PRICE AND VOLUME EFFECTS OF NIFTY 50 INDEX REORGANIZATION

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Abstract   *Nifty 50 index comprises of largest, most liquid, and reputed 50 (51 from 2016) stocks listed on National Stock Exchange (NSE) India. During the index-composition changes, many stocks keep entering and exiting the benchmark index, and their impact is observed in the changes in the returns of a particular stock. We study the impact on price and volume traded of stocks being included and excluded from the Nifty fifty index during the year 2000 to 2016. We find evidence that stocks generate abnormal positive returns after index inclusion and they face abnormal negative returns after index exclusion. Further, abnormal returns get reversed for index included stocks in 60 days after the inclusion, while the excluded stocks yield negative returns only in the first ten days. Based on the event study analysis, the empirical findings show that after 60 to 240 days of exclusion, these stocks yield around 4% to 7% positive abnormal returns. Thus, there is an evidence of a short-term impact on the returns of stocks because of inclusion or exclusion from the benchmark index. Relevant policy implications are discussed.*

Keywords: *NIFTY Fifty Index, Inclusion, Exclusion, India, Abnormal Returns, Abnormal Volume Traded*

JEL Classification: *G14*

INTRODUCTION

Each country has benchmark indices that represent the country's growth and development. On a regular interval, these indices are revised, and stocks are included or excluded from these indices based on a pre-decided criterion. The impact of particular stocks being included or excluded in the benchmark index has received increasing attention recently. The body of literature analyzing the effects of index inclusion and exclusion concerning the S&P 500 index is growing (Woolridge & Ghosh, 1986; Jain, 1987; Hegde & McDermott, 2003; and Chen et al., 2004). The results are consistent for a finding that S&P 500 index inclusion has a positive effect on the firm's stock to generate abnormal returns (Cai, 2007), whereas exclusion from the index is perceived as negative by the markets and it leads to negative abnormal returns (Mase, 2007). We derive our motivation from the fact that although index composition change has been studied vividly regarding the S&P 500, there is a lack of such a study in the Indian context concerning the nifty index.

In the present study, we determine whether the event of index composition changes has any information content which otherwise is not captured by the markets. We try to address the overarching question: does index inclusion indicate increasing abnormal returns, or does index exclusion send negative signals to the investors, followed by negative abnormal returns in the future? Further, we also try to examine the duration over which the market reactions of NIFTY inclusion or exclusion persist. We have conducted the analysis over six years for the period starting from the year 2000 to 2016 for NIFTY fifty index reorganization. We collected data on daily stock returns and volume traded for these stocks being included or excluded from the index.

Based on the analysis, the evidence of abnormal returns on inclusion or exclusion of stocks to the benchmark index provides a useful investment strategy to the investors who may take leverage of restructuring of benchmark indices. For example, with the fact that inclusion (exclusion) from the nifty 50 indexes has an impact on stock returns, investors can make a strategy to take a long position in an included and short position in excluded stocks to generate abnormal returns. Moreover, the findings of the study provide insights regarding the period for which this strategy would work and when it should be reversed. The results are consistent with the price pressure hypothesis (PPH) for inclusion but not for the exclusion from the index. Persistence of the abnormal positive (negative) returns also varies for inclusion (exclusion). Index included stocks yield a positive abnormal return in the short run, but it ceases to increase after 60 days. Exclusion from the stock is assumed to yield negative abnormal returns; however, according to the results, the negative returns persist only for ten days; the stocks generate positive returns afterwards. Additionally, we have also studied the impact of inclusion (exclusion) on the volume traded of the stocks during short and long event windows

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post announcements. Abnormal volume increases for the inclusion of the stocks in the long-run, whereas it reduces for exclusion. There are broad implications discussed at both theoretical and empirical levels to the existing literature examining the benchmark indices and impact on investor return (George, 2009; Lakshmy, 2014; Sankar, 2014). However, the existing studies have mainly relied on the BSE announcement, or the period used in the study is converged with the global financial crisis, which may alter the findings of the studies. We have examined this particular phenomenon of entering or leaving the benchmark index NIFTY fifty and studied the changes in price and volumes of those stocks perform over time using the event study methodology.

The remaining paper is organized as follows. Section 2 reviews the existing literature; the details of data and methodology are provided in Section 3. We have reported the results in Section 4 and given a discussion of the findings in Section 5, followed by a conclusion in Section 6.

LITERATURE REVIEW

The PPH was first studied by Scholes (1972). He showed the short-run effect (increase) in prices due to index inclusion. Index-based portfolios get revised after the changes in index composition, which creates an imbalance in demand and supply of the stock increasing price. The information content hypothesis was studied by Jain (1987). On the first trading day, funds yield abnormal returns of around +3% after addition and -1% after deletion.

