

IMPACT OF INFLATION RATE ON THE PERFORMANCE OF THE STOCK MARKET: WITH SPECIAL REFERENCE TO INDIA

Sachita Yadav*

Abstract *The stock market is a reflection of a country's economic activities. As the stock market represents every segment of the industrial sector and by finding out the impact of the inflation rate on the performance of the stock market, we can estimate the impact of inflation on the economic condition. This study analyses the impact of the inflation rate on the performance of the Stock Market in India. The time series data is to be analysed with the help of various statistical tests i.e., ADF Test, Co-integration Test, VECM, and Granger Causality Test. The results show that there is a long-run co-integration between inflation and NSE sectoral indices and most of the sectoral indices (Bank, CDI, FMCG, FS, IT, Metal, O&G, Pharma, and Reality) exhibit a positive relationship with inflation except Auto Sector and PSUB (negative correlation) during the period of the study. There is a one-directional Granger Causality that exists between the inflation rate and CDI, FMCG, and FS.*

Keywords: *Inflation Rate, Stock Market, Co-Integration, Granger Causality*

JEL Code: E44

INTRODUCTION

It is important to understand the integration between the stock market and inflation to formulate policies and strategies to control the negative impact of inflation (if any) on the performance of the stock market and on the growth of the economy. In today's world, due to geopolitical conflicts, every country is facing a significant increase in the general rate of inflation.

Developed countries may not feel the pain of an increasing inflation rate but it is very difficult for an emerging economy to control inflation once it breaches the tolerance level. Due to the pandemic and geopolitical conflicts, inflation has soared a lot and impacted the economic activities of each and every country including each and every individual. In this situation, there is a need to analyse the impact of inflation on the economy so that control measures can be adopted and reforms in the policies can be made to save the country from the worst possible situation.

The stock market reflects the economic activities of any country. Since the stock market represents each and every segment of the industrial sector and by finding out the

impact of the inflation rate on the performance of the stock market, we can estimate the impact of inflation on the overall economic condition.

The literature related to the study of the relationship between the rate of inflation and stock market performance is extensive. There are various researchers such as Branch (1974), Boyd, Levine and Smith (1996), Omran and Pointon (2001), Tripathi and Kumar (2014), Mbulawa (2015), among others, have contributed their pioneer work on this topic. It is well predicted that the stock market is one of the vital sources of economic growth as it mobilises otherwise idle savings provides investment opportunities and helps to create capital for the economy. However, in case of high inflation, savings shrink, hindering the process of capital formation.

In today's post-pandemic and geo-political war situation, when commodity prices are increasing and shortfall in all economic activities, academicians and policymakers drew their attention to the area of the relationship between the stock market and the inflation rate. Literature suggests that to a certain extent, inflation is not good for any economy. Therefore, there is a need to study and analyse the situation to reform the policies and corrective measures can be taken.

* Assistant Professor (Finance & Accounts), Arun Jaitley National Institute of Financial Management, An Autonomous Institute of Ministry of Finance, GoI, Faridabad, Haryana, India. Email: sachitarao@gmail.com

Statement Problem

The year 2021–2022 is also known as the year of inflation. Inflation has been soaring in every country during this period. Every country has been severely impacted by the Ukraine-Russia war and India is also not spared. There is a curiosity in the author's mind: is inflation really impacting the performance of economic activity (stock market) of the country or not?

Objectives of the Study

- To find out the correlation between the inflation rate and the stock market sectoral index return in India.
- To find out the cointegration between the inflation rate and the stock market sectoral index return in India.
- To find out the cause-and-effect relationship between the inflation rate and the stock market sectoral index returns in India.

LITERATURE REVIEW

Saryal (2007) conducted research in Turkey and Canada (1986–2005) using GARCH and determined that a high rate of inflation leads to high volatility in the stock market and high risk, which is more significant in Turkey compared to Canada. Tripathi and Kumar (2014) studied BRICS nations during the year 2000–2013 and revealed that there was a significant positive relationship between the stock index and inflation rate (India and China), however, it was negative in the case of Russia. Branch (1974) conducted a regression analysis on developed nations during the year 1960–1970 and found that when using a complete inflation hedge strategy, inflation would not be able to decrease the share price, and it would provide a shift to the assets enhance the share price. Mbulawa (2015) conducted research during the year 1980 – 2008 in Zimbabwe, suggesting that in the short run and medium run inflation is impacting the stock market performance but there was a positive and insignificant relation existing in the long run. Sidhu (2016) explained that, in general, Indian retail investors rely on information that does not offer a buffer against inflation or produce positive real returns. Omran and Pointon (2001) conducted a study that also represented the significant relationships in the long-run and short-run and this suggested that the inflation rate has had an impact on the Egyptian stock market performance during the period of the study. Reddy (2012) found that the performance of the Indian stock market was

