Effect of Exchange Rate on the Market Capitalization Segments of Indian Stock Market

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Effect, Exchange Rate, Macroeconomic Factors, Market Capitalization Segments, Indian Stock Market

ABSTRACT
The present article attempts to examine the effect of Exchange Rate on the market capitalization segments of the Indian stock market. The monthly data is observed from the period of April 2012 to March 2022 and employed Correlogram, Johansen's Cointegration, and Granger Causality tests on Exchange Rate and Indian stock market's market capitalization segments (BSE LargeCap, BSE MidCap, & BSE SmallCap indices). It reveals that the Exchange Rate has a long-run relationship with the BSE LargeCap and BSE MidCap indices segments of market capitalization of Indian stock market.

1. Introduction

The implementation of globalisation policies in India has resulted in significant changes in its stock market, which plays an important role in financial development and economic growth. The development of a country's stock market leads to economic growth (Guha Deb & Mukherjee, 2008). The macroeconomic factors show an economy's health based on its current state and trends or patterns in the overall economic condition. For decades, researchers have been attempting to empirically estimate the role of macroeconomic factors in the stock market. In recent decades, developed and developing countries have given preference to research into the relationship between macroeconomic variables and equity markets (A.K. & Pooja, 2017).

2. Literature Review

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

Initially, the research conducted by (Mukherjee & Naka, 1995) analysed the dynamic relationship between the Tokyo Stock Exchange (TSE) and six macroeconomic variables, namely the Exchange Rate (ER), CPI, Money Supply (MS), IPI, long-term government bond rate (LGB), and Call Money Rate (CMR). The study examines monthly data from January 1971 to December 1990 using Descriptive Statistics, ADF, PP, Johansen Co-integration, Vector Error Correction Model (VECM), and Vector Autoregressive (VAR) models. The findings show that a cointegrating relationship exists and that stock prices contribute to this relationship between stock prices and macroeconomic variables in Japan. In terms of forecasting ability, the VECM consistently outperforms the VAR model.

Then, (Kwon & Shin, 1999) examined the co-integration and causality between macroeconomic variables and stock market returns in Korea. Monthly data from January 1980 to December 1992 are used, and the macroeconomic variables chosen are the Balance of Trade (BoT), Exchange Rate, IPI, and Money Supply M1. The ADF, VECM, Co-integration, and Granger Causality tests were used, and the results showed that all of these macroeconomic variables have a direct long-run relationship with stock price indices.

The investigation conducted by (Pal & Mittal, 2011) studied the long-run association between Indian capital markets (BSE Sensex and CNX Nifty as proxy) and macroeconomic variables from January 1995 to December 2008. The quarterly data is used, as are the macroeconomic variables T-Bill (364 days), Inflation, Exchange Rate, and Gross Domestic Savings (GDS). Researchers used the ADF, Co-integration, and Error Correction Model

(ECM) tests. As a result, macroeconomic variables and stock indices have a long-run relationship. Then, ECM demonstrates that inflation has a significant impact on both indices, and T-Bill has a significant impact on Nifty alone, whereas Exchange Rate has a significant impact only on Sensex, and GDS has no impact on either indices.

In similar to this, (Naik & Padhi, 2012) using monthly data, researchers examined the relationship between the Indian stock market index (BSE Sensex) and macroeconomic variables such as IPI, WPI, Exchange Rate, M3, and T-Bills (91 days) from April 1994 to June 2011. The tests used are the ADF, PP, KPSS, Johansen Co-integration, and VECM. It reveals that the Sensex and variables have a long-run equilibrium relationship, and stock prices are positively related to the M3 and IPI but negatively related to the WPI. Furthermore, if macroeconomic variables cause stock prices in the long run but not in the short run, then there is bidirectional causality between IPI and stock prices, whereas unidirectional causality exists between M3 and stock price, stock price to WPI, and T-Bill to stock price.

Also, (Mangala & Rani, 2015) for the period April 2005 to March 2014, the relationship between the Indian stock market and macroeconomic factors such as IPI, WPI, Exchange Rate, Gold Price, Money Supply M2, and T-Bills (91 days) yield was studied, and CNX Nifty was used as a proxy for the Indian stock market. The tests used are the ADF, PP, Johansen Co-integration, VECM, IRF, and VDC. It reveals that the Exchange Rate, WPI, IPI, and stock market have a significant negative relationship, whereas M2, T-Bills yield have a significant positive relationship. Also, short run causality exists between the Exchange Rate and the Nifty, as well as between the Nifty and the M2 and the WPI, whereas long run causality exists between the Nifty and the T-Bills and the M2.

