Chapter 4

RELATIONSHIP BETWEEN EQUITY MUTUAL FUNDS AND THE STOCK MARKET IN INDIA

Contents

4.1 Introduction

Indian capital market exhibits rapid growth by attracting foreign investments. Many financial innovations have taken place in the past decade, highly contributing to its growth. A bi-directional causal relationship exists between the Indian economy and stock market (Deb & Mukherjee, 2008).The mutual fund industry plays a significant role in the development of financial markets in India. The industry has registered significant growth in terms of its assets under management. The overall size of the Indian mutual fund industry has increased to 38.04 trillion as of April 30, 2022, from 6.80 trillion as of April 30, 2012, a more than 5-and-a-half-fold increase in a decade (AMFI, 2022).

According to the portfolio theory, varying degrees of price co-movements exist between securities in the gains obtained from a diversified portfolio. People can participate in the economic growth of the nation by investing in equity shares. By analysing the history, it is clear that equity shares have been providing huge returns to its investors. But due to lack of knowledge regarding the financial market, common people refrain from making such investments. Also, fixed income-bearing instruments do not have the ability to meet inflation in the economy. However, selecting stocks thatdeliver great returns would be a difficult task that requires adequate knowledge regarding financial markets. Diversification of investment is made possible with the expertise of professional fund managers. Hence, equity mutual funds have been considered as an alternative mode of investment to direct investment in the stock market. However, investors are reluctant to make huge investments in mutual funds due to volatility in the market.

Analysing the degree and direction in which the fund prices move in relation to the stock market index is significant. Alexakis, et al. (2005) examined the relationship of mutual fund flows with stock market returns in Greece and concluded that the cash inflows and outflows in equity funds facilitated higher and lower returns in the stock market, respectively. A strong long-run relationship has been found between equity mutual funds and stock market indices (Gupta, Mathur, & Singh, 2021). Both stock market indices and mutual fund returns seem to be affected by global phenomena. Hence, it becomes imperative to study whether there exists a relationship between equity mutual funds and the stock market in India, which would aid the investors in selecting mutual funds that can be considered as an alternative to shares and facilitate financial experts in formulating policy decisions.

4.2 Data and Methodology

Large-cap funds, large and mid-cap funds, mid-cap funds, small-cap funds and BSE Sensex have been considered for the study. The funds which have outperformed the benchmark for most of the years out of the past 11 years (2011-2021) have been taken as sample for the study. The following funds have been selected from each of these categories:

Large-cap fund: Canara Robeco Bluechip Equity Fund
Large and Mid-cap fund: Mirae Asset Emerging Bluechip Fund
Mid-cap fund: UTI Mid Cap Fund
Small-cap fund: Nippon India Small Cap Fund

The daily net asset values of these funds and the Sensex for the period 1 January 2011 to 31 December 2021 have been considered for the study. Unit root tests are used to determine the order of integration. Vector Autoregression (VAR) has been used for selecting the optimum lag length for the models. The Johansen's cointegration test within a VECM framework has been used to identify the long-run relationships between equity mutual funds and Sensex. The Granger-causality test examines the short-run causality and exogeneity between equity mutual funds

and the Sensex. The results of variance decomposition and the impulse response function indicate long-run exogeneity.

4.3 Analysis, Results and Discussion

In this section, the relationship between equity mutual funds and the stock market in India is analysed. Furtherrmore, the empirical results are arrived at and discussed.

4.3.1 Unit Root Test

The research done by Granger and Newbold (1974) indicated the presence of spurious regressions in regressions with non-stationary variables. Stationarity means the statistical properties of a time series do not change over time. If a time series has a unit root, it shows a systematic pattern that is unpredictable. The VAR model is designed for use with non-stationary series that are known to be cointegrated (Chu, 2011).

According to the efficient market hypothesis theory, all publicly available information is reflected in stock prices (Fama, 1970). Then, testing the presence or absence of a unit root among variables can be interpreted as testing the weak-form market efficiency (Groenewold & Kang, 1993). As a result, it is imperative to test the stationarity of variables prior to performing the VAR model analysis. Augmented Dickey Fuller test (Dickey & Fuller, 1981) is used in this study for checking the stationarity of the data. The results of ADF tests are given in Table 4.1.

Table 4.1

ADF Test Results of Sensex and Equity Mutual Funds in India

Variables	Level						1ST Difference						Integration Order
	Intercept		Trend and Intercept		None		Intercept		Trend and Intercept		None		
	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value	
SENSEX	0.85	1.00	-1.88	0.67	2.26	1.00	-12.67	0.00	-14.57	0.00	-12.50	0.00	I (1)
Large-cap funds	1.35	1.00	-1.11	0.93	2.96	1.00	-14.29	0.00	-14.41	0.00	-14.03	0.00	I (1)
Large and Mid-cap funds	1.77	1.00	-0.76	0.97	3.55	1.00	-11.95	0.00	-12.14	0.00	-11.53	0.00	I (1)
Mid-cap funds	1.28	1.00	-0.74	0.97	2.91	1.00	-10.97	0.00	-11.11	0.00	-10.64	0.00	I(1)
Small cap funds	2.44	1.00	0.36	0.99	3.74	1.00	-12.56	0.00	-12.82	0.00	-10.14	0.00	I(1)

Source: EViews Output

Table 4.1 indicates the presence of unit root in their levels as their *p*-values are greater than 0.05. Hence, first differencing of the variables is done and the results imply that the variables become stationary at I (1). So, the integration order of all the variables is I (1).

