Index Rebalancing and its Valuation Ripple: A Deep Dive into Nifty 500 Companies

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ABSTRACT

The purpose of this study is to investigate how addition and deletion of companies from the index affects their market valuation. For this research, the NIFTY 500 index was taken into consideration as it is a well – diversified benchmark index. A total of 54 events in year 2024 were selected initially but only 40 companies were taken into the consideration for further analysis due to non – availability of data. To determine the shifts in valuations based on return generation during the event period, event study methodology was used as introduced by (MacKinlay, 1997). The study evidenced insignificant results related to both events i.e. inclusion and exclusion which is inconsistent with the prior literature. Despite the fact that the NIFTY 500 index companies were chosen mostly on their market size, investors could not yet have complete faith in them. Since investors still believe that the excluded companies fundamentals are robust, their exclusion is likewise unimportant to them. The NIFTY 500 index is quite huge which slows down the flow of information into the market and suggests that larger indices are associated with less efficient markets.

Keywords: Abnormal Returns (ARs), Cumulative Average Abnormal Returns (CAARs), Efficient Market Hypothesis (EMH), NIFTY, Market Cap.

1.   INTRODUCTION

Index composition changes, such as the inclusion or exclusion of companies, often sparks a significant interest among financial analysts, institutions, AMCs, HNIs (High Net – worth individuals and investors. These adjustments in index lead to shifts in a company's market valuation, liquidity and perception. Market participants respond by re – balancing their portfolios that might lead to changes in demand and price volatility of respective companies, as stocks were added or removed. In particular, large indices like NIFTY 50, BSE SENSEX, NIFTY 500, NIFTY MIDCAP 100, BSE 500, NIFTY BANK, NIFTY SMALL CAP 100 etc plays a significant role in shaping market sentiments because of their broad representation among diverse sectors.

The Efficient Market Hypothesis (EMH) presumes that share prices reflect all the publicly available information. Thus, EMH proposed that stocks can be bought or sold at market prices as far as investors think that there is no undisclosed or private information (Fama, 1970).

A stock index is a group of stocks that represents the market as whole, a particular segment or industry as well. It catches the complete behaviour of the equity market and depicts the movements of a certain portfolio of share prices to disclose the market trends or patterns. An effective stock index is characterised by good diversification, enhanced liquidity and overall representation of the market. Index composition should be subject to change to

precisely reflect the stock market's current scenario (Baba, 2019). To attain this, indices must be monitored and updated on regular intervals as there as so many reasons behind the adding or removing of companies from indices. In past few years, revisions in stock indices have becoming more prevalent across international or global markets.

Chakraborty (2011) posits that semi – strong form of market efficiency in share prices not only reflects all past and publicly available information but also react very quickly to latest available information, denoting that it is not possible to outperform the market and make abnormal profits solely by trading on new available information.

Thus, study aims to analyse the valuation effect of the index composition in NIFTY 500 companies, by using NIFTY 500 index as the proxy of the market as it is a well-diversified index that reflects the entire market by including companies from all sectors and industries.

## 2.	REVIEW OF LITERATURE

Literature provides a comprehensive examination of existing research and theories related to the impact of index composition changes on market valuation of the firm. Madeira (2004) demonstrated both short – term negative consequences from the exclusion of Libson's stocks from the PSI – 20 index and short-term positive benefits from their inclusion in the index. Chen et al. (2004) determined that there was no lasting fall for the companies that were removed from the S&P 500 index as compared to constant permanent gain in the prices of those that were added. Gujarati & Porter (2010) illuminates that between 1990 – 2005 the share prices of the stocks added to S&P 500 index were increased by over nine percent as compared to severe fall by nine percent to the share prices of stocks removed from the index.