Moreover, his results suggest that the excess return effect is reversed within a short time after the announcement. On the contrary, some researchers have argued that addition to the S&P 500 index does not have any information content, as there is no change in the financial health of the company. According to Kaul et al. (2000), the increased abnormal returns on addition can be attributed to improved management and monitoring by credit rating agencies. Based on the literature, we borrow from the PPH and posit that inclusion in the benchmark index would send a positive signal, whereas deletion would send negative signals to the market, due to which in the short-term index inclusion (exclusion) would have positive (negative) abnormal returns. We posit the following hypotheses.

H1a: Nifty 50 index inclusion is associated with positive abnormal returns in the short term.

H1b: Nifty 50 index exclusion is associated with negative abnormal returns in the short term.

To examine the changes over a long duration, Shliefer (1986) studied the S&P 500 index and concluded that there are permanent changes in prices due to index inclusion (exclusion) of the stock, which was named as an imperfect substitute hypothesis. The author named this effect as downward sloping demand curve (DSDC) effect. According

to the DSDC, authors have shown that there are permanent changes in the price due to index inclusion and exclusion. However, later studies failed to acknowledge the impact of DSDC (Chen et al., 2004). Some researchers argued that price increase or decrease following the event is temporary, and it tends to get reversed after a short period. In a study conducted by Harris and Gurel (1986), it was found that the duration of the price reversal after the index changes is approximately three months (90 days). Based on this evidence from the literature, we expect the reversal of abnormal returns following index composition in the long-run. The index inclusion and exclusion are regular activities of the market, and they do not create permanent changes in the value generation capacity of a particular company. In the process of index restructuring, markets are shocked or surprised, and they react with abnormal returns only in the short run. The impact of such shocks is reversed over time, and, based on these arguments, we posit the following hypotheses.

H2: Abnormal positive returns associated with Nifty 50 index inclusion tend to decrease in the long run.

H2b: Abnormal negative returns associated with Nifty 50 index inclusion tend to decrease in the long run.

In addition to the impact price, index reorganization also impacts the trading volume of stocks. Chen et al. (2004) studied the S&P 500 index addition and deletion effect from July 1962 to December 2000. Their results suggest that index included funds have more information, and investors get more informed about the included stocks, but they do not lose awareness of the stock that has been excluded. Thus, they attribute the asymmetry of price responses to investor awareness. Hegde and McDermott (2003) conducted a similar study for the S&P 500 index for the period of January 1991 to October 1998. Their findings suggest that the generation of abnormal returns for index addition is due to improved liquidity. The transaction cost of index added stocks reduce, and the time-weighted quoted spread decreases, which results in better liquidity. This effect is reversed for the stock excluded from the S&P 500 index in three months. The increase in liquidity leads to the higher (lower) volume traded after index inclusion (exclusion). We study the persistence of increased (decreased) abnormal volume in the context of the Nifty index in this paper. We borrowed from the existing literature and expected that because of being included in the benchmark index, stocks would exhibit improved liquidity and their ability to exhibit more information; therefore, these included stocks would have a higher trading volume over time. On the contrary, the stocks that have been excluded from the benchmark index may lose that information content attached to them and suffer from the problems of lower liquidity and may have reduced trading volume over time. Based on these arguments, we posit the following hypotheses.

H3a: Nifty 50 index inclusion is associated with a permanent increase in the abnormal trading volume of the stocks.

H3b: Nifty 50 index exclusion is associated with a permanent decrease in the abnormal trading volume of the stocks.

DATA AND METHODOLOGY

The objective of the study is to understand investors' capacity to generate abnormal returns due to index inclusion or exclusion. Further, we want to know the duration for which the effect of abnormal returns persists after the announcement. Investors and fund managers can take a long (short) position in the included (excluded) stock after the nifty index changes to get abnormal returns. Finally, the market reaction is captured through abnormal volume traded for the included (excluded) stocks.

The Nifty index is maintained by India Index Services and Products Ltd. (IISL), which is a specialized Indian company focused on managing the index. Nifty 50 is the index of 50 companies' stock across 12 sectors, which constitute about 63% of total market capitalization listed on the NSE. The total volume traded in nifty 50 stocks is around 44% of the total trading volume of the NSE. The index is revised twice every year based on market capitalization and liquidity of the stocks. From 2000 to 2016, there were 62 companies included (excluded) from the index. From 2016, the NSE decided to keep 51 securities in nifty 50 indices making three exclusions and four inclusions from the period effective from April 1, 2016. Thus, a total of 115 changes are considered during the sample period from April 2000 to March 2016 in the index composition. The list of firms excluded and included in the Nifty 50 index during this period is obtained from the NSE website[1]. There were 61 exclusions and 62 inclusions during the period. The final sample includes 62 inclusions and 51 exclusions (9 exclusions were due to mergers; therefore, they are removed from the sample). The details of the sample are explained in Table 1.