4.3.2 Selection of Optimal Lag Length

Since all the variables are integrated in the same order i.e., I (1), Johansen's co-integration test can be used to check whether a long-run relationship exists between the variables. Selection of optimum lag length is inevitable in time series analysis in order to bring valid results. Vector autoregressive model (VAR) is used for identifying the optimum lag length for the models. Likelihood Ratio, Final Prediction Error, Akaike Information Criterion, Schwarz Information Criterion and Hannan-Quinn Information Criterion are the commonly used criteria to identify the optimal lag length for the models. In this study, Akaike Information Criterion is used to select the appropriate lag length.

Table 4.2

Optimal Lag Selection of Large-cap Funds and Sensex

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-33264.65	NA	1.76e+08	24.66023	24.66460	24.66181
1	-19040.05	28417.58	4641.936	14.11864	14.13176*	14.12339
2	-19039.75	0.594538	4654.692	14.12139	14.14325	14.12929
3	-19033.70	12.06556	4647.630	14.11987	14.15048	14.13094
4	-19030.18	7.022401	4649.274	14.12022	14.15958	14.13446
5	-19026.66	7.011583	4650.928	14.12058	14.16869	14.13798
6	-19005.41	42.28925	4591.844	14.10779	14.16465	14.12835
7	-18982.11	46.34904	4526.604	14.09348	14.15909	14.11721
8	-18963.79	36.40279*	4478.818*	14.08287*	14.15722	14.10976*

Source: EViews Output
**indicates lag order selected by the criterion*
LR: Sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 4.2 indicates that all the criteria except the Schwarz information criteria select 8 as the optimum lag length for the model. As a result, 8 is regarded as the optimal lag length for further investigation of the relationship between large-cap equity mutual funds and the Sensex.

Table 4.3

Optimal Lag Selection of Large and Mid-cap Funds and Sensex

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-36531.64	NA	1.94e+09	27.06196	27.06633	27.06354
1	-21196.26	30636.68	22688.79	15.70538	15.71849*	15.71012
2	-21188.37	15.75106	22623.50	15.70250	15.72435	15.71040
3	-21187.08	2.582358	22668.89	15.70450	15.73510	15.71557
4	-21184.45	5.232976	22691.98	15.70552	15.74486	15.71975
5	-21173.75	21.30980	22579.67	15.70056	15.74864	15.71795
6	-21147.44	52.37243	22209.54	15.68403	15.74086	15.70458
7	-21126.77	41.11316	21936.96	15.67168	15.73725	15.69539
8	-21112.06	29.22792*	21763.67*	15.66375*	15.73806	15.69062*

Source: EViews Output
** indicates lag order selected by the criterion*
LR: Sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 4.3 shows that, except for the Schwarz information criteria, all the criteria choose 8 as the optimum lag length for the model. So, 8 is considered the optimal lag length for analysing the relationship between large and mid-cap funds and the Sensex.

Table 4.4

Optimal Lag Selection of Mid-cap Funds and Sensex

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-39211.07	NA	1.43e+10	29.05748	29.06185	29.05906
1	-23126.02	32134.35	95360.95	17.14118	17.15430	17.14592
2	-23109.30	33.37233	94466.53	17.13175	17.15362*	17.13966
3	-23107.71	3.178475	94635.15	17.13354	17.16415	17.14461
4	-23105.93	3.541160	94791.20	17.13519	17.17454	17.14942
5	-23104.67	2.521904	94983.44	17.13721	17.18531	17.15461
6	-23084.02	41.08776	93819.21	17.12488	17.18172	17.14544
7	-23069.53	28.83420	93092.23	17.11710	17.18269	17.14082
8	-23057.29	24.30941*	92526.12*	17.11100*	17.18533	17.13788*

Source: EViews Output
** indicates lag order selected by the criterion*
LR: Sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 4.4 implies that all the criteria except Schwarz information criterion select 8 as the optimum lag length for the model. Therefore, 8 is considered as the optimal lag length for the further analysis of the relationship between mid-cap equity funds and the Sensex.

Table 4.5

Optimal Lag Selection of Small-cap Funds and Sensex

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-36860.52	NA	2.48e+09	27.30557	27.30994	27.30715
1	-20730.20	32224.79	16064.94	15.36015	15.37326	15.36489
2	-20686.99	86.26811	15605.01	15.33110	15.35296*	15.33900
3	-20686.44	1.085832	15645.00	15.33366	15.36426	15.34473
4	-20684.55	3.770718	15669.46	15.33522	15.37456	15.34945
5	-20674.77	19.48859	15602.46	15.33094	15.37902	15.34833
6	-20654.18	40.98346	15411.89	15.31865	15.37547	15.33920
7	-20637.01	34.13202	15262.37	15.30890	15.37447	15.33261
8	-20626.91	20.09065*	15193.46*	15.30437*	15.37868	15.33125*

Source: EViews Output
** indicates lag order selected by the criterion*
LR: Sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 4.5 implies that as per all the criteria except Schwarz information criteria, 8 is the optimum lag length for the model. Therefore, 8 is considered as the optimal lag length for analysing the relationship between small-cap equity mutual funds and the Sensex.

4.3.3 Johansen's Co-Integration Test

In order to identify the nature of long-run relationship between the variables, Johansen's maximum likelihood method of co-integration, developed by Johansen (1988) is applied. Johansens cointegration was employed to examine the dynamic linkage between stock market and equity funds in Australia (Pojanavatee, 2014). The long term relationship between investment fund flows and stock returns in Turkey was also explored using Johansens cointegration (Burucu & Contuk, 2011). In this study, Johansens' co-integration was employed to examine whether long-run relationship exists between stock mareket and equity mutual funds in India.

