short-term negative impact of Brexit on the global market.

Reference [10] studied on the Turkey market using the BIST 100 stock market index and correlated with the industrial production data, inflation data. Multiple Linear Regression Model and Ordinary Least Square (OLS) model was used. The study was concluded saying that investors should not keenly focus on the GDP and gold price data while investing in the capital market. This particular paper also says that there was a negative impact of inflation in short term. Using the OLS (Ordinary Least Squares) model, the parameters of a linear regression model may be calculated. Finding a linear approximation to the data that minimises the sum of the squared differences between the responses that are actually seen in the dataset and those that are anticipated by the approximation is the goal of ordinary least squares (OLS).

Reference [11] studied on the Turkey market and it used fisher’s hypothesis to study the market. While correlating with stock market, with inflation data they also used International Reserves data. They have used GARCH model to correlate stock market data and inflation data in additional to International Reserves. According to this research, the stock market won't serve as a real hedge against inflation, and the following claim also defies Fisher's theory.

Reference [12] studied on Stock market return and inflation data in United States of America. To find the anomaly in Fisher’s hypothesis, Fama’s proxy hypothesis was used. The Fama-French three-factor model, sometimes referred to as the Fama-French proxy hypothesis, is an addition to the Capital Asset Pricing Model that adds two additional components to explain the cross-section of stock returns. According to the Fama-French Model, a stock's return depends on the market return, the size of the company, and the book-to-market ratio. MS-GARCH model was used, and this study was done in U.S which is developed country and it is much stable market compared to developing country. The findings imply that the share market and inflation and economic Growth have an unbalanced link.

Reference [13] studied about Chinese stock market and inflation data, and found lack of correlation with the fisher’s hypothesis. To study the correlation, Coefficient Linear Regression Model was used.

Reference [14] studied the relationship of inflation and stock market of Botswana, this study conducted with monthly change Consumer Price Index (CPI) and DCI (Botswana Equity Market). It was found that Fama’s proxy hypothesis hold good with respect to Botswana’s inflation and stock market.

Reference [15] studied about Chinese stock market and inflation data, and in this study the approach used was non linear dynamic approach. Recursive Neural Network was used to analysis inflation and stock market. The processing of sequential input, such as time series data or plain language, is the goal of recurrent neural networks (RNNs), a subset of neural networks. It was concluded by saying that moderate inflation can boost the stock market, but extremely high inflation can bring negative effect on market.

Reference [16] studied about Indian Stock market and Inflation data. Inflation data was taken from CPI and stock market data was taken from Nifty 50 Index. Vector Autoregressive Model was used to correlate Stock market and Inflation. For the purpose of predicting stock market trends and making investment decisions, the VAR model may assist in predicting the future values of the variables. There was a negative correlation between Inflation and Share market.

Reference [17] studied about Kenya Stock market and Inflation data. The used Model was ARIMA. An alternative to the standard ARIMA model, is used to evaluate time series data with long memory features, such as stock prices and inflation rates. Inflation and the stock market were shown to be positively correlated.

III. PROBLEM DEFINATION

The status of an economy as a whole may be learned a lot by researching the connection between the stock market and inflation. Since higher stock prices may signal more confidence in the economy and potential for future development, the stock market is sometimes seen as a leading predictor of economic growth. Contrarily, inflation is a measurement of the total rise in the cost of goods and services across an economy. Risk factors for economic instability include an overheated economy and excessive inflation rates. Researchers may learn more about how these two economic indicators interact and how changes in one may impact the other by examining the link between the stock market and inflation. Investors, decision-makers, and other stakeholders may utilise this data to inform their choices. Policymakers may benefit from research on the relationship between the stock market and inflation in a number of ways. Understanding the correlation between these two economic indicators will help policymakers make better decisions about economic policy.

IV. DATA AND METHODLOGY

1. *Data Source*

Information analysed to determine how the stock market and inflation rate are related, between 2011 and 2022, data was gathered from the National Stock Exchange (NSE) and Reserve Bank of India (RBI) websites and represented by the Nifty 100 index. The market capitalization-weighted Nifty 100 index, used to simulate the stock market, includes the top 100 companies listed on the NSE. It is often used as a benchmark for the Indian stock market and is considered as a superb representation of the Indian economy. Inflation was measured using the CPI, and the RBI supplied the data. To give a detailed investigation of the correlation between the stock market and inflation, this data was gathered during an 11-year period. To find any trends, patterns, or causal connections between the two variables, the data gathered from both sources was evaluated statistically. The research seeks to provide insightful information that will help investors and politicians make wise choices.

1. *Tools and Technique*

For the correlation of Stock market and inflation Regression model best suits, because they can accurately describe a linear connection between the two variables, regression models, especially linear regression, are ideally suited for examining the association between the stock market and inflation. In other words, linear regression may assist determine the direction and degree of any link between changes in inflation and stock market fluctuations, assuming there is one at all. In this study to correlate stock market and inflation we use Ordinary Least Square (OLS) Linear regression model. The relationship between the stock market (usually represented by an index, such as the Nifty 100) and inflation may be modelled using OLS linear regression. The fundamental equation for OLS regression model is

Y = B0 + B1\*X

where X is the independent variable (inflation) and B0 is the y-intercept (the value of Y when X = 0). (The change in Y for a one-unit change in X).

In this case, the model may be used to determine the relationship between inflation and the share market index. The assessment of B1, the slope of the line, may reveal if there is a positive or critical relationship between the stock market and inflation. When inflation is zero, the value of B0 may be used to calculate the index level for the stock market. It's crucial to remember that this model implies that the two variables have a linear connection and that the errors have a normal distribution with a mean of 0. The stock market may really be influenced by other variables, thus it's vital to bear in mind that this model should be utilised with care and in combination with other studies. OLS model is a powerful regression model which is used in many of the economic research work.

V. CONCLUSION

For a number of reasons, first of all, knowing how stock prices and inflation interact may aid investors in choosing more wisely. Second, central banks may choose better interest rates and other monetary policy instruments by recognising the connection between stock values and inflation. Thirdly, it may aid economists in providing more accurate forecasts of future economic situations, which can aid decision-makers in making better choices. Finally, it may aid in the management of risks brought on by variations in inflation rates for both investors and enterprises. The relationship between Share market and Inflation using OLS model can best fit because the goodness of fit and significance of the coefficients measurements that OLS offers are also helpful in determining the magnitude and direction of the link. Finally, OLS is a well-liked option to correlate Inflation and stock, since it is extensively used in economics and finance.

VI. REFERENCES

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