

DO THE TREASURY BILLS EFFECTS THE MARKET CAPITALIZATION SEGMENTS OF STOCK MARKET: EVIDENCE FROM INDIA

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Abstract

This article investigates about the effect of Treasury Bills (T-Bills) on the market capitalization segments of stock market in India. The monthly data is observed from the period of April 2012 to March 2022 and employed Johansen's Cointegration test on T-Bills and Indian stock market's market capitalization segments (BSE LargeCap, BSE MidCap, & BSE SmallCap indices). The result shows that there is an existence of long-run relationship between the T-Bills and segments of market capitalization of Indian stock market.

Keywords: Effect, Treasury Bills, Macroeconomic Factors, Market Capitalization Segments, Indian Stock Market

1. Introduction

The adoption of globalization policies in India has undergone tremendous change in its stock market, which plays a vital role in the financial development and economic growth. The development of stock market causes growth in the economy of a country (Guha Deb & Mukherjee, 2008). The macroeconomic factors indicate the health of an economy by its situation and trends or pattern of the entire economic condition. For the past few decades, researchers have been working to estimate the macroeconomic factors role in the stock market empirically. In recent decades, developed and growing countries have prioritised studies examining the connection among macroeconomic variables and the equity markets (A.K. & Pooja, 2017). Treasury Bills (T-Bills) is one of the important macroeconomic indicators which have a crucial role in the performance of generating monetary source in a country and its three maturities are 91, 182, and 364 days. And since India is the world's most rapidly growing economy and has a major role in the global economy, it is important to investigate the effect of the T-Bills on the Indian stock market's market capitalization segments (i.e. BSE LargeCap, BSE MidCap & BSE SmallCap indices) performances. Hence, this article attempts to study the effect of T-Bills on the market capitalization segments of the stock market in India.

2. Literature Review

Some of the existing literatures on the macroeconomic indicators and stock markets association are provided below.

Initially, the research conducted by (Mukherjee & Naka, 1995) analyzed the dynamic relation between the Tokyo Stock Exchange (TSE) and six macroeconomic variables namely Exchange Rate (ER), CPI, Money Supply (MS), IPI, long-term government bond rate (LGB), and Call Money Rate (CMR). The monthly data from January 1971 – December 1990 is used in the study and Descriptive Statistics, ADF, PP, Johansen Co-integration, Vector Error Correction Model (VECM), and Vector Autoregressive (VAR) model are the tests applied for examining. The result reveals that there is a cointegrating relation exists and that stock prices contributes to this relation among stock prices and macroeconomic variables in Japan. Also, the VECM consistently outperforms the VAR model in forecasting ability.

Then, (Kwon & Shin, 1999) analyzed the co-integration and causality between the macroeconomic variables and stock market returns in Korea. The monthly data for the period of January 1980 – December 1992 is used and the selected macroeconomic variables are Balance of Trade (BoT), Exchange Rate, IPI, Money Supply M1. The employed tests were ADF, VECM, Co-integration, and Granger Causality tests which indicated that all these macroeconomic variables have a direct long-run relationship with the stock price indices.

The investigation conducted by (Pal & Mittal, 2011) examined the long-run relationship between Indian capital markets (BSE Sensex & CNX Nifty as proxy) and the macroeconomic variables from the period January 1995 to December 2008. The quarterly data is used and the macroeconomic variables namely, T-Bill (364 days), Inflation, EXR, and Gross Domestic Savings (GDS) are chosen. The ADF, Co-integration, and Error Correction Model (ECM) tests were applied. It results that there is a long-run relationship between the macroeconomic variables and stock indices. Then, ECM shows that Inflation has a significant impact on both indices and T-Bill has a significant on Nifty alone whereas EXR have a significant impact only on Sensex while GDS is insignificant to both the indices.