The long-run relationship between the variables is dependent upon the number of co-integrating equations. For estimating the number of co-integrating equations,Trace test and Max-Eigen value statistics are used at a 5 percent level of significance. These tests are based on five alternative assumptions, which are:

1) The model does not allow for any deterministic components in the data.

2) The model does not allow for any linear trends in the data, but allows for constants in the co-integrating equations.

3) The model allows for linear trends in the data, but no trends in the co-integrating equations.

4) The model allows both constants and linear trends in the co-integrating equations.

5) The model allows for non-linear trends and this is the least restrictive model on deterministic components.

Table 4.6

Johansen's Co-integration Test - Large-cap Funds and Sensex

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.046597	129.8136	15.49471	0.0001
At most 1	0.000415	1.119766	3.841466	0.2900
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.046597	128.6939	14.26460	0.0001
At most 1	0.000415	1.119766	3.841466	0.2900
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: EViews Output

Table 4.6 indicates the presence of one co-integrating equation at a 1% level of significance. Hence, it can be inferred that there exists a long-run relationship between large-cap equity mutual funds and the Sensex.

Table 4.7

Johansen's Co-integration Test-Large and Mid-cap Funds and Sensex

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.022716	64.37409	15.49471	0.0000
At most 1	0.000873	2.357073	3.841466	0.1247
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.022716	62.01702	14.26460	0.0000
At most 1	0.000873	2.357073	3.841466	0.1247
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: EViews Output

The results indicated in Table 4.7 suggest that there exists one co-integrating equation at a 1% level of significance. Thus, there exists a long-run relationship between large and mid-cap equity mutual funds and the Sensex.

Table 4.8

Johansen's Co-integration Test - Mid-cap Funds and Sensex

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.007514	22.90895	15.49471	0.0032
At most 1	0.000948	2.559334	3.841466	0.1096
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.007514	20.34961	14.26460	0.0048
At most 1	0.000948	2.559334	3.841466	0.1096
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: EViews Output

Table 4.8 implies that there exists one co-integrating equation at a 1% level of significance. Therefore, the results indicate the existence of a long-run relationship between mid-cap equity mutual funds and the Sensex.

Table 4.9

Johansen's Co-integration Test - Small-cap Funds and Sensex

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.008179	29.03494	15.49471	0.0003
At most 1	0.002542	6.869487	3.841466	0.0088
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.008179	22.16546	14.26460	0.0023
At most 1	0.002542	6.869487	3.841466	0.0088
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: EViews Output

Table 4.9 implies that two co-integrating equations exist at 1% levels of significance. Hence, it can be inferred that there is a long-run relationship between small-cap equity mutual funds and the Sensex.

The results of the present research is consistent with the studies of Alexakis, Dasilas, and Grose, (2013) in which they found that the Japanese mutual funds and stock prices were cointegrated. Furthermore, co-integration was found to exist between mutual funds' return and the stock market index in Dhaka (Hossain, Rahman, & Rajib, 2009).

4.3.4 Vector Error Correction Model

Since Co-integration test confirms the existence of long run relationship between the variables, VECM is used to examine the long run causality of Sensex and equity mutual funds in India. The normalised co-integrating coefficients of Sensex and large-cap funds are given in the table 4.10.

Table 4.10

Normalised Co-integrating Coefficients of Sensex and Large-cap Funds

Sensex	Large-cap Funds
1.000000	-1312.062
	(15.2123)
**(standard error in parentheses)*	

The signs of the normalized co-integrating coefficients are reversed to enable their proper interpretation.

Estimated Equation

Sensex = 1312.062Large-cap Funds

The results reveal that, in the long-run, large-cap equity mutual funds exert positive influence on the stock market, which implies that the Sensex will rise with the increase in the net asset values of large-cap equity mutual funds and fall with the decrease in the net asset values.

The Error Correction Term (ECT) indicates the speed of adjustment of the model or the time taken by the system in order to rectify the temporary disequilibrium.

Table 4.11

Estimates of Error Correction Term *c*(1) - Large-cap Funds and Sensex

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.049884	0.004429	-11.26184**	0.0000
C(2)	0.030808	0.018912	1.628987	0.1034
C(3)	0.005941	0.018892	0.314454	0.7532
C(4)	-0.035001	0.018802	-1.861598	0.0627
C(5)	0.022484	0.018744	1.199566	0.2304
C(6)	0.089482	0.018743	4.774129**	0.0000
C(7)	-0.077827	0.018774	-4.145518**	0.0000
C(8)	0.062754	0.018938	3.313652**	0.0009
C(9)	0.003418	0.018962	0.180281	0.8569
C(10)	-28.81830	30.55820	-0.943063	0.3457
C(11)	-95.48335	30.57515	-3.122907**	0.0018
C(12)	19.33537	30.35226	0.637032	0.5241
C(13)	-81.10883	30.35674	-2.671856	0.0076
C(14)	-74.86008	30.39319	-2.463054	0.0138
C(15)	25.66714	30.40726	0.844112	0.3986
C(16)	-100.5869	30.47051	-3.301122	0.0010
C(17)	-54.97775	30.63657	-1.794514	0.0728
C(18)	16.89629	6.300953	2.681545	0.0074

Source: EViews Output

**Significant at 1% level of Significance

C(1) denotes the co-efficient of the speed of adjustment to the long-run in a VECM. For the ECT to be consistent, the coefficient should be negative and statistically significant. Table 4.11 indicates that the coefficient is negative and statistically significant at a 1% level of significance. Hence, the results imply that any disturbance caused to the temporary equilibrium of the variables in the model will be automatically corrected in the long run.

The normalised co-integrating coefficients of Sensex and large and mid-cap funds are given in table 4.12.