Jain (1987) revealed that the excess return on equities included in the S&P 500 index was +3 percent while the excess return on stocks removed was -1 percent. Parthasarathy (2011) demonstrated sustained, positive anomalous returns around index releases and Nifty index inclusion. Selvam et al. (2012) found that both the addition and removal of equities from NSE S&P CNX Nifty index caused a negative reaction in the market, indicating that investors saw these movements as signs of possible flaws or concern about the companies. The negative sentiments in the market specifically caused due to misconceptions about the viability of the performance of recently added stocks and worries about the financial stability of the stocks that were eliminated.

Baba (2019) studied the effects of inclusion and exclusion information on the value of stocks in the metal industry and stated that inclusion cause a rise in stock valuation while exclusion causes a decline in market valuation. In the both cases, study discovered evidence of semi – strong form of market efficiency. Antonio J. Monroy Antón (2012) investigated into weak and semi – strong informational efficiency in EU ETS markets and concluded that EU UTS had semi – strong informational efficiency only. Kutchu (2012) evaluated a semi – strong form of market efficiency in the Indian stock market and revealed that there was a probability for abnormal returns with regards to company specific factors by using event study methodology. Dharmarathne (2013) carried out a study to look at the Sri – Lankan share market's efficiency from 1999 to 2005 and concluded that it was somewhat semi – strong efficient.

The majority of this field's study has been carried out in industrialised nations or well-established markets like USA, Canada, Japan, Germany etc. Also, in India as well, there is relatively less research has been conducted in this area. The studies majorly covered popular

indices like NIFTY 50, BSE SENSEX, S&P 500, BANK NIFTY but an index like NIFTY 500 had not been explored yet. Thus, this study is aimed to provide a comprehensive view to assess the value implication of exclusion from and inclusion of companies in NIFTY 500 index companies in the current context.

3. STATEMENT OF PROBLEM

The price discovery and simplicity in transfer of company's shares is significantly affected by stock markets. To monitor market trends, the creation of stock indices and frequently up – dation of price movements of the constituent stocks have become common across the globe nowadays. Stock indices, often referred to as market portfolios are well known for representing the whole market as they take into account a significant number of stocks meeting specific market standards. Although, investors typically have keen interest in tracking the indices while creating their investment portfolio. The notion of efficient markets holds major importance in the investment process as it posits that historical, publicly available information and even insider or confidential information will not substantially contribute to achieve returns that surpass those of market portfolio (index) (Ahmad Khan #1 & Ikram, 2012). In order to generate consistent returns with overall market, index fund managers strive to assume market – level risk. They keep on eyeing to detect any shifts in market portfolio and modifies their investment portfolios accordingly.

Indices often undergo changes in their composition resulting in the inclusion and exclusion of companies. These adjustments typically impact the supply and demand dynamics of the market for the shares that are impacted, particularly if a sizeable percentage of investors are index funds. In turn, these adjustments in market dynamics brought by inclusion and exclusion have significant impact on the market valuation affected by compositional changes.

Therefore, current study is aimed to answer a few crucial and empirical questions about whether adding stocks in the index increased or lowered the valuations and if removing stocks from the index increased or decreased valuations. The NIFTY 500 index, created by NSE was chosen because of its wide industry representation and recent use a gauge of the Indian economy in order to evaluate the valuation impact of the index inclusion and exclusion.

4. RESEARCH METHODOLOGY

The aim if the study is to examine how changes in index composition affect a company's stock valuation. The NIFTY 500 index is subject to changes, which include the addition of new stocks and the removal of underperforming ones. When a stock satisfies certain eligibility requirements (For e.g. Market cap), it is added to the index; when it is no longer fulfils the necessary performance standards, it is removed. So, in this study, these inclusions and exclusions were taken up as "EVENTS". Event study methodology as suggested by MacKinlay has been used to analyse the returns around selected event.

