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AN IMPACT OF INFLATION AND EXCHANGE RATE ON STOCK RETURNS: EVIDENCE FROM INDIA

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Abstract

The study investigates the existence of relationship between Indian stock market and two macro economic variables namely, inflation and exchange rate. It covers a data period from April 2011 to March 2017. Multivariate Regression Model has been employed to investigate the relationship between BSE Sensex returns as dependent variable, and macro economic variables namely inflation (CPI) and exchange rate (USD- INR) as independent variables. Multicollinearity between independent variables has been tested by calculating Variance Inflation Factor and Tolerance statistics. Both the tests paved the way for application of multivariate regression as multicollinearity among independent variables is not found. The Results of multivariate regression show evidence of positive significant relationship between inflation and stock returns and insignificant relationship between exchange rate and stock returns in India. The findings suggest that Indian Stock Market is driven by inflation.

***Keywords**: Stock returns, Inflation, Exchange rate*

INTRODUCTION

Financial markets play a crucial role in the foundation of a stable and efficient financial system of an economy. The stock markets and their indicators in the form of indices, reflect the potential, the direction and health of the economy. There is extensive group of macroeconomic variables that influences the stock prices in the share market. The literature provides plethora of studies performed in international and national context to examine the relationship between stock market and macroeconomic variables. The present study extends the existing literature in the Indian context. This study takes into consideration two macroeconomic variables – Inflation and Exchange Rate, and a widely used composite index of the Indian Stock Market– BSE Sensex.

Literature on effects of inflation on stock market

Omran and Pointon (2001) examined the impact of the inflation rate on the performance of the Egyptian stock market. It was found that there is short and long run relationship between the stock market performance variables and inflation rate. **Wongbampo and Sharma (2002)**

investigated the relationship between stock market prices and macroeconomic variables including inflation in five Asian countries (Malaysia, Indonesia, Philippines, Singapore and Thailand) using consumer price index as proxy for inflation and reported that there is a negative relationship between stock prices and inflation in all the five Asian countries. **Mukhopadhyay and Sarkar (2003)** analysed the Indian stock market returns prior to and after market liberalization for the influence of macroeconomic factors on returns. They found that inflation exerted influence on Indian stock returns in the post-liberalization period. **Ali *et al.* (2010)** examined the various macroeconomic fundamentals and the stock prices for Pakistan during a period of 1990 to 2008. The results revealed that industrial production index and the inflation rate in Pakistan have dependency with the stock prices. **Daferighe and Charlie (2012)** investigated the impact of inflation on stock market performance in Nigeria using time series data for twenty years from 1991- 2010. It was found out that there is negative relationship exists between inflation and the stock market performance measures but inflation had a positive relationship with the turnover ratio. Low level of inflation revealed that stock market investment is a good hedge against inflation in Nigeria. **Khan and Yousuf (2013)** concluded that inflation (CPI) is insignificant in influencing the stock prices, in the long-run in Bangladesh. **Adusei (2014)** found that that there is a negative statistically significant relationship between inflation and stock returns in the short run using data (January 1992- December 2010) from the Ghana Stock Exchange (GSE).

On the contrary, **Graham (1996)** finds a positive relationship between inflation and stock returns in the USA (1976-1982). **Choudhry (1998)** investigates the relationship between stock returns and inflation in four high inflation countries (Argentina, Chile, Mexico and Venezuela) and finds a positive relationship between stock market returns and inflation rate. **Adusei (2014)** concluded that there is positive statistically significant relationship in the long run in the Ghana Stock Exchange (GSE).

Literature on effects of exchange rate on stock market

Jorion (1990, 1991), Bodnar and Gentry (1993), and **Bartov and Bodnar (1994)** all fail to find a significant relation between simultaneous dollar movements and stock returns for U.S. firms. **Ali *et al.* (2010)** concluded that currency exchange rate has no dependency with the stock prices in Pakistan. On the contrary, **Khan and Yousuf (2013)** found that exchange rate is negatively related to stock prices in Bangladesh. **Kumar (2014)** performed the study to

understand the impact of exchange rate and crude oil prices on Indian stock market (S&P CNX Nifty). Significant positive impact of exchange rate and crude oil prices on stock market was found.

