Impact of Key Macroeconomic Variables of India and USA on Movement of the Indian Stock Return in case of S&P CNX Nifty

Nikita B  
Amrita School of Business  
Amrita Vishwa Vidyapeetham  
Amrita University  
Coimbatore, India  
nikitabadri@gmail.com

Balasubramanian P  
Amrita School of Business  
Amrita Vishwa Vidyapeetham  
Amrita University  
Coimbatore, India  
bala@amrita.edu

Lakshmi Yermal  
Amrita School of Business  
Amrita Vishwa Vidyapeetham  
Amrita University  
Coimbatore, India  
yermal@gmail.com

Abstract—The stock market is referred as the barometer of Indian economy; it is the indicator of the country’s economic condition. Many studies have established the relationship between Indian stock returns and macro economic variables such as gold price, oil price, exchange rate, etc. This study investigates the relationship between the Indian stock returns and the Macro economic variables viz interest rate of India, interest rate of USA, inflation rate of India, inflation rate of USA, GDP growth rate of India and GDP growth rate of USA. Quarterly data was collected for a period from January, 2000 to December, 2015 for all the macro economic variables. Regression Model was used to analyze the data, the variables were tested for stationarity, serial correlation, heteroscedasticity and normality. The study found that the GDP growth rate of India and USA are the significant predictors of S&P CNX Nifty return.

Keywords—S&P CNX Nifty Return; Interest rate of India; Interest rate of USA; Inflation rate of India; Inflation rate of USA; GDP growth rate of India; GDP growth rate of USA.

I. INTRODUCTION

The stock market of India have attracted many national and international investors since liberalization. The changes in the macro economic variables of a country affect the flow of the capital and the stock market movements. Numerous national and international factors directly or indirectly affect the stock market performance. Monetary policy and indicators of growth in advanced economies, especially the US, has spillover effects on emerging markets like India. Since India has considerable trade and financial exposure with US, the impact is likely to be significant.

This study investigates the relationship between the Indian stock return and the Macro-economic variables viz Interest Rate of India, Interest Rate of USA, Inflation Rate of India, Inflation Rate of USA, GDP growth rate of India and GDP growth rate of USA. Quarterly data was collected for a period from January 2000 to December 2015. The secondary data was collected from the NSE Database, Capitaline database and OECD Database. Using regression model, it was found that the GDP growth rate of India and USA are the significant predictors of S&P CNX Nifty return. Other variables (interest rate of India, interest rate of USA, inflation rate of India and the inflation rate of USA) were not found to be significant in our analysis.

II. LITERATURE REVIEW

Many researchers have conducted various studies to check the impact of macro-economic variables on stock market return. Reference [1] studied the Impact of Key macro-economic variables such as Index of Industrial Production (IIP), Foreign Direct Investment (FDI) and Wholesale Price Index (WPI) on movement of the Indian Stock Market (BSE). The study was conducted for the period from 2002 to 2013 and found that IIP is a significant predictor of BSE Sensex, whereas FDI and WPI were not found to be a significant predictor of BSE Sensex.

Reference [2] studied the impact of oil price, exchange rate, debt traded value and gold rate on the stock market (NSE Nifty). The study found that the oil price and the exchange rate has a significant impact on the Indian stock market.

Reference [3] studied the long-run relationships between NSE-Nifty share price index and other crucial macroeconomic variables and also examined the short-run causal nexus between NSE Nifty price index and the selected macro-economic variables in India. The macro economic variables such as index of industrial production, money supply, exchange rate, interest rate, consumer price index and the US stock price index were used. The study found that the NSE-Nifty price index has a long-run positive relationship with money supply, index of industrial production, interest rate, and the US stock market index and negative relationship with exchange rate and the NSE-Nifty price index in long run.

Reference [4] studied the casual relationship of NSE S&P CNX Nifty and Gold price. The study was conducted between April, 2002 and March, 2015. The study showed that the return on NSE (S&P CNX NIFTY) did not have Granger causality relationship with gold price. The Gold price and NSE return are related to each other; there is unidirectional relationship between the two in the short run. There also exists a long-run causality relationship between these variables.
Reference [5] studied whether change in global oil price affects the Indian stock market returns. It was inferred from the study that a negative mean return exists on stocks where as on the crude oil prices there exist a positive average returns. Crude oil series is less volatile than Index series. Furthermore, through Johansen’s co-integration test it has been inferred that among index and oil series there is no long-term integration. Thereafter, through the application of Granger Causality Test it was inferred that in the long run, the market was not integrated but these series do not even cause each other in short run.