The goal of the study on index composition changes was to consider changes in the NIFTY 500 index in 2024. The list of companies is obtained from a press release by NSE on 23rd of August, 2024, which is also considered as "Date of Announcement" for this particular event. NIFTY 500 Index is taken up as a benchmark index for the above study. Share prices of the respective companies have been taken from Prowess Database and verified from NSE Official website for the reliability of data. The following criteria was applied to produce the data sets that were used to examine the returns surrounding the inclusion and exclusion dates:

a)   The companies which were included and excluded belongs to NIFTY 500 index only.
b)   Stock's daily closing price for a period of 196 days before event date and 10 days after the event announcement date is available in the database.
c)   During the event window, there was no event clustering for the companies that were chosen based on the aforementioned criteria. Only event connected to their inclusion and exclusion from the index took place during the event window.

4.1 PROCEDURE FOLLOWED WHILE CONDUCTING EVENT STUDY

a)   Dates of announcement of inclusion and exclusion of companies is taken as "EVENT DAY". 20 days surrounding the event day [10 days before (-10) and 10 days after the event day (+10)] taken up as "EVENT WINDOW". 180 days prior to the first day of the event window i.e. -190 day to -11 days before the event day has been taken as the estimation window.
b)   Returns of NIFTY 500 index were regarded as a well – diversified portfolio and market's counterpart.
c)   Returns of 180 days during the 'estimation window' of the respective shares' returns (RJ) were regressed against the Nifty 500 returns (RM) to determine the constant and the regression coefficient in order calculate the expected returns during the event window (Market Model).
d)   The Difference between the actual returns and the expected returns (as computed in step 3) during the event window is considered as 'abnormal returns' (ARs).
e)   Average Abnormal Returns (AARs) were calculated across stocks by taking simple average of the companies considered throughout the event window, on a day basis.
f)   Cumulative Average Abnormal Returns (CAARs) were also calculated. The Average Abnormal Returns in all the trading days in the event window and Cumulative Average Abnormal Returns during the event window were analysed by using 't' test to identify whether they are statistically different from zero to identify the statistically significant abnormal returns, representing excessive downward or upward valuation in the context of value implication.

4.2 CALCULATIONS

The Return of individual securities are calculated as:

$$R_{jt} = (P_{jt} - P_{jt-1} / P_{jt-1})$$

Where, R_{jt} is the returns of security 'j' at time 't'

P_{jt} is the price of security 'j' at time 't'

P_{jt-1} is the price of security 'j' at previous time observed

In order to calculate the expected return during the event window, based on the constant and regression coefficient during the estimation window (180) days, the following regression is used.

$$R_{jt} = \propto_j + \beta_j R_{mt} + \varepsilon_{jt}$$

Where, R_{jt} is expected return of security j on day 't'

$\propto_j$ is intercept term for security 'j'

β_j is systematic risk component of security 'j'

R_{mt} is return on the market portfolio of the Nifty 50 on day 't'

ε_{jt} is white noise error term of security 'j' on day 't' having zero mean and constant variance

The Abnormal Returns are calculated as,

$$AR_j = R_{jt} - R_{mtj}$$

Where, AR_j is Abnormal Return of the security 'j'

R_{mtj} is the Return of the security 'j' at time 't' arrived at after regressing security return with market returns

$$R_{mt} = (I_{mt} - I_{mt-1}) / I_{mt-1}$$

Where, I_{mt} is Closing Market Index at time 't'

I_{mt-1} is Closing Market Index at previous time observed

❖   The Average Abnormal Returns (AARs) in step 5 for event days observed in the event window across stocks are calculated as,

$$AAR_t = \sum_{j=1}^{n} AR_t = (ARj1 + ARj2\dots\dots\dots ARjn) / n$$

Where, AAR_t is Average Abnormal Returns at time 't' for the sample stocks

AR_{j1} is Abnormal Returns observed in security 1 at 't'

AR_{j2} is Abnormal Returns observed in security 2 at 't'

AR_{jn} is Abnormal Returns observed in security n at 't'

Cumulative Average Abnormal Returns (CAARs) are the sums of daily Average Abnormal Returns (AARs) during the event window:

$$CAAR_t = \sum_{t-k}^{k} (AARt)$$

Where, -k to +k denotes -10 to +10 during the event window.