negatively impacted due to an increase in inflation and interest rates. Patel (2012) revealed that there is a long run relationship exists between macroeconomic variables (Gold Prices, Silver Prices & Oil Prices, Inflation, Interest Rate, Exchange Rate, Index of Industrial Production, Money Supply) and stock market indices (Nifty & Sensex). Naka, Mukherjee and Tufte (1998) study concluded that domestic inflation is the most dangerous sign to Indian stock market performance as it is impacting Indian households and industries badly. Singh, Tripathi and Lalwani (2012) also found a significant relationship between inflation and stock market performance. Someshwari and Mahadevappa (2013), indicated in their research that inflation is an ongoing issue in India. Under historical cost accounting, the profit margin is exaggerated and deceptive. Higher than with general price level accounting is the degree of correlation between earnings per share and the current market price of shares under historical cost accounting. Habib and Islam (2017) stated in their research that five macroeconomic variables— inflation, industrial production, exchange rate, interest rates, and money supply—have been identified based on the available literature and financial theory. These variables are believed to have a major influence on the performance of the Islamic stock market.

Research Gap

There are numerous studies have been conducted on the topic by different countries, but only a few in India. Most of the studies have covered only stock market returns as the performance indicator of the stock market. However, there are various other performance indicators such as market activity and market liquidity (Omran & Pointon, 2001), which have not been considered in previous studies in India. There is also a gap, i.e., insufficient literature on sector-wise stock market performance and inflation rate relationship.

Hence, the current research paper will consider stock price, the volume of trade across all sectors, and the inflation rate to fill the identified gap.

RESEARCH METHODOLOGY

Research Design

The current study emphasises analysis the relationship between the inflation rate and the performance of the Indian stock market. The Indian stock market comprises various

industrial sectors, and there is a need to identify the impact of inflation on each and every industrial sector and to find out which sector is impacted at large. This will enable policymakers to formulate policies for the same and able to control the impact of inflation up to some extent.

Hypothesis

- H_{01} : There is no correlation between the inflation rate and the stock market sectoral indices return of India.
- H_{02} : There is no cointegration between the inflation rate and the stock market sectoral indices return of India.
- H_{03} : There is no cause-and-effect relationship between the inflation rate and the stock market sectoral indices return of India.

Statistical Test

The time series data is to be analysed with the help of various statistical tests i.e., the ADF Test (to check for stationarity), Co-integration Test (to check for integration between sectoral indices performance (return), and inflation rate in the long and short run, using the Johanson Co-integration Test and VECM, and the Granger Causality Test.

Research Variables

The literature section has suggested that there are various performance indicators of the stock market, and the researcher intends to include two key performance indicators of the stock market i.e., sectoral indices price and inflation rate for the current research work as mentioned below:

Dependent Variables (DV)

Sectoral Indices Return (monthly)- (Nifty Bank Index, Nifty Financial Services Index, Nifty Financial Services 25/50 Index, Nifty Financial Services Ex-Bank Index, Nifty Auto Index, Nifty IT Index, Nifty FMCG Index, Nifty Healthcare Index, Nifty Media Index, Nifty Metal Index, Nifty Pharma Index, Nifty Private Bank Index, Nifty PSU Bank Index, Nifty Realty Index, Nifty Consumer Durables Index, Nifty Oil, and Gas Index)

Independent Variable (IV)

Inflation Rate (monthly)