Daily returns and volumes traded for the respective firms have been collected from the CMIE Prowess database. Daily nifty returns and the daily trading volume for the sample period are collected from NSE website archives[2]. We have used event study analysis for event windows ranging from [0 to 2] days to [0 to 240] days. The estimation window for abnormal returns is [-200 to -10] days. Abnormal volume analysis is compared throughout 14 weeks preceding two weeks before the event.

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[1] The data was obtained from https://www.nseindia.com/.
[2] Kindly refer to https://www.nseindia.com/resources/historical-reports-capital-market-daily-monthly-archives for the details.

Table 1: Distribution of Nifty 50 Index Changes during the Sample Period

Year	Total Inclusions	Inclusions Retained	Total Exclusions	Exclusions Retained
2000	4	4	4	4
2001	0	0	0	0
2002	7	7	7	5
2003	3	3	3	3
2004	5	5	5	5
2005	2	2	2	2
2006	3	3	3	3
2007	6	6	6	5
2008	3	3	3	3
2009	5	5	5	3
2010	4	4	4	3
2011	2	2	2	2
2012	4	4	4	3
2013	3	3	3	3
2014	3	3	3	2
2015	4	4	4	4
2016	4	4	3	3
	62	62	61	53

Table 1 reports number of stocks included to and excluded from the Nifty fifty index during 2000-2016. Source: author's calculation.

Calculation of Abnormal Returns

Daily returns of the stock are obtained from the CMIE Prowess database. We calculated the abnormal return for the event period by the following formula.

$$\text{Abnormal return} = R_{i,j} - \alpha_{i,j} + \beta_{i,j} \, R_{mt}$$

Where $R_{i,j}$ is NSE return of security i for the event period j, $\alpha_{i,j} \, \beta_{i,j}$ are, respectively, intercepted and slope parameters for security i for estimation period j, R_{mt} is market return (here, NSE daily returns for the event period).

Calculation of Abnormal Volume Ratio

The abnormal volume ratio is calculated for different event windows with the help of the following formula (Harris & Gurel, 1986).

$$\text{Vr}_{it} = \frac{Vmt}{Vit} * \frac{Vm}{Vi}$$

Where V_m is average of daily trading volume and V_i is average of daily volume traded of stock i for estimation period [-80 to -10]. V_{mt} and V_{it} are the daily trading volume for period t, which is the event period.

$$\text{AVr}_t = \frac{1}{n} \Sigma \text{Vrit}$$

The mean of this AVR_t (MAVR) is calculated for different event windows. If this ratio is one, then we can say there is no significant difference in trading volume after inclusion

or exclusion. The ratio significantly greater than 1 implies a post-event increase in trading volume and vice versa.

RESULTS AND ANALYSIS

Table 2: MCAR for Different Event Windows

Event Window	Inclusion		Exclusion	
	MCAR	t Statistic	MCAR	t Statistic
[0 to 2]	0.013***	5.84	-0.019***	4.01
[0 to 10]	0.018***	6.05	-0.023***	5.97
[0 to 60]	0.086***	17.87	0.049***	15.40
[60 to 120]	0.009***	5.49	0.063***	13.07
[120 to 240]	0.004	1.68	0.077***	12.37

Table 2 reports the results of event study analysis. Day 0 refers to the inclusion or exclusion from the index
Source: author's calculation

Abnormal Returns for Index Inclusion and Exclusion

The mean cumulative abnormal return (MCAR) for inclusion is 1.3% for a two-day event period and increases up to 1.8% (all values are significant at 1% level) for the next ten days. The abnormal return is the highest for 60 days (three months) event window. The results in Table 1 are consistent with George (2009); the abnormal returns of the S&P 500 index addition get reversed in three months. The MCAR begins to decrease after 60 days. The mean abnormal returns are 0.9% and 0.4% after 120 days (six months) and 240 days (a year), respectively. Abnormal positive returns after index inclusion are not permanent. According to hypothesis 2, the abnormal returns decrease in the long run. Investors who take a long position in the stocks which are included in the index should take the reverse position in 60 days.