OBJECTIVES

The objectives of the study are as follows:

1. To examine the relationship between Indian stock market (returns) and inflation.
2. To examine the relationship between Indian stock market (returns) and exchange rate**.**

HYPOTHESES

H_{01}: There is no significant relationship between Indian stock market (returns) and inflation.

H_{02}: There is no significant relationship between Indian stock market (returns) and exchange rate.

DATA AND DATA SOURCES

In this study, BSE Sensex is considered as dependent variable. On the other hand two macro-economic variables namely inflation and exchange rate are considered as independent variables. Consumer price index (CPI) and USD- INR are taken as proxy variables for inflation and exchange rate respectively. The study covers the period from April 2011 to March 2017 (monthly observations). Monthly data of CPI (index value) and USD- INR is collected from official website of Reserve Bank of India. Monthly data of BSE Sensex is collected from official website of Bombay Stock Exchange.

METHODOLOGY

In this study, Multivariate Regression Model (as given below) has been employed to investigate the relationship between BSE Sensex returns as dependent variable, and macroeconomic variables namely inflation (CPI) and exchange rate (USD- INR) as independent variables.

$Y= \alpha+ \beta_1X_1+ \beta_2X_2 + e$

Where,

Y = BSE Sensex returns

α = Intercept.

β_1 =Slope of inflation

β_2 =Slope of exchange rate

X_1= Inflation

X_2= Exchange rate

Before applying the Multivariate Regression Model, multicollinearity between predictor (independent) variables has been tested by calculating Variance Inflation Factor and Tolerance statistics.

Calculation of returns

BSE Sensex returns have been measured as the continuously compounded monthly change in the share price index as shown below:

$r_t = \ln(P_t / P_{t-1})$

Where,

r_t is continuously compounded return at time t

P_t is monthly closing value of the index for the period t

P_{t-1} is monthly closing value of the index for the period t-1

FINDINGS AND DISCUSSION

Descriptive statistics

Table 1 presents the summary of descriptive statistics for the selected dependent and independent variables under the study. Monthly observations of all the variables have been examined from April 2011 to March 2017 to estimate the following statistics. The average return of BSE Sensex is 0.0061 with standard deviation of 0.0486. The mean of CPI (index value) and USD- INR are 125.1706 and 55.5554 with the deviation of 12.3189 and 6.3021 respectively. The skewness of all the variables lies between −½ and +½, therefore the distributions are approximately symmetric (Bulmer, 1979). The kurtosis of CPI, USD- INR and BSE Sensex returns are negative indicating a relatively flat distribution.

Table 1: Descriptive statistics

	Minimum	**Maximum**	**Mean**	**Std. deviation**	**Skewness**	**Kurtosis**
CPI (Index value)	105	145.5	125.1706	12.3189	0.086	-1.187
USD-INR	44.1553	66.5742	55.5554	6.3021	-0.406	-1.008
BSE sensex returns	-0.1125	.1066	0.0061	0.0486	-0.157	-0.155

Inferential statistics

Correlation

Before using regression analysis, the relationship between dependent variable and independent variables is investigated using Pearson correlation. It is clear from Table 2, that the association between stock market returns (BSE Sensex returns) and inflation (CPI) is significant at 5% level ($r = 0.307$, $p < 0.05$). The sign and magnitude of correlation coefficient depicts that there is weak positive correlation between Sensex returns and inflation. However, the correlation between stock market returns and exchange rate (USD- INR) is found to be insignificant.