Similarly, (Alam, 2017) analysed the short-run and long-run relationship between the Indian stock market (CNX Nifty & BSE Sensex as proxies) and selected macroeconomic variables such as WPI, T-Bill (91 days), Interest Rate, IPI, Exchange Rate, and M3 using monthly data from March 2005 to April 2013. The tests used in this study are the PP unit root, Johansen Co-integration, OLS, and Garch (1, 1) model, which reveals that there is a long-run relationship between stock prices and selected macroeconomic variables. It also demonstrates that WPI, M3, and IPI have a positive relationship with stock indices, whereas T-Bill, Interest Rate, and Exchange Rate have a negative relationship.

Then, (Priya et al., 2021) examined the impact of macroeconomic variables on the stock market of China. In this study, the CPI, IIP, Interest Rate, M2, GP, OP, and Exchange Rate are used. Monthly observations were collected from January 2001 to December 2019, and descriptive statistics, ADF (lag length optimised using AIC), Johansen Co-integration, and VECM analyses were performed. It demonstrates that a long-run relationship exists between all macroeconomic variables and the stock market.

3. Data and Methodology

The monthly data for the ten years is observed from April 2012 to March 2022. The closing values of the market capitalization segments, namely the BSE LargeCap, BSE MidCap, and BSE SmallCap indices of the Indian stock market, as well as the Exchange Rate ($ US Dollar), are obtained from the official BSE and RBI websites, respectively. The Descriptive Statistics, Augmented Dickey-Fuller (ADF) test, Correlogram test, Johansen's Cointegration test, and Granger Causality test were used in this study.

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
Mean	3762.82	13063.72	13473.96
Median	3524.95	13191.99	12670.49
Maximum	6787.39	25277.72	29457.76
Minimum	1917.12	5300.40	5191.25
Standard Deviation	1233.83	5112.19	5854.77
Skewness	0.7620	0.5292	0.9609
Kurtosis	3.1063	2.8569	3.7112
Jarque – Bera	11.6705	5.7038	20.9971
Probability	0.0029	0.0577	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, and the high mean value is BSE SmallCap at 13473.96 and the low mean value is BSE LargeCap at 3762.82. In the case of median, the high value is BSE MidCap at 13191.99, and the low value is BSE LargeCap at 3524.95. Followed by the Maximum description, the high value is BSE SmallCap at 29457.76 and the low value is BSE LargeCap at 6787.39. Under the minimum value represents, the high value is BSE MidCap at 5300.40 and the low value is BSE LargeCap at 1917.12. In the case of standard deviation, the high and low value is BSE SmallCap and BSE LargeCap at 5854.77 and 1233.83 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 BSE SmallCap index. 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 which it was covered from 2012 to 2022.

4.2. ADF Test

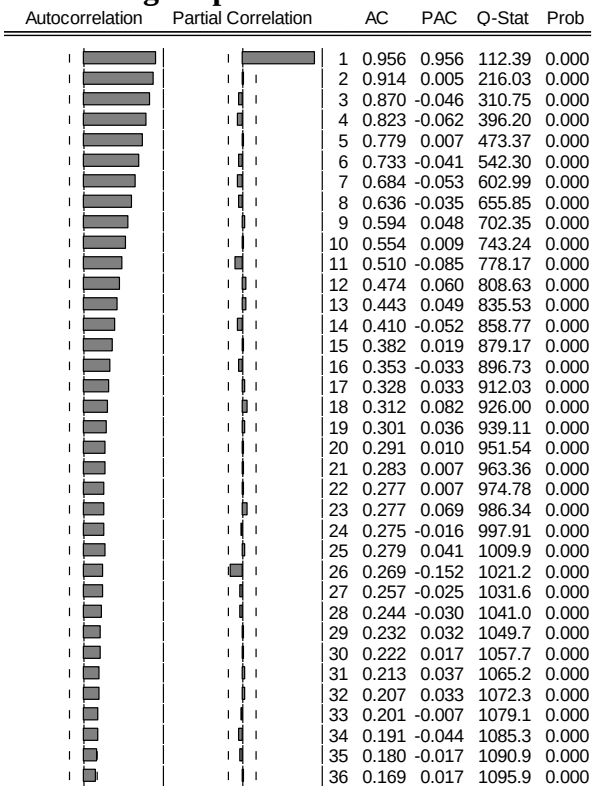
Variables	P-value	t-statistics	Test Critical Values (1%, 5%, 10% Levels)		
BSE LargeCap	0.981	0.390	3.486	2.885	2.579
BSE MidCap	0.881	0.523	3.492	2.888	2.581
BSE SmallCap	0.792	0.877	3.492	2.888	2.581

Table 2: ADF Test Results for Market Capitalization Segments

Table 2 explains the augmented dickey fuller test for BSE LargeCap, BSE MidCap, and BSE SmallCap indices. 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.