Sources of Data

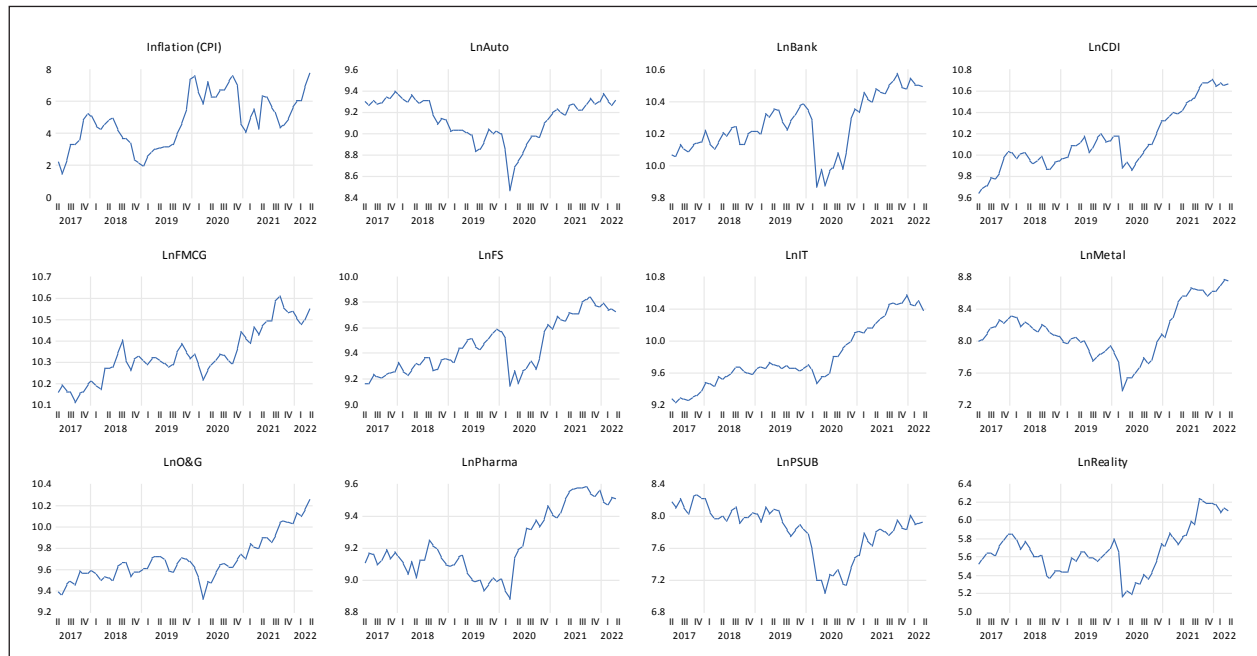
Annual inflation rate data and sectoral indices historical data have been used for the study for the period from 2010 to 2021. There are two major stock exchanges in India i.e., the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE). BSE is the oldest and NSE is the largest (in terms of volume) stock exchange. The largest stock exchange in India i.e., NSE has been considered. There are a total of sixteen sectoral indices (Nifty Bank Index, Nifty Financial Services Index, Nifty Financial Services 25/50 Index, Nifty Financial Services Ex-Bank Index, Nifty Auto Index, Nifty IT Index, Nifty FMCG Index, Nifty Healthcare Index, Nifty Media Index, Nifty Metal Index, Nifty Pharma Index, Nifty Private Bank Index, Nifty PSU Bank Index, Nifty Realty Index, Nifty Consumer Durables Index, Nifty Oil, and Gas Index) in NSE and all are going to be considered to analyse the effect of inflation rate on the performance of each sector in India. The study relies on secondary data, which has been collected from the below-mentioned resources:

- Inflation Rate (Independent Variable), Source of data - Statista Website i.e., www.statista.com, and economic outlook.
- Sectoral Indices Return (Dependent Variable), Source of data - NSE India Website i.e., www.nseindia.com.

The Implication of the Study

The proposed study aims to examine the long-run and short-run relationship between the inflation rate and the performance of various sectoral indices of NSE India. Market activities and market liquidity have been used to analyse the same. This study seeks to identify the impact of the inflation rate on various sectors. The results will assist the Indian government and policy makers to formulate or make reforms in the existing policies wherever possible. It takes too much effort to build a nation and just due to this inflation, we can't lose whatever we have built till now. So, there is high time to conduct an in-depth analysis of the situation and build a more stable economy.

ANALYSIS



Source: Created by author with Eview.

Fig. 1: Trend of the Inflation Rate and Various Sectors

Fig. 1 depicts the trend line of the inflation rate and various sectors in India from 2017 to 2022. This depicts the fact that whenever there is an increase in the inflation rate there is a decrease in the performance of the various sectors in India.

However, to examine in detail the extent of the impact of the inflation rate on the various sectors in India, there is a need to conduct a detailed empirical analysis.