In similar to this, (Naik & Padhi, 2012) studied the relationship between the Indian stock market index (BSE Sensex) and macroeconomic variables namely IPI, WPI, EXR, M3, and T-Bills (91 days) for the period of April 1994 to June 2011 using monthly data. The ADF, PP, KPSS, Johansen Co-integration, and VECM are the tests employed. It reveals that there is a long-run equilibrium relationship between the Sensex and variables and the stock prices are positively related to the M3 and IPI but negatively related to WPI. Also, the macroeconomic variables causes the stock prices in the long run but not in the short run then there is bidirectional causality exists between IPI and stock prices whereas unidirectional causality from M3 to stock price, stock price to WPI and T-Bill to stock price are found.

Also, (Mangala & Rani, 2015) studied the relationship between the Indian stock market and macroeconomic factors namely IPI, WPI, ER, Gold Price, Money Supply M2, and T-Bills (91 days) yield and CNX Nifty has been taken as proxy for Indian stock market for the period of April 2005 to March 2014. The ADF, PP, Johansen Co-integration, VECM, IRF, and VDC are the tests

employed. It reveals that there is a significant negative relationship between the ER, WPI, IPI and stock market while M2, T-Bills yield have significant positive relationship. Also short run causality runs from ER to Nifty, Nifty to M2, and WPI whereas long run causality found from Nifty to T-Bills and M2.

Similarly, (Alam, 2017) examined the short-run and long-run relationship between Indian stock market (CNX Nifty & BSE Sensex as proxy) and selected macroeconomic variables namely WPI, T-Bill (91 days), Interest Rate, IPI, EXR, and M3 for the period of March 2005 to April 2013 by using the monthly data. The PP unit root, Johansen Co-integration, OLS, and Garch (1, 1) model are the tests employed in this study, which reveals that there exist a long-run relationship between stock prices and selected macroeconomic variables. It also shows that WPI, M3, IPI are positively related to stock indices while T-Bill, Interest Rate, EXR are negatively related.

Then, (Priya et al., 2021) examined the impact of macroeconomic variables on the stock market of China. The CPI, IIP, Interest Rate, M2, GP, OP, and Exchange Rate are used in this study. The monthly observations from January 2001 to December 2019 had been taken and the Descriptive statistics, ADF (lag length optimised using AIC), Johansen Co-integration, and VECM analyses were applied. It reveals that there is an existence of long run relationship between all the macroeconomic variables and the stock market.

3. Data and Methodology

The monthly data for the 10 years is observed for the period data of April 2012 to March 2022. For obtaining this data, the closing values of the market capitalization segments, i.e. BSE LargeCap, BSE MidCap, BSE SmallCap indices of Indian stock market and T-Bills (91, 182 and 364 days) are sourced from the official BSE and RBI websites respectively. The present research used the Descriptive Statistics, Augmented Dickey-Fuller (ADF) test, and Johansen's Cointegration test.

4. Results and Discussion

4.1. Descriptive Statistics

The results from the analysis of the study are discussed here. The descriptive statistics brief the summary of the data which is observed for this study is shown in the below provided Table 1.

| Descriptive | BSE LargeCap | BSE MidCap | BSE SmallCap | T-Bills 182 Days | T-Bills 364 Days | T-Bills 91 Days |
|--------------------|--------------|------------|--------------|------------------|------------------|-----------------|
| Mean | 3762.82 | 13063.72 | 13473.96 | 8906.20 | 10868.67 | -17390.82 |
| Median | 3524.95 | 13191.99 | 12670.49 | 6370.97 | 9219.77 | -15969.57 |
| Maximum | 6787.39 | 25277.72 | 29457.76 | 48389.70 | 58955.60 | -1020.18 |
| Minimum | 1917.12 | 5300.40 | 5191.25 | 237.30 | 751.07 | -68431.00 |
| Standard Deviation | 1233.83 | 5112.19 | 5854.77 | 7981.95 | 7938.26 | 9113.71 |
| Skewness | 0.7620 | 0.5292 | 0.9609 | 2.1929 | 2.1501 | -1.3742 |
| Kurtosis | 3.1063 | 2.8569 | 3.7112 | 8.6201 | 9.9554 | 6.2079 |
| Jarque Bera | 11.6705 | 5.7038 | 20.9971 | 1103.272 | 1448.860 | 387.392 |

| | | | | | | |
|--------------------|--------|--------|--------|--------|--------|--------|
| Probability | 0.0029 | 0.0577 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
|--------------------|--------|--------|--------|--------|--------|--------|