4.3. Exchange Rate and BSE LargeCap Index



	AC	PAC	Q-Stat	Prob
1	0.956	0.956	112.39	0.000
2	0.914	0.005	216.03	0.000
3	0.870	-0.046	310.75	0.000
4	0.823	-0.062	396.20	0.000
5	0.779	0.007	473.37	0.000
6	0.733	-0.041	542.30	0.000
7	0.684	-0.053	602.99	0.000
8	0.636	-0.035	655.85	0.000
9	0.594	0.048	702.35	0.000
10	0.554	0.009	743.24	0.000
11	0.510	-0.085	778.17	0.000
12	0.474	0.060	808.63	0.000
13	0.443	0.049	835.53	0.000
14	0.410	-0.052	858.77	0.000
15	0.382	0.019	879.17	0.000
16	0.353	-0.033	896.73	0.000
17	0.328	0.033	912.03	0.000
18	0.312	0.082	926.00	0.000
19	0.301	0.036	939.11	0.000
20	0.291	0.010	951.54	0.000
21	0.283	0.007	963.36	0.000
22	0.277	0.007	974.78	0.000
23	0.277	0.069	986.34	0.000
24	0.275	-0.016	997.91	0.000
25	0.279	0.041	1009.9	0.000
26	0.269	-0.152	1021.2	0.000
27	0.257	-0.025	1031.6	0.000
28	0.244	-0.030	1041.0	0.000
29	0.232	0.032	1049.7	0.000
30	0.222	0.017	1057.7	0.000
31	0.213	0.037	1065.2	0.000
32	0.207	0.033	1072.3	0.000
33	0.201	-0.007	1079.1	0.000
34	0.191	-0.044	1085.3	0.000
35	0.180	-0.017	1090.9	0.000
36	0.169	0.017	1095.9	0.000

Table 3: Correlogram Test for ER and BSE LargeCap in Long-run

Table 3 describes the BSE LargeCap index in terms of exchange rate in the long run, as demonstrated by the Autocorrelation test. The results indicate that there is a unidirectional relationship between the BSE LargeCap index and the exchange rate. However, the BSE LargeCap index had an impact on the exchange rate. Furthermore, the p-value is less than 0.05 and is accepted at the 5% level of significance, indicating that there is a relationship between the BSE LargeCap index and the exchange rate during the study period.

4.4. Exchange Rate and BSE MidCap Index

Hypothesized No. of CE (s)	**Eigen Value**	**Trace Statistic**	**Critical Value (0.05)**	**Prob.**
None	0.5473	15.6152	15.4947	0.0404*
At most 1	0.3463	8.0364	3.8414	0.0486*

Table 4: Johansen Cointegration Test for ER and BSE MidCap in Long-run

Table 4 displays the results of Johansen Trace Statistics on monthly average closing prices of the BSE MidCap index with the exchange rate. The BSE MidCap index moves in tandem with the exchange rate. The test could explain why there are two co-integration equations at 15.6152, and it's significant at the 5% level. Furthermore, the Eigen value is 0.5473, indicating that the BSE MidCap index is 55 percent co-moved with exchange rates. The results show that there is co-integration between the BSE MidCap index and the exchange rates because the trace value is greater than the critical value.

4.5. Exchange Rate and BSE SmallCap Index

Null Hypothesis	**F- value**	**p- value**
BSE SmallCap index does not granger cause US $	6.8676	0.0759
US $ does not Granger Cause BSE SmallCap Index	0.6208	0.5948

Table 5: Granger Causality Test for ER and BSE SmallCap in Long-run

Table 5 examines the long-run relationship between the BSE SmallCap index and the US Dollar, as demonstrated by the Granger causality test. As a result, the BSE SmallCap index does not granger because of the US Dollar, the F-value is 6.8676, and the p-value is 0.0759. Furthermore, the US Dollar does not granger because the F-value of the BSE SmallCap index is 0.6208 and the p-value is 0.5948. The results indicate that there is no relationship between the US dollar and the BSE SmallCap index. In general, the BSE SmallCap index has no impact on the US dollar. The Granger Causality test reveals no relationship between the US dollar and the BSE SmallCap index during the study period.

5. Conclusion

The present study examines the effect of Exchange Rate ($ US Dollar) on the segments of the market capitalization of the Indian stock market for a period of ten years, from April 2012 to March 2022. The Descriptive Statistics, Augmented Dickey-Fuller test, Correlogram test, Johansen's Cointegration test, and Granger Causality test are the tests employed in this study, which reveals that there is an existence of a long-run relationship between the Exchange Rate and the Indian stock market's market capitalization segments, the BSE LargeCap and BSE MidCap indices, while there is no relation with the BSE SmallCap index. This work will be helpful for investors, stock brokers, and policymakers to make decisions by considering this macroeconomic factor for investments, and the researchers may include more macroeconomic factors in the future to obtain a better outcome.

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