The MCAR for the two days after the exclusion is -1.9 %, and it reduces further to -2.3% after ten days. In the long run, excluded stocks do not continue to yield negative returns. The excluded stocks show an increase in abnormal returns of 4%, 6%, and 7% (significant at 5% level) after 60 days, 120 days, and 240 days, respectively. We conclude that abnormal negative returns of the excluded stock decrease in the long run (H2b). The negative abnormal returns in the first ten days after the exclusion can be attributed to the overreaction of the market and PPH.
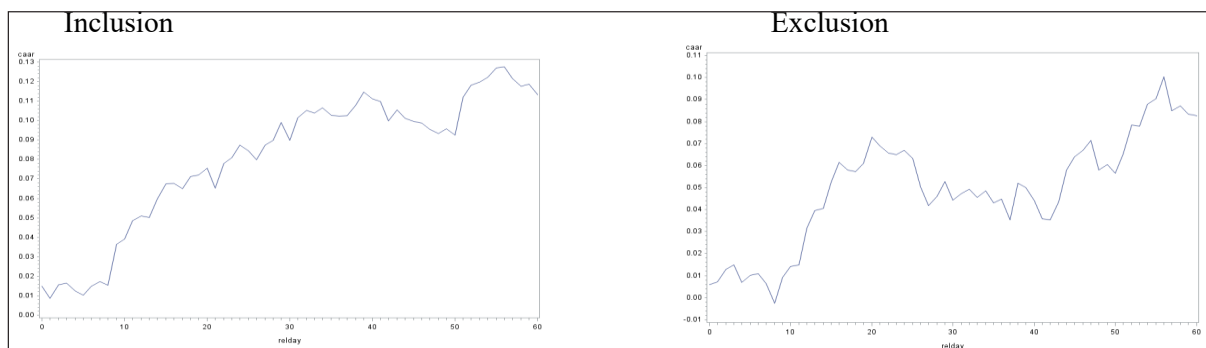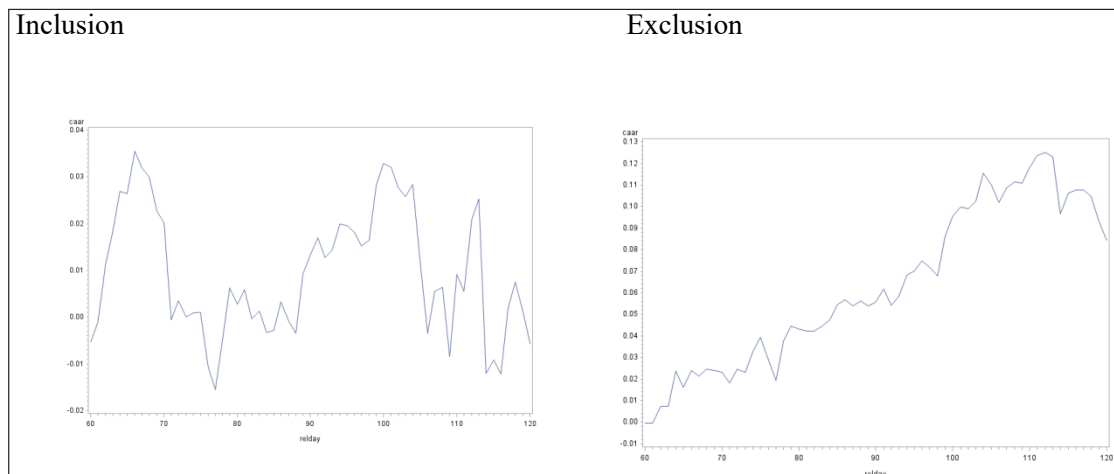