While the Average Abnormal Returns (AARs) are used to analyse the information content of changes in composition of index and Cumulative Average Abnormal Returns (CAARs) are used to analyse the adjustments of prices to new information. In order to check the efficiency of market, student 't test' has been applied to know whether the Average Abnormal Returns and the Cumulative Average Abnormal Returns did not differ significantly from zero –

$$t = \sqrt{N} \frac{AARt}{St} \sim tn\text{-}1$$

5.   SAMPLE METHOD AND SIZE

The method used to collect the sample of companies is purposive sampling method as companies chosen are for specific purpose i.e. exclusion and inclusion from NIFTY 500 index. A total of 54 events (27 inclusion and 27 exclusion) had taken out for the analysis purpose. 14

companies were removed (13 inclusion and 1 exclusion) from the final data set due to non – availability of data. The reason for non – availability of data (inclusion) is because they are newly listed companies, having entered the market through IPOs within a year. If these companies were included, the event window and estimation period been too short, which would not have been suitable for the proper data analysis. At last, study selected sample of 40 companies out of which 14 are of index inclusion and 26 are of index exclusion as presented in Table 1.

TABLE 1.

SAMPLE SIZE

	INCLUSION	EXCLUSION
Total no. of events	27	27
Events removed due to non – availability of data	13	1
Data available for analysis purpose	14	26
TOTAL EVENTS AVAILABLE	**40**	

6. RESULTS AND DISCUSSION

Exclusion day stock valuation

A company's removal from an index is regarded as a noteworthy informational event having potential to affect the company's valuation. An effort has been undertaken in this study to evaluate the valuation effect of exclusion of the stocks from the NIFTY 500 index and has been highlighted in the following paragraph.

The data set of 26 companies that were evaluated for the study during the event window is analysed for exclusion based on AAR and CAAR with their respective values and statistical significance at 5% as presented in Table 2.

TABLE 2.

AARs and CAARs of the Excluded Companies

DAYS	AAR	t-Statistics AAR	CAAR	t-Statistics CAAR
-10	0.008849	0.068616	0.008849	0.240106
-9	-0.00369	-0.04934	0.00516	0.140021
-8	0.007599	0.064749	0.01276	0.346227
-7	-0.00256	-0.03344	0.010197	0.276676
-6	0.002672	0.018376	0.012869	0.349182
-5	-0.00478	-0.05802	0.008092	0.219571
-4	0.00607	0.092899	0.014162	0.384277
-3	0.008618	0.053488	0.02278	0.618122
-2	0.004341	0.064654	0.027121	0.735906
-1	0.003928	0.046724	0.031049	0.842492
0	0.005719	0.053841	0.036768	0.997663
1	-0.00829	-0.12345	0.028475	0.772643
2	0.005682	0.061686	0.034157	0.926816
3	-0.002	-0.0236	0.03216	0.872632

4	-0.00701	-0.07629	0.025154	0.682531
5	0.003266	0.030652	0.02842	0.771157
6	-0.0032	-0.03755	0.025225	0.684448
7	0.0052	0.07021	0.030425	0.825545
8	0.011178	0.106389	0.041603	1.128853
9	0.008359	0.089787	0.049961	1.35566
10	0.004164	0.030602	0.054125	1.46864

It is observed that the event day generated positive AAR of 0.5719 percent which was insignificant showing that the exclusion from index had adversely affected the companies' valuation during the pre-event period. On the +8th day, AAR is 1.11 percent which is highest among event window but still it shows insignificant results. On -17th day, AAR generated 8.54 percent returns, signifying that impact of exclusion from index starts impacting 17 days before the announcement. This can be due to the problem of information asymmetry or some insider news maybe leaked to some big investment houses or traders. Although no significant CAAR found during the event window, but it can be seen from the t- statistics that results are in increasing order. It means exclusion from index news takes more than 10 days to be digested in the market showing the weak form of market efficiency as stock prices react very slow to the information or information takes time to dissolve in the market.