Table 1: Descriptive Statistics

Table 1 indicates the market capitalisation segments among Indian stock market which has been covered from 2012 to 2022. With regard to the mean value of the closing value of the variables, the BSE LargeCap at 3762.82, BSE MidCap at 13063.72, BSE SmallCap at 13473.96, T-Bills 182 days at 8906.20, 91 days at 10868.67, and 364 days at -17390.82, and the high mean value is BSE SmallCap at 13473.96 and the low mean value is T-Bills at -15969.57. In the case of median, the high value is BSE MidCap at 13191.99, and the low value is T-Bills 91 days at 4073.75. Followed by the Maximum description, the high value is T-Bills 364 days at 58955.60 and the low value is T-Bills 91 days at -1020.18. Under the minimum value represents, the high value is BSE MidCap at 5300.40 and the low value is T-Bills 91 days at -68431.00. In the case of standard deviation, the high and low value is T-Bills 91 days and 182 days at 9113.71 and 7981.95 accordingly. Further, the analysis of Skewness is explained with asymmetrical and positively skewed. Moreover, the value of Kurtosis is leptokurtic. And the Jargue – Bera test value is high at the T-Bills. Since the probability value represents at less than 5% level at the closing values of the segments of market capitalization in the Indian stock market and the T-Bills which it was covered from 2012 to 2022.

4.2. ADF Test

| Variables | P-value | t-statistics | Test Critical Values (1%, 5%, 10% Levels) | | |
|-------------------------|---------|--------------|--|--------|--------|
| | | | 1% | 5% | 10% |
| BSE LargeCap | 0.981 | 0.390 | -3.486 | -2.885 | -2.579 |
| BSE MidCap | 0.881 | -0.523 | -3.492 | -2.888 | -2.581 |
| BSE SmallCap | 0.792 | -0.877 | -3.492 | -2.888 | -2.581 |
| T-Bills 182 Days | 0.525 | -1.514 | -3.444 | -2.867 | -2.570 |
| T-Bills 364 Days | 0.525 | -8.380 | -3.443 | -2.867 | -2.569 |
| T-Bills 91 Days | 0.598 | -9.188 | -3.443 | -2.867 | -2.569 |

Table 2: ADF Test Results for Market Capitalization Segments and T-Bills

Table 2 explains the augmented dickey fuller test for BSE LargeCap, BSE MidCap, BSE SmallCap, 182-days bill, 364-days bill, and 91-days bill. For BSE LargeCap index it is noticed from the t-statistic value of augmented dickey fuller test is that 0.390 and the test critical value is that -3.486 (1% level), -2.885 (5% level), and -2.579 (10% level) and the p-value is 0.981. It is greater than level of significance. For BSE MidCap index it is noticed from the t-statistic value of augmented dickey fuller test is that -0.523 and the test critical value is that -3.492 (1% level), -2.888 (5% level), and -2.581(10% level) and the p-value is 0.881. It is greater than level of

significance. For BSE SmallCap index it is noticed from the t-statistic value of augmented dickey fuller test is that -0.877 and the test critical value is that -3.492 (1% level), -2.888 (5% level), and -2.581 (10% level) and the p-value is 0.881. It is greater than level of significance. For 182-days bill it is noticed from the t-statistic value of augmented dickey fuller test is that -1.5141 and the test critical value is that -3.443 (1% level), -2.867 (5% level), and -2.570 (10% level) and the p-value is 0.525. It is greater than 5% level of significance. For 364-days bill it is noticed from the t-statistic value of augmented dickey fuller test is that -8.380 and the test critical value is that -3.444 (1% level), -2.867 (5% level), and -2.569 (10% level) and the p-value is 0.525. It is greater than 5% level of significance. For 91-days bill it is noticed from the t-statistic value of augmented dickey fuller test is that -9.188 and the test critical value is that -3.443 (1% level), -2.867 (5% level), and -2.569 (10% level) and the p-value is 0.598. It is greater than 5% level of significance.