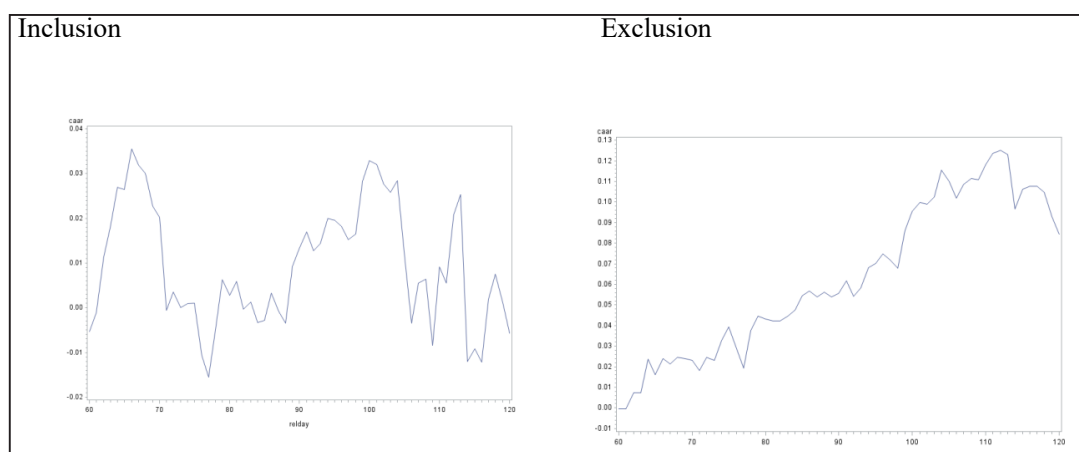**Fig. 1a. CAAR for 0 to 60 days**

Fig. 1b. CAAR for 60 to 120 days

Fig. 1c: CAAR for 120 to 240 days

Fig. 1: CAAR for Respective Relative Days for Inclusion and Exclusion

Table 3: MAVR for Different Event Windows

	Inclusion		Exclusion	
	MAVR	**t Statistic**	**MAVR**	**t Statistic**
[0 to 2]	1.73***	14.89	1.29***	12.74
[0 to 10]	1.48***	24.86	1.28***	15.00
[0 to 60]	1.56***	49.20	1.18***	16.98
[60 to 120]	1.53***	47.67	1.08***	30.26
[120 to 240]	1.67***	45.87	0.98***	48.83

Table 3 reports the results of event study analysis. Day 0 refers to the inclusion or exclusion from the index.

Abnormal Volume for Index Inclusion and Exclusion

Abnormal volume is increasing significantly after the index inclusion, as reported in Table 2. For event windows 0 to 2, the mean abnormal volume ration (MAVR) is 1.73 for inclusion. This result shows that after two days of inclusion, there was a 73% increase in volume traded of the included stocks. This increase continues to rise for all the event windows. The included stocks see around a 50% increase in volume for the first six months (120 trading days). For the event period 120 to 240 days, the MAVR is 1.67, which shows that abnormal volume traded for included stocks continue to increase in the long run. Therefore, our hypothesis 3a gets supported. The exclusion column shows a decrease in the abnormal volume ratios as the length of the event window increases. The MAVR value is 1.29 (highest) in the first event window of 0 to 2 days, and it is 0.98 (lowest) for 240 days event window. All the values are significant at 5% level. The MAVR ratios are 1.28, 1.18, and 1.08, which implies the abnormal volume was 28% higher after ten days of exclusion, 18% after 60

days, and only 8% after 120 days. Thus, exclusion from the index decreases abnormal volume traded permanently.

DISCUSSION AND IMPLICATIONS

In the present study, we examined the impact of index reorganization for the Indian benchmark index NIFTY fifty for the period of 2010 to 2016. There were a total of 62 stocks or around 115 instances of the stocks being either included or excluded. Using the event study analysis over both short- and long-term periods, we examined the market reactions in price and volume for the included and excluded stocks. Collecting data from multiple sources such as the NSE archives and CMIE Prowess Database, our findings contribute to the existing literature (Beneish & Whaley, 2002; Chaudhary, 2017; George, 2009; Hashemi & Pouraghajan, 2017; Kumar & Mishra, 2013) in both theoretical and empirical aspects.

The practical implications of the study are noteworthy, especially for fund managers. They may follow the insights provided in the present study and keep tracking the index rebalancing trends to find out scrips that may generate abnormal returns in the future. The unique contribution of the study lies in the coverage of both short- and long-term event windows ranging from 2 to 240 days. Based on these multiple event windows, fund managers and investors time their decisions to buy or sell the included or excluded scrips. Further, our findings also indicate the investor behavior and their biases towards scrips on the basis of their place in the benchmark index. Future studies can further explore the aspect of investors' behavioral biases in the context of Nifty fifty index reorganization. The study period considered here spans over six years, which could be one of the limitations of the present study, and future studies may undertake similar studies covering longer time periods.

CONCLUSION

We studied the Nifty fifty market inclusion-exclusion effect on the stock prices in India for the period 2000-2016. We find that the market response for the inclusion is more intense than for the exclusion. Based on the abnormal return and abnormal volume ratio analysis, positive abnormal returns tend to increase in the first 60 days of the inclusion; whereas, negative abnormal returns persist only for ten days. The results suggest that the investors taking a long position in included stock should reverse their position in at least the first 60 days to make positive gains on their portfolios. Although investment in the included stocks can fetch positive abnormal returns, a similar effect may not be observed in case of exclusion from the Nifty index. The decrease in stock prices gets reversed in ten days after the exclusion of a particular stock from the index. We also find that the abnormal volume traded increases in the long run for included stocks and reduces for excluded stocks.

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