Table 1: Correlation Analysis

Sectors	Inflation-Correlation (Probability)	Remarks
Lnauto	-0.1933, (0.1388)	Negative but not significant correlation
Lnbank	0.1142, (0.3848)	Positive but not significant correlation
Lncdi	0.4397, (0.0004)	Positive and significant correlation
Lnfmcg	0.3611, (0.0046)	Positive and significant correlation
Lnfs	0.33017, (0.01)	Positive and significant correlation
Lnit	0.42917, (0.0006)	Positive and significant correlation
Lnmetal	0.0173, (0.8956)	Positive but not significant correlation
lno_g	0.3563, (0.0052)	Positive and significant correlation
lnpharma	0.3414, (0.0076)	Positive and significant correlation
Lnpsub	-0.6144, (0.000)	Negative and significant correlation
Lnreality	0.1552, (0.2362)	Positive but not significant correlation

Source: Created by author.

Table 1 represents the correlation between the inflation rate and various sectoral indices in India. The correlation analysis shows mixed results as two sectoral indices, i.e., Auto and Public Sector Banks (both significant), are negatively correlated with inflation. All other variables are positively

and significantly correlated except for banks, metal, and reality sectoral indices. However, a simple correlation analysis does not depict the whole truth about the impact of the inflation rate on the performance of the stock market so further tests have been performed.

Table 2: Unit Root Test

Variable	At Level	First Difference
Inflation CPI	0.4213	0.0000
LnAuto	0.4739	0.0000
LnBank	0.3835	0.0000
LnCDI	0.7955	0.0000
LnFMCG	0.8106	0.0000
LnFS	0.5256	0.0000
LnIT	0.8833	0.0000
LnMetal	0.9219	0.0000
LnOG	0.9388	0.0000
LnPharma	0.7939	0.0000
LnPSUB	0.4247	0.0000
LnReality	0.6549	0.0000

Source: Created by author.

To check the stationarity of the data, the Augmented Dickey-Fuller (ADF) test has been conducted. The ADF unit root test indicated that the inflation rate and all the sectoral indices are stationary at the same level, i.e., at the first difference I (1), and hence they follow stochastic trends. Further, this

test suggests that the data is appropriate for conducting other statistical tests (Table 2).

To find the lag length, the VAR Lag Order Selection Criteria have been used. The Akaike information criteria (AIC) has been used to finalise the lag length (Table 3).

Table 3: VAR Lag Order Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	653.10	NA	2.76e-25	-22.49	-22.06	-22.33
1	1148.17	764.31	1.36e-30	-34.81	-29.22*	-32.64
2	1312.96	185.03	1.28e-30	-35.54	-24.79	-31.36
3	1572.92	182.43	2.03e-31*	-39.61	-23.70	-33.43*

Source: Created by author.

*indicates lag order selected by the criterion.

Lag length- 3-1= 2

Table 4: Cointegration Test- Unrestricted Cointegration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.960542	718.5547	334.9837	0.0000
At most 1 *	0.869420	534.3005	285.1425	0.0000
At most 2 *	0.814215	418.2616	239.2354	0.0000
At most 3 *	0.740211	322.3212	197.3709	0.0000
At most 4 *	0.682349	245.4917	159.5297	0.0000
At most 5 *	0.599076	180.1239	125.6154	0.0000
At most 6 *	0.526873	128.0269	95.75366	0.0001
At most 7 *	0.461246	85.36867	69.81889	0.0018
At most 8 *	0.365665	50.11440	47.85613	0.0302
At most 9	0.198818	24.16924	29.79707	0.1934
At most 10	0.174581	11.53422	15.49471	0.1807
At most 11	0.010435	0.597946	3.841465	0.4394

Source: Created by author.

Trace test indicates 9 cointegrating eqn(s) at the 0.05 level.

*denotes rejection of the hypothesis at the 0.05 level.

**MacKinnon-Haug-Michelis (1999) p-values.

The co-integration test reflects that the null hypothesis of no co-integration has been rejected as the Table 4 co-integration test reflected that there are at most 8 co-integrations. This denotes the rejection of the null hypothesis at the 5% level

of significance. The test results show that there is a long-run association between inflation and various sectoral indices return. As the variables are co-integrated with each other, we can run a VECM.

Table 5: VECM

Lag	LRE*Stat	df	Prob.	Rao F-Stat	Df	Prob.
1	179.12	144	.0250	1.2734	(144, 87.3)	0.1097
2	143.79	144	.4891	0.8975	(144, 87.3)	0.7192
3	152.84	144	.2913	.9858	(144, 87.3)	0.5357

Source: Created by author.