Table 4.12

Normalised Co-integrating Coefficients of Sensex and Large and Mid-cap Funds

Sensex	Large and Mid-cap Funds
1.000000	**-474.0625**
	(10.3653)
(standard error in parentheses)	

The signs of the normalized co-integrating coefficients are reversed to enable their proper interpretation.

Estimated Equation

Sensex = 474.0625Large and Mid-cap Funds

The results reveal that, in the long-run, large and mid-cap equity mutual funds exert positive influence on the stock market, which indicates that the Sensex will rise with the increase in the net asset values of large and mid-cap equity mutual funds and fall with the decrease in their net asset values.

Table 4.13

Estimates of Error Correction Term *c*(1) - Large and Mid-cap Funds and Sensex

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.026114	0.003386	-7.711672	0.0000
C(2)	0.032218	0.019122	1.684882	0.0921
C(3)	0.000168	0.019135	0.008790	0.9930
C(4)	-0.032338	0.019101	-1.693008	0.0905
C(5)	0.033265	0.019047	1.746464	0.0808
C(6)	0.088915	0.018994	4.681326	0.0000
C(7)	-0.073009	0.019066	-3.829246	0.0001
C(8)	0.062444	0.019124	3.265281	0.0011
C(9)	0.002043	0.019127	0.106828	0.9149
C(10)	24.07000	14.01425	1.717538	0.0859
C(11)	-15.75122	14.04098	-1.121804	0.2620
C(12)	-19.15655	13.94345	-1.373875	0.1695
C(13)	52.68541	13.91928	3.785067	0.0002
C(14)	-42.69434	13.96295	-3.057688	0.0022
C(15)	-7.257915	14.02218	-0.517602	0.6048
C(16)	-14.63593	14.09778	-1.038173	0.2992
C(17)	-24.16858	14.11888	-1.711791	0.0870
C(18)	14.46034	6.396480	2.260672	0.0238

Source: EViews Output

**Significant at 1% level

Table 4.13, makes it clear that the coefficient is negative and statistically significant at a 1% level of significance. Hence, the results indicate that any disturbance caused to the temporary equilibrium of the variables in the model will be automatically corrected in the long run.

The normalised co-integrating coefficients of the Sensex and mid-cap funds are given in the table 4.14.

Table 4.14

Normalised Co-integrating Coefficients of Sensex and Mid-cap Funds

Sensex	Mid-cap Funds
1.000000	**-282.2175**
	(17.7377)
(standard error in parenthese)	

The signs of the normalized co-integrating coefficients are reversed to enable their proper interpretation.

Estimated Equation

Sensex = 282.2175 Mid-cap Funds

The results reveal that, in the long-run, mid-cap equity mutual funds exert positive influence on the stock market, which implies that the Sensex will rise with the increase in the net asset values of mid-cap equity mutual funds and fall with the decrease in their net asset values.

Table 4.15

Estimates of Error Correction Term *c*(1) - Mid-cap Funds and Sensex

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.009086	0.002006	-4.529791	0.0000
C(2)	0.020847	0.019301	1.080090	0.2802
C(3)	-0.000674	0.019304	-0.034926	0.9721
C(4)	-0.032329	0.019249	-1.679555	0.0931
C(5)	0.021424	0.019166	1.117828	0.2637
C(6)	0.087031	0.019166	4.540997	0.0000
C(7)	-0.078219	0.019237	-4.066101	0.0000
C(8)	0.056748	0.019283	2.942915	0.0033
C(9)	0.007469	0.019421	0.384587	0.7006
C(10)	0.806252	6.873977	0.117291	0.9066
C(11)	10.73228	6.915211	1.551982	0.1207
C(12)	-1.874086	6.898118	-0.271681	0.7859
C(13)	-1.114219	6.884601	-0.161842	0.8714
C(14)	20.85031	6.890220	3.026073	0.0025
C(15)	-5.293837	6.916046	-0.765443	0.4440
C(16)	3.217694	6.935988	0.463913	0.6427
C(17)	-6.201473	6.915763	-0.896716	0.3699
C(18)	11.91701	6.418738	1.856597	0.0634

Source: EViews Output

**Significant at 1% level

The results in table 4.15 indicate that the coefficient is negative and statistically significant at a 1% level of significance. Hence, any disturbance caused to the temporary equilibrium of the variables in the model will be automatically corrected in the long run.

The normalised co-integrating co-efficients of Sensex and small-cap funds is given in table 4.16.

Table 4.16

Normalised Co-integrating Coefficients of Sensex and Small-cap Funds

Sensex	Small-cap Funds
1.000000	**-626.9283**
	(34.8875)
(standard error in parenthese)	

The signs of the normalized co-integrating coefficients are reversed to enable their proper interpretation.

Estimated Equation

Sensex = 626.9283Small-cap Funds

The results reveal that, in the long-run, small-cap equity mutual funds exert positive influence on the stock market, which indicates that the Sensex will rise with the increase in the net asset values of small-cap equity mutual funds and fall with the decrease in the net asset values.