Days with positive AAR values show that equities generally surpassed projected returns. Negative AAR values, on the other hand, indicate underperformance in comparison to expected returns. The abnormal returns on each day are tested to see if they deviate substantially from zero in the t-statistics column for the average daily rate. The t-statistics are modest for the majority of days, meaning that none of the AAR values are statistically significant. The cumulative abnormal returns over time are displayed by CAAR. It displays the entire event's influence over the course of the event window. By day 10, the cumulative abnormal return hits 5.41%, indicating that during the course of the event window, stocks have surpassed expectations overall by about 5.41%.
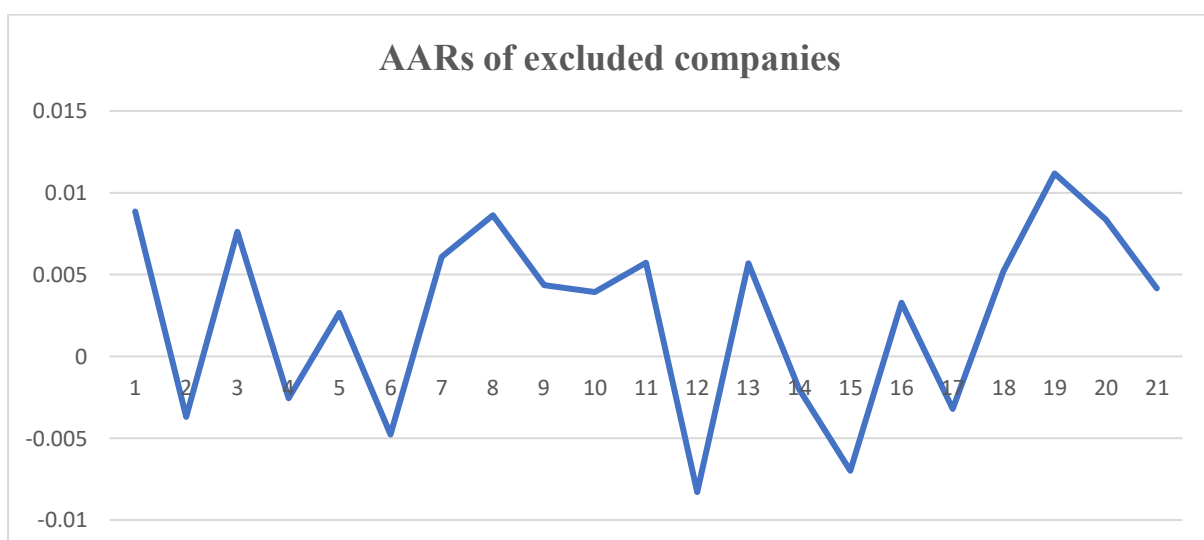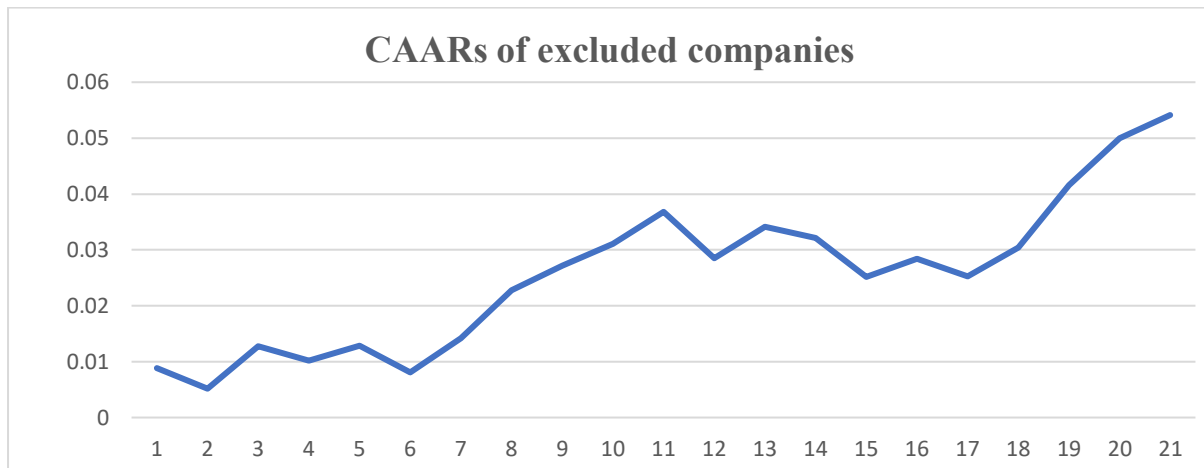