4.3. Johansen's Cointegration Test

| Vector | Trace Statistics λ trace | Maximal Eigen Value λ max | 5% critical value for Trace Statistics | 5% critical value for Max. Eigen Statistics |
|--------------------|-------------------------------------|---|--|---|
| None (r = 0) | 65.30172 | 30.88486 | 95.75366 | 40.07757 |
| At most (r = 1) | 34.41687 | 22.81687 | 69.81889 | 33.87687 |

Table 3: Johansen's Cointegration Test for Market Capitalization Segments and T-Bills 182 Days

Table 3 interprets the 182-day bills for turnover in Government Securities Market which has been explained by Johansen's Cointegration Test and it is covered the duration from 2012 to 2022. The Eigen value of 182-day bill is that 0.2684, the trace statistic is 34.4168, and the critical value is that 69.8188. It is noticed that the trace value is lesser than the critical value; it is not significant at 5% level. Further, it also proved in the case from Maximum Eigen value model, the Maximum Eigen value is 22.8167 and it is lesser than the critical value. It is resulted from the table that, it is rejected at 5% level of significance. By and large, to accept the alternative hypothesis, i.e., the 182-day bill can increase the face value turnover in securities market.

| Vector | Trace Statistics λ trace | Maximal Eigen Value λ max | 5% critical value for Trace Statistics | 5% critical value for Max. Eigen Statistics |
|--------------------|-------------------------------------|---|--|---|
| None (r = 0) | 65.30172 | 30.88486 | 95.75366 | 40.07757 |
| At most (r = 1) | 11.60000 | 6.407527 | 47.85613 | 27.58434 |

Table 4: Johansen’s Cointegration Test for Market Capitalization Segments and T-Bills 364 Days

Table 4 explains the 364-day bills for turnover in Government Securities Market which has been explained by Johansen’s Cointegration Test and it is covered the duration from 2012 to 2022. The Eigen value of 364 -day bill is that 0.0840, the trace statistic is 11.6000, and the critical value is that 45.8561. It is noticed that the trace value is lesser than the critical value, it is not significant at 5% level. Further, it also proved in the case from Maximum Eigen value model, the Maximum Eigen value is 6.4075 and it is lesser than the critical value. It is resulted from the table that, it is rejected at 5% level of significance. By and large, to accept the alternative hypothesis, i.e., the 364-day bill can increase the face value turnover in securities market.

| Vector | Trace Statistics λ trace | Maximal Eigen Value λ max | 5% critical value for Trace Statistics | 5% critical value for Max. Eigen Statistics |
|--------------------|-------------------------------------|---|--|---|
| None (r = 0) | 65.30172 | 30.88486 | 95.75366 | 40.07757 |
| At most (r = 1) | 5.192473 | 3.267979 | 29.79707 | 21.13162 |

Table 5: Johansen’s Cointegration Test for Market Capitalization Segments and T-Bills 91 Days

Table 5 interpret the 91-day bills for turnover in Government Securities Market which has been explained by Johansen’s Cointegration Test and it is covered the duration from 2012 to 2022. The Eigen value of 91-day bill is that 0.0437, the trace statistic is 5.1924, and the critical value is that 29.7970. It is noticed that the trace value is lesser than the critical value, it is not significant at 5% level. Further, it also proved in the case from Maximum Eigen value model, the Maximum Eigen value is 3.2679 and it is lesser than the critical value. It is resulted from the table that, it is rejected at 5% level of significance. By and large, to accept the alternative hypothesis, i.e., the 91-day bill can increase the face value turnover in securities market.

5. Conclusion

The present study examines the effect of T-Bills (91, 182, and 364 days) on the segments of the market capitalization of Indian stock market for the period of 10 years from April 2012 to March 2022. The Descriptive Statistics, Augmented Dickey-Fuller test, and Johansen’s Cointegration test are the tests employed in this study which reveals that there is an existence of long-run relationship between the Treasury Bills and the Indian stock market’s market capitalization segments. This work will be helpful for the investors, stock brokers, and policy makers to make decisions by considering this macroeconomic factor for investments, and also the researchers may include more number of macroeconomic factors in future to obtain the better outcome.

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