Table 4.17

Estimates of Error Correction Term *c*(1)-Small-cap Funds and Sensex

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.010259	0.002162	-4.745270	0.0000
C(2)	0.025800	0.019247	1.340467	0.1802
C(3)	-0.001927	0.019254	-0.100095	0.9203
C(4)	-0.033674	0.019220	-1.752057	0.0798
C(5)	0.026748	0.019167	1.395534	0.1629
C(6)	0.090950	0.019127	4.754963	0.0000
C(7)	-0.080147	0.019204	-4.173380	0.0000
C(8)	0.060653	0.019255	3.149897	0.0016
C(9)	0.000738	0.019287	0.038289	0.9695
C(10)	4.810044	16.94737	0.283822	0.7766
C(11)	19.99500	17.22368	1.160902	0.2457
C(12)	-12.97499	17.15482	-0.756347	0.4495
C(13)	70.17205	17.09812	4.104080	0.0000
C(14)	-24.53337	17.18613	-1.427510	0.1535
C(15)	-10.89412	17.26023	-0.631169	0.5280
C(16)	-3.736188	17.32861	-0.215608	0.8293
C(17)	-13.75350	17.09552	-0.804509	0.4211
C(18)	12.46862	6.430928	1.938852	0.0526

Source: EViews Output

**Significant at 1% level

Table 4.17 makes it evident that the coefficient is negative and statistically significant at a 1% level of significance. Hence, it can be concluded that any disturbance caused to the temporary equilibrium of the variables in the model will be automatically corrected in the long run.

4.3.5 Granger-Causality Test

After establishing that the variables are cointegrated, it is imperative to analyse the nature of the short-run relationship between equity mutual funds and the stock market. Hence, the VECM-based Granger causality test, along with variance decomposition analysis and impulse response analysis, is employed. Chu (2010) used the Granger causality test to analyse the short-run relationship between the equity funds of the Hong Kong Mandatory Provident Fund (MPF) and the indices of the Hong Kong Investment Fund Association. The relationship between mutual funds and the stock index in Jordan has also been examined using the Granger causality test (Al-Jafari, Salameh, & Asil, 2013).

Table 4.18

Granger Causality Test Results

Direction of Causality	F-Statistic	Probability value	Outcome
Large-cap funds > Sensex	18.79	1.E-27	Large-cap funds cause Sensex
Sensex > Large-cap funds	1.07	0.38	Sensex does not cause Large-cap funds
Large and Mid-cap funds > Sensex	11.31	7.E-16	Large and Mid-cap funds cause Sensex
SENSEX > Large and Mid-cap funds	1.19	0.30	Sensex does not cause Large and Mid-cap funds
Mid-cap funds > Sensex	4.49	2.E-05	Mid-cap funds cause Sensex
SENSEX > Mid-cap funds	0.60	0.78	Sensex does not cause Mid-cap funds
Small-cap funds > Sensex	5.45	8.E-07	Small-cap funds cause Sensex
SENSEX > Small-cap funds	1.08	0.38	Sensex does not cause Small-cap funds

Source: EViews Output

The Granger causality test indicates that the Sensex is granger caused by the net asset values of equity mutual funds. One way causal relation runs from equity mutual funds to Sensex, which denotes that a change in the net asset values

of equity mutual funds causes Sensex to change accordingly. Hence, it can be implied that equity mutual funds tend to influence the stock market in India.

4.3.6 Variance Decomposition Analysis

Variance decomposition analysis is applied to determine the relative quantitative importance of shocks given to the variables in the VECM system. It examines the contribution of each innovation using a 120-day forecast error variance of the variables. To obtain the variance decomposition of price linkages, Cholesky decomposition is used.

The variance decomposition results of large-cap equity mutual funds and the Sensex are shown in table 4.19.

Table 4.19

Variance Decomposition Analysis of Large-cap Funds and Sensex

Period (in days)	Variance Decomposition of Sensex		Variance Decomposition of Large-cap Funds	
	SENSEX	Large-cap Funds	SENSEX	Large-cap Funds
1	100.000	0.000	0.022	99.978
30	69.477	30.521	1.467	98.533
60	28.664	71.335	2.396	97.604
90	16.964	83.036	2.846	97.154
120	12.572	87.428	3.088	96.912

Source: EViews Output

The results indicate that on the first day, the variance in the Sensex is explained by its own shocks. As the days progress, the variance in the Sensex is due to the influence exerted by large-cap equity mutual funds. After 120 days, 87% of the change in the Sensex is explained by the shock exerted on large-cap equity mutual funds. However, only 3% of the variance in large-cap equity mutual funds is explained by the shocks on the Sensex after 120 days.

Table 4.20

Variance Decomposition Analysis of Large and Mid-cap Funds and Sensex

Period (in days)	Variance Decomposition- Sensex		Variance Decomposition- Large and Mid-cap Funds	
	Sensex	Large and Mid-cap Funds	Sensex	Large and Mid-cap Funds
1	100.000	0.0000	0.017	99.983
30	91.984	8.0156	0.668	99.332
60	65.364	34.637	1.426	98.574
90	43.463	56.537	1.966	98.037
120	31.007	68.993	2.328	97.672

Source: EViews Output

From the empirical evidence, it is implied that on the first day, the variance in the Sensex is explained by its own shocks. Further, large and mid-cap equity mutual funds begin to exert an influence on the Sensex, which results in its variance. After 120 days, 69% of the change in the Sensex is explained by the shocks to large and mid-cap equity mutual funds. Moreover, movements in the Sensex explain only 2% of the forecast error variance in large-cap equity mutual funds after 120 days.

Table 4.21

Variance Decomposition Analysis of Mid-cap Funds and Sensex

Period (in days)	Variance Decomposition of Sensex		Variance Decomposition of Large-cap Funds	
	Sensex	Mid-cap Funds	Sensex	Mid-cap Funds
1	100.000	0.000	0.316	99.684
30	96.173	3.827	0.0473	99.953
60	88.655	11.344	0.0265	99.976
90	88.655	11.345	0.0215	99.978
120	68.091	31.909	0.0205	99.979

Source: EViews Output

Table 4.21 presents the variance decomposition of the Sensex and mid-cap equity mutual funds. It is obvious that on the first day, the variance in the Sensex is explained by its own shocks. After 120 days, the shocks on mid-cap equity mutual funds cause 32% of forecast error variance in the Sensex. Furthermore, the variance in mid-cap equity mutual funds is almost completely explained by its own

shocks after 120 days. It implies that the Sensex has no role in influencing the values of mid-cap equity mutual funds.