Reference [6] studied the impact of FII on BSE Sensex data and attempts to present the correlation between them. The study was done for data between 2001 and 2013. The study found that Sensex movement is highly influenced by FII. It was found that the Sensex increased when there were positive inflows of FIIs and decreased when there were negative FII inflows.

Reference [7] studied about Macro-economic factors impact on S&P BSE Bankex Returns. The macro-economic variables such as Foreign Direct Investments (FDI), Index of Industrial Production (IIP), money supply, inflation rate, Foreign Exchange Reserves and Foreign Portfolio Investments (FPI) were used. The study was conducted for the period from April 2005 to March 2015. It was found that BSE Bankex returns is significantly impacted by FDI and Foreign Exchange Reserves and no multicollinearity is present between the variables.

In this study, we are analyzing the effect of major economic indicators of Indian economy as well as US economy on India’s National Stock Exchange (NSE). The high dependence of India on US for trade indicates that the macro-economic variables of USA may have an impact on the businesses in India. The macro economic variables as GDP Growth rate, interest rates and inflation rates of USA and India are studied for a possible influence on S&P CNX NIFTY. It is the benchmark index for NSE, comprising of 50 of the largest and most liquid stocks found on the NSE platform.

HYPOTHESES DEVELOPMENT

We have developed the following hypotheses to study the impact of the Macro economic Variables – Interest Rate of India, Interest Rate of USA, Inflation Rate of India, Inflation Rate of USA, GDP Growth rate of India and GDP Growth rate of USA on S&P CNX Nifty.

H0a : Rate of Inflation of India is not a significant predictor of S&P CNX Nifty.
H1a : Rate of Inflation of India is a significant predictor of S&P CNX Nifty.
H0b : Interest Rate of USA is not a significant predictor of S&P CNX Nifty.
H1b : Interest Rate of USA is a significant predictor of S&P CNX Nifty.
H0c : Rate of Inflation of India is not a significant predictor of S&P CNX Nifty.
H1c : Rate of Inflation of India is a significant predictor of S&P CNX Nifty.
H0d : Rate of Inflation of USA is not a significant predictor of S&P CNX Nifty.
H1d : Rate of Inflation of USA is a significant predictor of S&P CNX Nifty.
H0e : GDP Growth rate of India is not a significant predictor of S&P CNX Nifty.
H1e : GDP Growth rate of India is a significant predictor of S&P CNX Nifty.
H0f : GDP Growth rate of USA is not a significant predictor of S&P CNX Nifty.
H1f : GDP Growth rate of USA is a significant predictor of S&P CNX Nifty.

IV. DATA SOURCE AND RESEARCH METHODOLOGY

A. Data Source

The data for the study was collected from the websites of the NSE, Capitaline and OECD using the Secondary sources. S&P CNX Nifty data were collected from the Website of NSE and the Capitaline, whereas data of Interest Rate of India, Interest Rate of USA, Inflation Rate of India, Inflation Rate of USA, GDP Growth rate of India and the GDP Growth rate of USA were collected from the Website of OECD. The sample period for the study is from 2000 to 2015.

B. Tools And Techniques:

Regression Analysis was used to analyze the collected data. Multiple Regression Analysis technique is used in evaluating the impact of two or more Independent Variables on Single dependent Variable. This paper attempts to analyze the impact of Interest Rate of India, Interest Rate of USA, Inflation Rate of India, Inflation Rate of USA, GDP Growth rate of India and GDP Growth rate of USA on S&P CNX Nifty.

To prove the Hypotheses, the following equation is formed.

\[
S&P \text{CNX Nifty} = c + b1*RIND + b2*RUS + b3*IUSA + b4*IIND + b5*INDGDP + b6*USGDP + e
\]

Where

- \( S&P \text{CNX Nifty} \) = value of S&P CNX Nifty in the given period \( t \),
- \( c \) = Coefficient of intercept,
- \( RIND \) = Interest Rate of India,
- \( RUS \) = Interest Rate of USA,
- \( IUSA \) = Rate of Inflation of USA,
- \( IIND \) = Rate of Inflation of India,
INDGDP = GDP Growth rate of India,
USGDP = GDP Growth rate of USA,
e = Error term
b1 to b6 are corresponding coefficients of the independent variables.