Figure 1. AARs of excluded companies.

Figure 2. CAARs of excluded companies.

Inclusion day stock valuation

It is presumed that a company's share price has increased upon inclusion in an index on the stock exchange. Gujarati & Porter (2010) illuminates that between 1990 – 2005 the share prices of the stocks added to S&P 500 index were increased by over nine percent as compared to severe fall by nine percent to the share prices of stocks removed from the index. Similar efforts have been undertaken to investigate how stock prices respond to new additions to the NIFTY 500 index. The way that shares prices respond to the addition of the stocks to the index is explained in following paragraph:

The data set of 14 companies that were evaluated for the study during the event window is analysed for inclusion based on AAR and CAAR with their respective values and statistical significance presented in Table 3.

TABLE 3.

AARs and CAARs of the Included Companies

DAYS	AAR	t-Statistics AAR	CAAR	t-Statistics CAAR
-10	0.006571	0.058368	0.006571	0.148617
-9	-0.00784	-0.06112	-0.00127	-0.02867
-8	-0.00233	-0.01757	-0.0036	-0.08137
-7	-0.00816	-0.11955	-0.01175	-0.26586
-6	-0.01143	-0.1001	-0.02319	-0.52438
-5	-0.00504	-0.04163	-0.02823	-0.63841
-4	-0.0015	-0.01693	-0.02972	-0.67228
-3	-0.00498	-0.05524	-0.03471	-0.78497
-2	-0.00135	-0.01588	-0.03606	-0.81558
-1	-0.01074	-0.12122	-0.0468	-1.05853
0	-0.00118	-0.02208	-0.04799	-1.08533
1	-0.01635	-0.23995	-0.06434	-1.45512
2	-0.00061	-0.00904	-0.06494	-1.46885
3	4.89E-05	0.000492	-0.0649	-1.46775
4	-0.01042	-0.1911	-0.07532	-1.7035

5	-0.0006	-0.00605	-0.07592	-1.71702
6	-0.00581	-0.0626	-0.08173	-1.8485
7	-0.00086	-0.01654	-0.08259	-1.86792
8	-0.00332	-0.05142	-0.08591	-1.94296
9	0.000617	0.010665	-0.08529	-1.929
10	-0.00196	-0.03499	-0.08725	-1.97341

The day of event noted an AAR of -0.118 percent, showing insignificant results on the day of inclusion. Moreover, the effect was also not positive and the presence of abnormal returns has been eliminated. Positive AAR on – 10th day and +9th day indicates that, on average, performed better than expected, while a negative AAR suggested underperformance of stocks. The value of t – statistics of AAR closer to '0' indicates weak significance while larger absolute values suggest that AAR is statistically significant. As we can see in the data, all values are closer to '0' signifying insignificant results. Starting at day -10, the AAR is positive at 0.65 percent but the t – statistic is very low i.e. 0.058368, indicating that this positive abnormal return is not statistically significant. The stock also sees a pattern of small negative AARs from day -9 to day -1 but none of the AARs are statistically significant as their t – statistics is closer to zero. This implies that the stock performance in the days preceding the occurrence is not strongly supported by the evidence.