Table 4.22

Variance Decomposition Analysis of Small-cap Funds and Sensex

Period (in days)	Variance Decomposition of Sensex		Variance Decomposition of Small-cap Funds	
	Sensex	Small-cap Funds	Sensex	Small-cap Funds
1	100.000	0.000	0.316	99.684
30	96.314	3.6864	0.037	99.963
60	87.563	12.437	0.087	99.913
90	75.558	24.442	0.158	99.842
120	63.105	36.895	0.234	99.766

Source: EViews Output

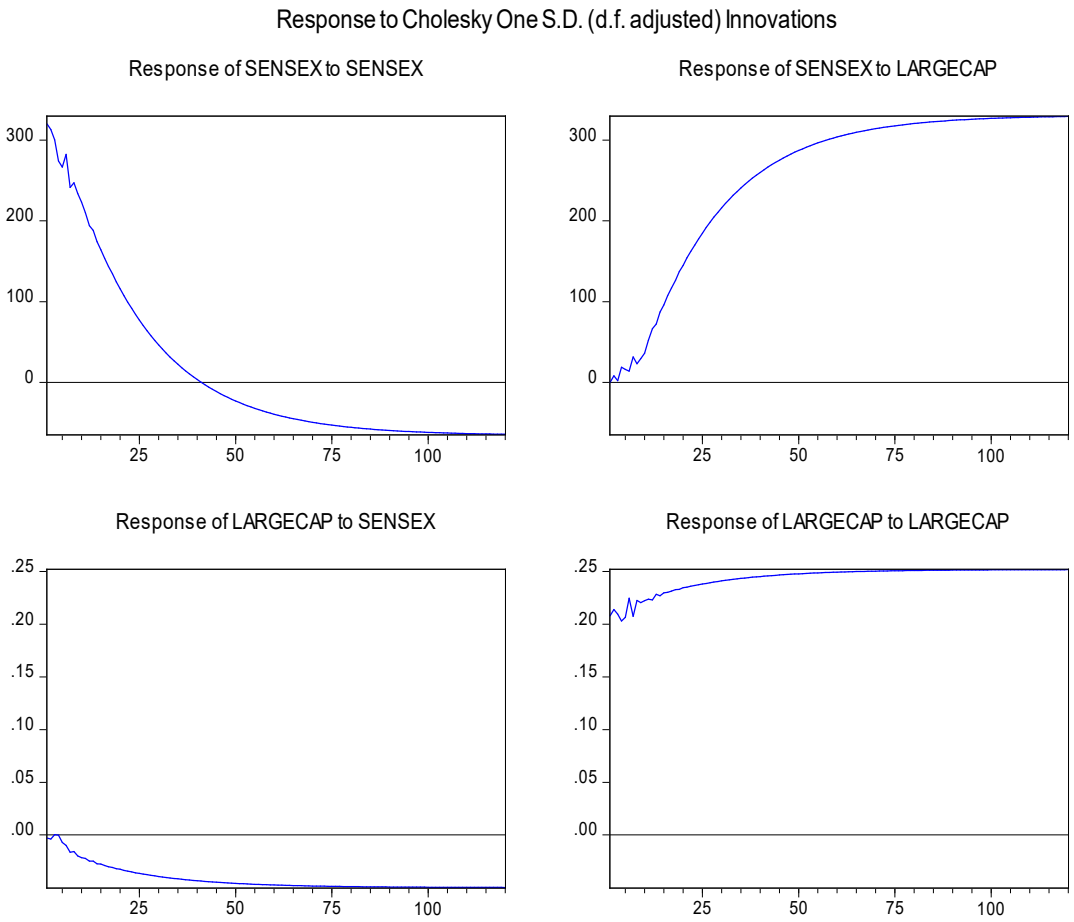
The results in table 4.22 suggest that on the 1st day the variance in Sensex is wholly explained by its own shocks. However, the forecast error variance in it increases due to movements in small-cap equity mutual funds day by day. After 120 days, 37% of the variance in the Sensex is explained by the movements in small-cap equity mutual funds. But the variance in small-cap equity mutual funds is almost completely explained by its own shocks after 120 days which indicates that the Sensex exerts no role in influencing the values of small-cap equity mutual funds.

4.3.7 Impulse Response Analysis

The impulse response function is applied in order to analyse the transmission mechanism between equity mutual funds and stock market in India. It reveals the direction of change in the dependent variable due to shocks imposed by external variables. The persistence of shock indicates the speed by which the price system returns to equilibrium. Cholesky decomposition is considered to obtain the impulse response function of the price linkages. The impulse response function is reported for 120 days and is followed by the significance and magnitude of VAR lag order selection criteria. Figure 4.1 indicates the response of Sensex to its own shock and shocks in large-cap equity mutual funds and the response of large-cap equity mutual funds to shocks in Sensex and its own shocks.