V. RESULTS AND DISCUSSIONS

Table 1 Results

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.008498</td>
<td>0.099561</td>
<td>0.085358</td>
<td>0.9323</td>
</tr>
<tr>
<td>RIND</td>
<td>-0.006799</td>
<td>0.010389</td>
<td>-0.654452</td>
<td>0.5155</td>
</tr>
<tr>
<td>RUS</td>
<td>0.001128</td>
<td>0.013684</td>
<td>0.082398</td>
<td>0.9346</td>
</tr>
<tr>
<td>IUSA</td>
<td>-0.019884</td>
<td>0.010808</td>
<td>-1.839821</td>
<td>0.0711</td>
</tr>
<tr>
<td>IIND</td>
<td>-0.003382</td>
<td>0.005075</td>
<td>-0.666369</td>
<td>0.5079</td>
</tr>
<tr>
<td>USGDP</td>
<td>0.048993</td>
<td>0.020857</td>
<td>2.349015</td>
<td>0.0224</td>
</tr>
</tbody>
</table>

Regression Analysis tests results are given in Table 1. It is found that at 5% level of significance, the GDP growth rate of India and USA are the significant predictors of S&P CNX Nifty return and that the interest rate of India, interest rate of USA, inflation rate of India and the inflation rate of USA are not significant predictors of S&P CNX Nifty return.

In order to test the normality of residuals, Jarque-Bera test was done (Table 2) and it was found that they satisfy normality.

Table 2 Tests for Normality

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Dev</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Jarque-Bera</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.54e-18</td>
<td>0.002468</td>
<td>0.205984</td>
<td>-0.262945</td>
<td>0.091061</td>
<td>-0.164149</td>
<td>2.961652</td>
<td>0.286783</td>
<td>0.866415</td>
</tr>
</tbody>
</table>

Breush-Godfrey test for serial correlation was performed to test autocorrelation. The results in Table 3 show that there is no autocorrelation in the model.

Table 3 Breusch- Godfrey Serial Correlation LM Test

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Prob. (F(2,54))</th>
<th>Prob. Chi-Square(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.791232</td>
<td>3.919514</td>
<td>0.1765</td>
<td>0.1409</td>
</tr>
</tbody>
</table>

Table 4 Heteroscedasticity Test; Breusch-Pagan-Godfrey

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Prob. (F(5,66))</th>
<th>Prob. Chi-Square(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.481735</td>
<td>13.23304</td>
<td>0.0337</td>
<td>0.0395</td>
</tr>
</tbody>
</table>

Scaled explained SS | 10.25526 | Prob. Chi-Square(6) | 0.1143

To test whether there is heteroscedasticity in the model, Breusch-Pagan-Godfrey test was conducted (Table 4) and it was found that heteroscedasticity is present in the model. White’s test was used to obtain adjusted standard error in the presence of heteroscedasticity. The results of the test are summarized in table 5.

Table 5 White Heteroscedasticity -Consistent Standard Errors & Covariance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.008498</td>
<td>0.118513</td>
<td>0.071707</td>
<td>0.9431</td>
</tr>
<tr>
<td>RIND</td>
<td>-0.006799</td>
<td>0.012007</td>
<td>0.566303</td>
<td>0.5735</td>
</tr>
<tr>
<td>RUS</td>
<td>0.001128</td>
<td>0.011500</td>
<td>0.098045</td>
<td>0.9222</td>
</tr>
<tr>
<td>IUSA</td>
<td>-0.019884</td>
<td>0.011504</td>
<td>1.728397</td>
<td>0.0894</td>
</tr>
<tr>
<td>IIND</td>
<td>-0.003382</td>
<td>0.004326</td>
<td>0.781674</td>
<td>0.4377</td>
</tr>
<tr>
<td>USGDP</td>
<td>0.048993</td>
<td>0.020191</td>
<td>2.426518</td>
<td>0.0185</td>
</tr>
</tbody>
</table>

CONCLUSION

From the study it can be observed that the GDP growth rate of India and the GDP growth rate of USA are the significant predictors of S&P CNX Nifty return and that the interest rate of India, interest rate of USA, inflation rate of India and the inflation rate of USA are not the significant predictors of S&P CNX Nifty return.

SCOPE FOR IMPROVEMENT

This study would be useful in understanding the relationship between the macroeconomic variables of other countries and their impact on Indian stock markets. The volume of Foreign Institutional Investors and those of Foreign Direct Investment, Index of Industrial Production, Wholesale price index may also be studied as influencing factors of stock markets.

REFERENCES