On the event day, AAR is slightly negative i.e. -0.118 percent but also the t – statistics is very low -0.02208 indicating that there was not a notable aberrant return on the actual event day. The CAAR keeps decreasing marginally to -0.04799, and the t-statistic for CAAR remains low -1.08533 indicating that the stock has not demonstrated an anomalous return that is statistically significant over time. Following the occurrence of event there is a noticeable drop in the AAR on day 1 i.e. -0.01635 with a relatively with a larger t – statistics -0.23995 though still not statistically significant. After the event, stock appears to underperform although this underperformance is not much noteworthy.
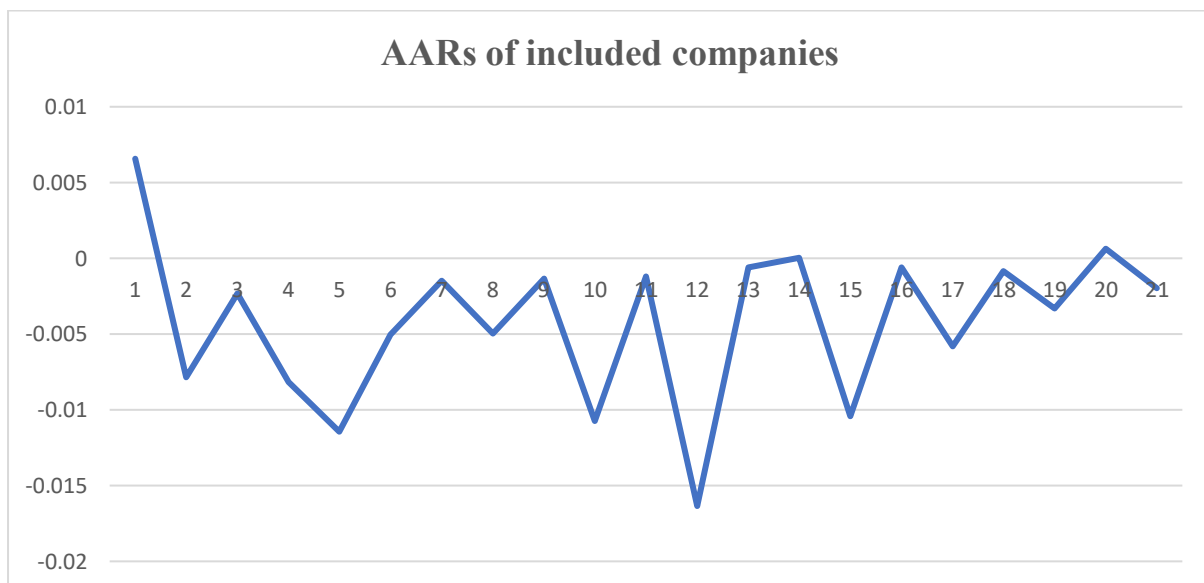