*Edgeworth expansion corrected likelihood ratio statistic.

The VEC LM Test results in Table 5 show that the null hypothesis of no short-run cointegration between inflation and sectoral indices cannot be rejected as the p-value is less than .05. This represented that the inflation is not integrated

with sectoral indices in the short-run. As the variables are cointegrated in the long run, the author conducted a causality test to check the cause-and-effect relationship between the variables. The result of the same is depicted in Table 6.

Table 6: Granger Causality Tests- Pairwise Granger Causality Tests

Null Hypothesis	Obs	F-Statistic	Prob
LNAUTO does not Granger Cause INFLATION_CPI_INFLATION_CPI_ does not Granger Cause LNAUTO	58	1.02903	0.3644
LN BANK does not Granger Cause INFLATION_CPI_INFLATION_CPI does not Granger Cause LN BANK	58	3.05893 0.16917	0.0553 0.8448
LN CDI does not Granger Cause INFLATION_CPI_INFLATION_CPI_ does not Granger Cause LN CDI	58	3.35931 0.23588	0.0423 0.7907
LN FMCG does not Granger Cause INFLATION_CPI_INFLATION does not Granger Cause LN FMCG	58	4.24853 0.97659	0.0194 0.3833
LN FS does not Granger Cause INFLATION_CPI_INFLATION does not Granger Cause LN FS	58	4.86591 0.04731	0.0115 0.9538
LN IT does not Granger Cause INFLATION_CPI_INFLATION does not Granger Cause LN IT	58	2.43445 0.59535	0.0974 0.5550
LN METAL does not Granger Cause INFLATION_CPI_INFLATION does not Granger Cause LN METAL	58	0.09447 0.27201	0.9100 0.7629
LN O_G does not Granger Cause INFLATION_CPI_INFLATION does not Granger Cause LN O_G	58	0.95800 0.36119	0.3902 0.6985
LN PHARMA does not Granger Cause INFLATION_CPI_INFLATION does not Granger Cause LN PHARMA	58	0.02697 2.28895	0.9734 0.1113
LN PSUB does not Granger Cause INFLATION_CPI_INFLATION does not Granger Cause LN PSUB	58	0.69531 2.96405	0.5034 0.0602
LN REALITY does not Granger Cause INFLATION_CPI_INFLATION does not Granger Cause LN REALITY	58	1.37156 0.29853	0.2626 0.7431

Source: Created by author.

This is the last test conducted by the author. The empirical analysis of the test shows that we can't accept the null hypothesis in the case of CDI, FMCG, and FS. As the p-value is less than 5%, LnCDI is the Granger Cause of Inflation, as the p-value is .04, LnFMCG is the Granger Cause of Inflation, as the p-value is .019; and LnFS is also a Granger

Cause of Inflation, as the p-value is 0.011. This shows that during the period of the study consumer durable index, Fast Moving Consumers Goods and Financial Services are the one-directional granger causes of inflation. This statistical hypothesis has shown that inflation causes changes in CDI, FMCG, and FS during the period of the study. While in other

cases, we didn't find any evidence of Granger Causality at a 5% significance level.

DISCUSSION

It has been found that inflation and NSE India Indices have a long-run cointegration, but in a short period of time, the data did not reflect any cointegration. The Granger Causality Test has shown one-directional causality between Inflation and indices (CDI, FMCG, and FS). In all these three indices the correlation results are also positive and significant. However, in the case of other variables the statistical test did not result in any causality, this means that these time series are independent.

Tripathi and Kumar (2014) stated in their research work that there is a significant negative relationship between the stock index and the inflation rate in Russia and a significantly positive relationship between in India and China. The correlation result of this study also supports the same as most of the sectoral indices (Bank, CDI, FMCG, FS, IT, Metal, O&G, Pharma, and Reality) have a positive relationship with inflation except for the Auto Sector and PSUB (negative correlation). Patel (2012) resulted in the study that there is a long run relationship exists between macroeconomic variables (Interest Rate, Inflation, Exchange Rate, Index of Industrial Production, Money Supply, Gold Price, Silver Price and Oil Price) and stock market indices (Nifty and Sensex). The result of this study also shows a long-term co-integrating relationship between various sectoral indices and inflation rates.

To conclude the results and achieve the objectives of the study, it can be stated that inflation in India is impacting the performance of the sectoral Indices.

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