Figure 4.1

Impulse Response Analysis - Large-cap Funds and Sensex

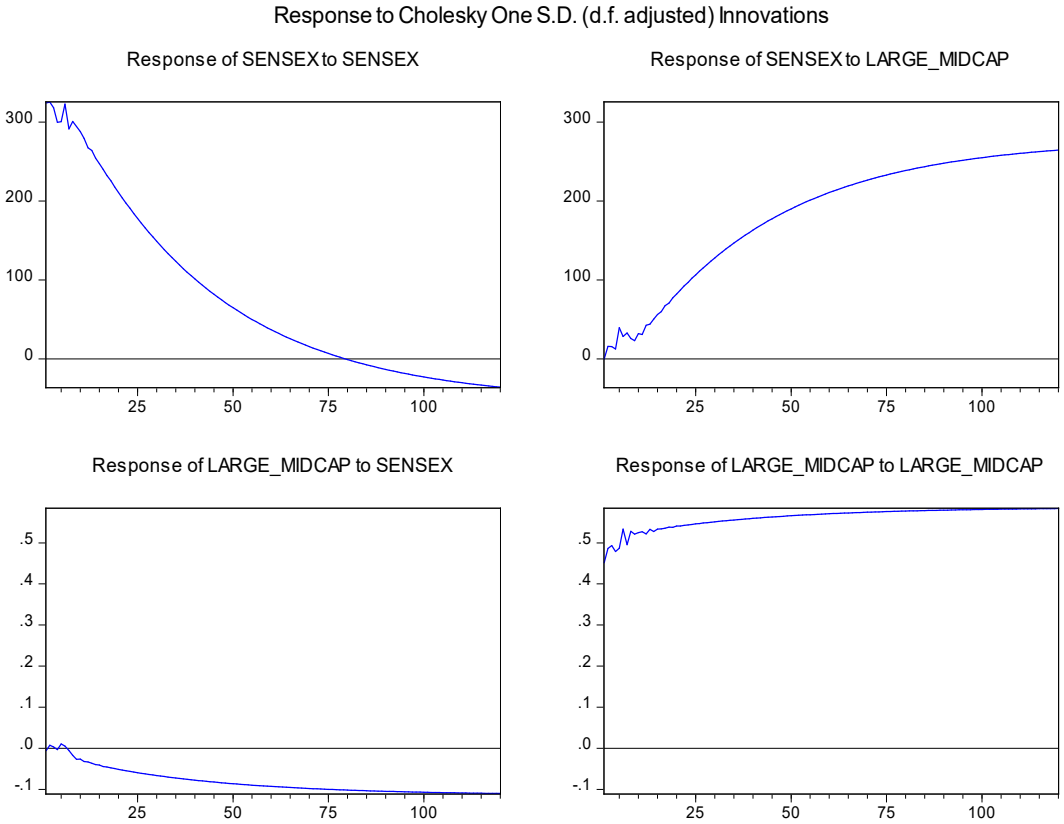


Source: EViews Output

The results imply that the Sensex exhibits a negative response to its own shocks, whereas, it shows a positive response towards shocks in large-cap equity mutual funds. While, large-cap equity mutual funds have a negative response to shocks in the Sensex, it responds positively to its own shocks.

Figure 4.2

Impulse Response Analysis - Large and Mid-cap Funds and Sensex

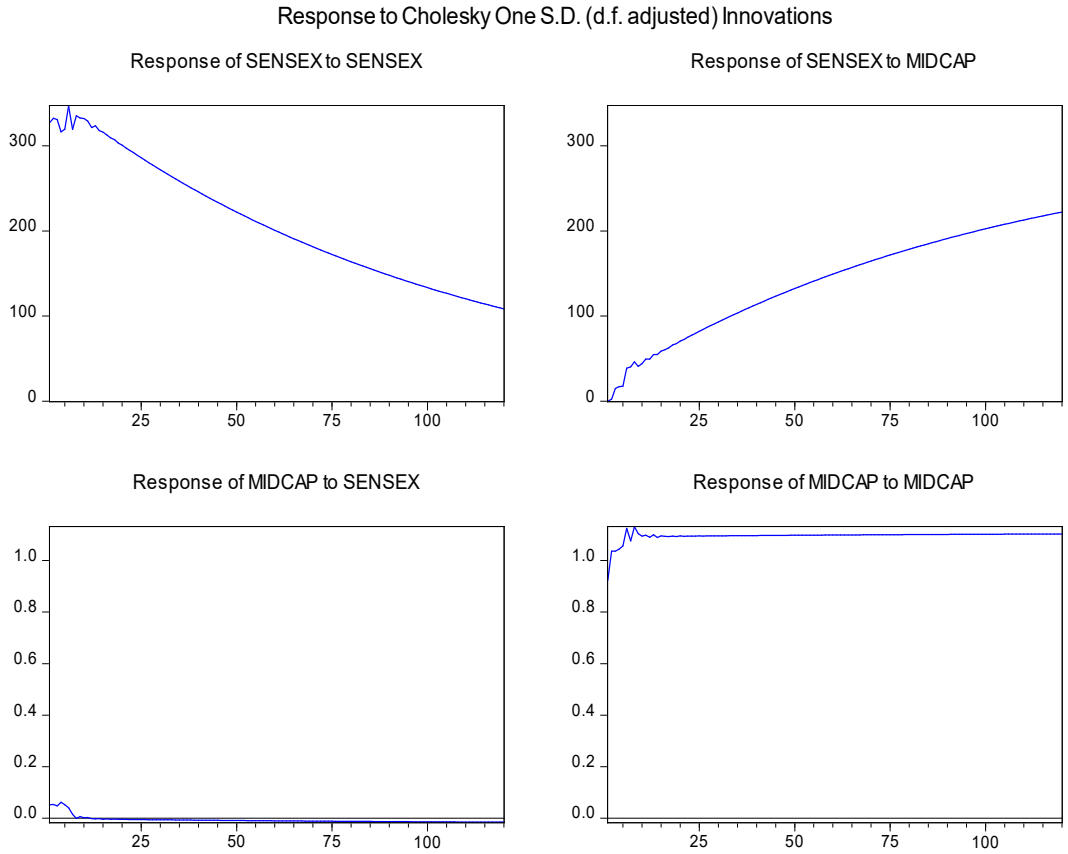


Source: EViews Output

The empirical evidence suggests that the Sensex shows a negative response to its own shocks, while it shows a positive response towards shocks in large and mid-cap equity mutual funds. On the other hand, large and mid-cap equity mutual funds show a negative response to shocks in the Sensex. However, it exhibits a slightly positive response to its own shocks.