Figure 3. AARs of included companies

The CAAR shows its lowest value on day 10 i.e. 0.08725 with a t – statistics of – 1.97341. It may be inferred from this that the stock has underperformed overall in the days that have followed the event, and this underperformance is getting close to statistical significance i.e. - 1.96. Remarkably, on day 9, the AAR turns positive 0.0617 while not statistically significant, indicating a very little improvement in aberrant performance.
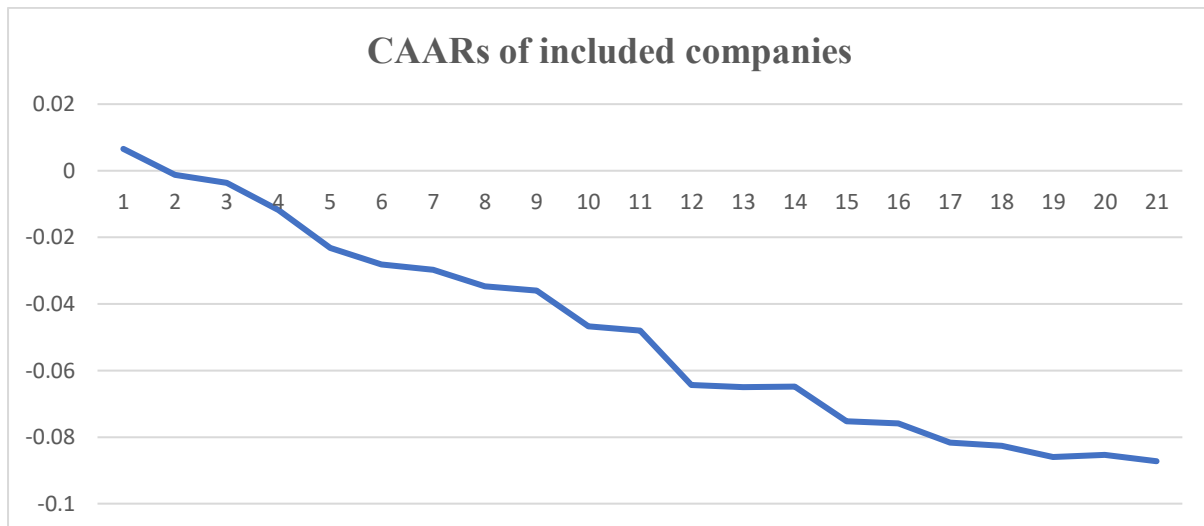

Figure 4. CAARs of included companies.

7.   LIMITATIONS AND FUTURE DIRECTIONS

Since some of the companies in the analysis are relatively young and were just listed through IPOs, and due to eligibility of higher Market capitalisation, got entry into the NIFTY 500 index. Data for these companies is not completely available, this is the reason for their removal from dataset. This lack of historical data might affect the accuracy of the event study. Most of the research in this field has mostly been carried out in developed and industrialised nations like USA, U.K, Germany. Therefore, underdeveloped markets and emerging economies might not be able to fully benefit from the findings of such studies. Moreover, the NIFTY 500 index is a wide representation of the Indian stock market, although not much research has been done on it. This offers a chance to investigate and broader event studies in this context even more, particularly when compared to indexes in developed markets that have undergone thorough investigation. Future research might explore this kind of study in underdeveloped or emerging markets and could utilize multiple indices to provide a broader and more comprehensive perspective.

8.   IMPLICATIONS

This study on index inclusion and exclusion for a variety of market players. For institutional investors, it provides insight into stock price movements around rebalancing events, allowing them to make intelligent portfolio adjustments. Management can utilise this information to better understand investor's behaviour and to plan corporate communications strategically to take advantage of the visibility boost that inclusion provides or lessen the negative effects of the exclusion. The study can help regulators and policymakers to maintain market stability and transparency. Changes in indexes can be used by individual investors to predict future volatility in stocks and make adjustments in their trading or investment plans accordingly. The study also emphasizes how crucial it is for index fund managers to monitor rebalancing events in order to

maximise fund performance and efficiently handle tracking problems. All market players can react strategically to index driven market dynamics by using this information.

9. CONCLUSION

A unique chance to investigate the varied effects induced is presented by a change in an index's makeup. The purpose of this study is to evaluate how changes in the index's composition may affect the valuation of the companies. The NIFTY 500 index was used as a stand – in for the market in the study which was done on NIFTY 500 companies in 2024. A total of 40 such events has been selected where a company has been included or excluded from the index. The results drawn from the study are inconsistent with literature as event in this study does not generate significant abnormal returns in the event window and event day itself.

The results are not consistent with existing literature because the companies included in the NIFTY 500 index were selected on the basis of their market capitalisation, but investors might not fully trust these companies yet. Additionally, the exclusion companies also didn't show significant results as investors still believe that the fundamentals and book value of these companies are still strong enough as compared to newer ones being added into the index. Another reason could be the large size of the NIFTY 500 index, which means that it takes time for the information to completely integrate into the market. This implies that larger the index, the weaker the form of market efficiency.

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