Table 2: Correlation

	Consumer price index	USD- INR
BSE sensex returns	0.307 (*)	0.160

** Correlation is significant at the 0.05 level*

Multiple regression

The existence of multicollinearity is a vital issue in applying Multivariate Regression Model. Multicollinearity is a situation when predictor (independent) variables in the regression model are highly intercorrelated. In this study, Tolerance Statistic Value and Variance Inflation Factor (VIF) have been estimated for investigating the multicollinearity problem in the regression model. After examining the test result (*See Table* 3), it has been found that VIF of both the predictor variables is less than 10 and Myers (1990) has suggested that value of 10 is a good value at which to worry**.** Related to VIF is the Tolerance statistic, which is its reciprocal (1/ VIF) and therefore its value below 0.1 indicates serious problem. Tolerance statistics of both the variables is greater than 0.1. Thus, it is clear from both the tests that multicollinearity is not present in the predictor variables.

Table 3: Multicollinearity diagnostics

	Collinearity statistics	
Variable	**Tolerance**	**Variance inflation factor (VIF)**
CPI(index value)	0.317	3.157
USD-INR	0.283	3.531

To examine the fit of the regression model and to identify how best the predictor variables i.e. consumer price index (CPI) and exchange rate (USD- INR) predicts an outcome variable i.e. stock market returns (BSE Sensex returns), multiple regression model has been used. The

model summary Table 4 reports the strength of the relationship between the model and the dependent variable. The table displays R square (R^2), adjusted R^2, constant, beta value (β), t-value and significance value. It can be seen that 12.1% of the variation in stock market returns are accounted for (or predicted by) the predictor variables. The predictor variable inflation (CPI) is found to be positively significant ($\beta = 0.002$, $p < 0.05$). This finding is consistent with Graham (1996), Choudhry (1998) and Adusei (2014). Another predictor variable of the study- exchange rate (USD-INR) is found to be insignificant ($\beta = -0.002$, $p > 0.05$), which suggests that Indian Stock Market is driven by inflation (as measured by CPI). Therefore, it is concluded that H_{01} is rejected and H_{02} is accepted.

Table 4: Regression model summary

	β	**t**	**Sig.**
(Constant)	-0.139	-2.071	0.044 (*)
CPI (index value)	0.002	2.286	0.027 (*)
USD-INR	-0.002	-1.219	0.229
R^2	0.121		
Adj. R^2	0.085		

** β coefficient is significant at the 0.05 level*

1. *Dependent variable= BSE Sensex returns, Independent variable= Consumer price index (CPI) and exchange rate (USD- INR)*
2. *Beta co-efficient (β) is the unstandardised regression coefficient*
3. *R^2 refers to the coefficient of determination that measures the proportion of the variance in the dependent variable that is explained by the independent variable.*

Findings clearly indicate that with the increase in inflation, stock returns also increase. High inflation stimulates new investors to invest in stock market to earn higher return than the financial instruments bearing interest rate. Investing in stock market is a way to find the return rate beyond the inflation rate. If the investment return is below the inflation rate, investors will lose their purchasing power. As a result, the new comers begin to invest and present investors add more funds in the stock market. When there are more investors and funds in the market, it brings more demand for the stock and as a result, the stock price and return finally go up. Therefore, it can be concluded that stock returns act as a hedge against inflation in India.

CONCLUSION

The present study investigated the existence of relationship between Indian stock market and two macro economic variables namely, inflation and exchange rate. It covered a data period from April 2011 to March 2017. Multivariate Regression Model was employed to investigate the relationship between BSE Sensex returns as dependent variable, and macroeconomic variables namely inflation (CPI) and exchange rate (USD- INR) as independent variables. Multicollinearity between independent variables was tested by calculating Variance Inflation Factor and Tolerance statistics. Both the tests paved the way for application of multivariate regression as multicollinearity among independent variables was not found. The results provided evidence as to absence of relationship between exchange rate and stock returns in India during the study period. But positive significant relationship between inflation and stock returns suggested that Indian Stock Market is driven by inflation. Inflation stimulates investors to invest in stock market to earn higher return than the inflation rate, so that they do not lose their purchasing power. Therefore, it can be concluded that stock returns act as a hedge against inflation in India.

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