Figure 4.3

Impulse Response Analysis - Mid-cap Funds and Sensex

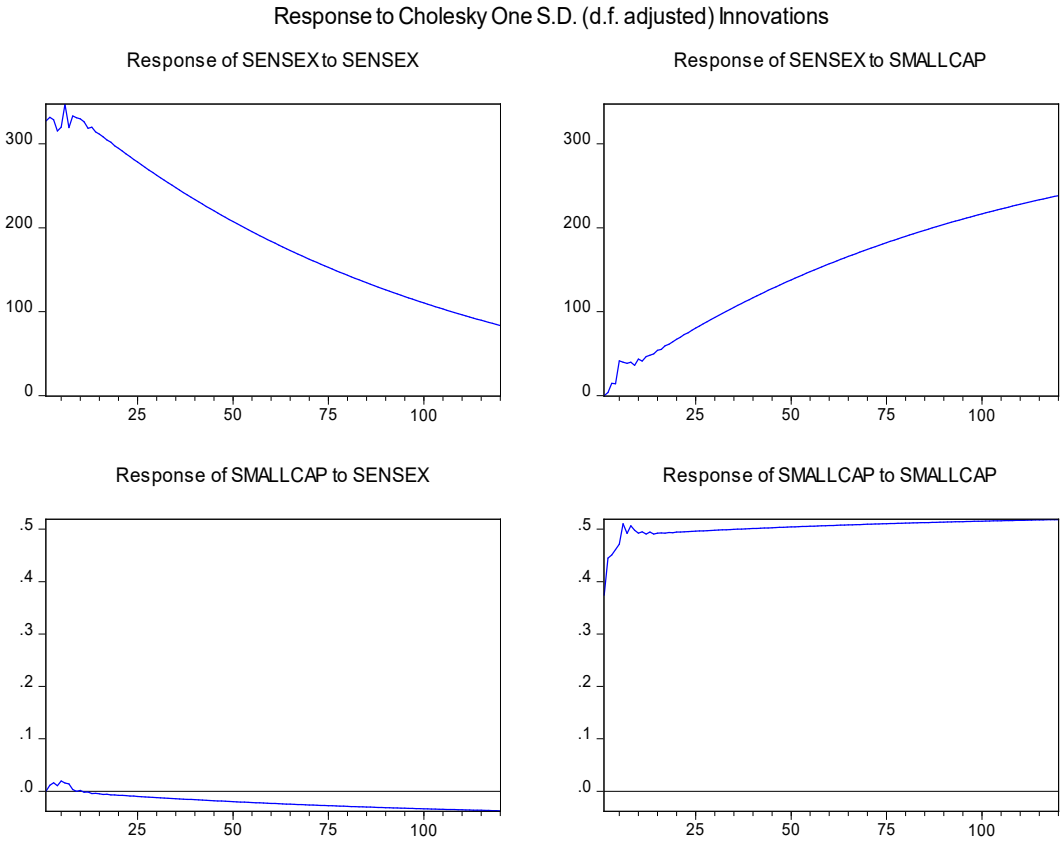


Source: EViews Output

The results in table 4.3 imply that the Sensex shows a negative response to its own shocks and a positive response to shocks in mid-cap equity mutual funds. The results also indicate that the mid-cap equity mutual funds show a slightly negative response to shocks in the Sensex, whereas they exhibit a slightly positive response to their own shocks.

Figure 4.4

Impulse Response Analysis - Small-cap Funds and Sensex



Source: EViews Output

Figure 4.4 makes it clear that the Sensex shows a negative response to its own shocks and a positive response to shocks in small-cap equity mutual funds. The results also imply that the small-cap equity mutual funds have a slightly negative response to shocks in the Sensex and a slightly positive response to their own shocks.

From the impulse response function results, it can be concluded that the findings are consistent with the results of Johansen's cointegration tests, which indicate the cointegrated nature of the stock market index and equity mutual funds. The results of the impulse response function confirm the findings of the Granger causality tests, indicating the causal relationship that runs from equity mutual funds to the Sensex. The results are also consistent with those of the variance decomposition analysis, which implies that the Sensex is strongly endogenous.

4.4 Conclusion

The study examined the dynamic relationship between equity mutual funds and the stock market in India. The time series data employed in this study become stationary at the first difference. Johansen's cointegration test results imply that a long-run relationship exists between equity mutual funds and the stock market in India. Additionally, according to VECM results, equity mutual funds have a positive long-term influence on the stock market. Furthermore, it is discovered that for the Sensex and equity mutual funds, the rate of price adjustment to long-run equilibrium is significant.

Granger-causality test results indicate that equity mutual funds granger cause Sensex, indicating that a movement in the net asset values of equity mutual funds could cause Sensex to change. As per the variance decomposition analysis, the Sensex has less exogeneity. The impulse response function suggests the existence of a close relationship between the net asset values of equity mutual funds and the stock market index for future periods, which indicates that, in India, movements in equity mutual fund values cause the stock market index to change. Hence, equity mutual funds can be considered as an alternative to direct investment in the stock market. Moreover, equity mutual funds provide diversification and professional expertise, making them a more suitable option for investors to reap huge benefits from the market.