EFFECTIVENESS OF ADDITIONAL SURVEILLANCE MEASURES –EMPIRICAL STUDY USING INDIAN MARKET DATA[1]

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Abstract

SEBI along with the exchanges has implemented Short term Additional Surveillance Mechanism (STASM) as a pre-emptive, effect based mechanism to deter market price manipulations. Stocks that breach the pre-defined limits with respect to daily prices, volatility and market dominance measured across a period of 5-15 days, fall under STASM category. STASM category stocks are subjected to overall additional margins and selective additional margins for the market dominating investors, so that price manipulation is discouraged. This study analyses the impact of the surveillance measure in the short run by using a event study methodology on the price and volume activity. Further in order to understand if the behaviour of price and volume movement is heterogeneous among stocks with continuation and reversal price trends, a dummy variable regression framework is used. The study results show that post inclusion of stock into STASM category, the prices stabilize and traded volume reduces. Based on the results from regression analysis we find that liquidity impact is heterogeneous and stocks with negative CAR are less liquid as compared to

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those with positive CAR. Difference in size of companies does not contribute to liquidity. The current criteria for inclusion of stock into STASM seem to capture stocks that have patterns that are similar to manipulated stocks and post inclusion results show stabilization of prices and reduction in trading volumes. The above results hold good in the post exclusion period also proving the short term effectiveness of the mechanism.

Contents

1 Introduction

Securities markets are important for the growth and development of an economy, as it facilitates the allocation of capital to the most productive and profitable projects in the country. Market manipulation attempts to distort the security prices for personal gains. Such distortions can harm the welfare of the economy, as it can lead to improper allocation of capital and also contribute to market inefficiency. Aggarwal &Wu (2006) define market manipulation as "market trading behaviour where trader creates artificial trading volume and artificial prices and induces others to trade, in order to obtain profits or reduce losses". Fletcher (2018) classified market manipulations into traditional market manipulation and open market manipulation. Traditional market manipulation involves deception, fraud, fictitious trades, price manipulation and such other misconduct that are currently regulated through various anti-manipulation laws and regulations. However, open market manipulations are apparently legal trades executed in the open market trading platforms, with an intent to disturb the fine equilibrium between demand and supply, create artificial prices and volumes that induce volatility and thereby adversely affect market quality and integrity. As the trades are apparently legal, the question of differentiating a legitimate trade from a manipulative one is a regulatory challenge faced by most regulators across the globe. Putnis (2012) stated that "There is no generally accepted definition of the term market manipulation. Legal definition of the term is intentionally not explicit. The term is used in literature in imprecise manner". The supreme court of India in its judgments on different cases has provided some guidance regarding market manipulation. In the case of SEBI Vs. Rakhi (2018), the supreme court observed that market manipulation is a "deliberate attempt to interfere with the free and fair operation of the market and create artificial, false, misleading appearances with respect to price, market, product, security and currency". From the above definition, it can be inferred that any legal trade that is not genuine, attempts to interfere with market operations or mislead the market is "manipulative". Neither intent nor successful manipulative outcomes

are regarded as essential. The contemporary definitions across other global markets also rely heavily on the intention behind price distortion, as an important factor differentiating truly legitimate trades from the manipulative ones. However, Flecher (2018) argued that using price distortion along with "Intent" as the differentiator between good and manipulative transactions is inadequate, because price distortions are also caused by genuine and legal trades that depend on factors like information asymmetry and differences in future expected performance. Often additional evidences like profit or personal gains of the manipulator, market domination, economic reasonableness alleged manipulation result in classifying an apparently legal trade as manipulative, as evidenced by difference cases laws dealing with the subject. Hence, it is proposed that both "intent and harm done to the market" must be considered to differentiate apparently legal manipulative trades from those that are fair economic trades carried out in the markets. Common market conditions that accompany open market manipulations are listed as market dominance, abnormal price volatility, illiquidity (Flecher, 2018).

Market surveillance mechanism is an important tool used to ensure that trading is done in an orderly manner. Real time market surveillance involves monitoring the market activity with the objective of preventing market abuse of market manipulation. In addition to surveillance, regulators have implemented different restrictive trading practices like position limits, imposition of additional margins, price bands that control volatility and cap the single-day price movements, circuit breakers and periodic call auction, rumor verification mechanism, and dissemination of information to prevent market manipulation. While the above measures are aimed at protecting markets from traditional manipulation practices, it is felt that the targeted effect-based surveillance actions can help deter open market manipulations. The Additional Surveillance Mechanism (ASM) implemented by SEBI the capital market regulator through the exchange surveillance mechanism is an effect based preemptive surveillance measure. Trade data is monitored real-time, and securities that exhibit

abnormal price and traded volume variations, along with concentration of trading among a few investors are shortlisted under the ASM category. Surveillance actions on these securities include the imposition of additional margins selectively for the market dominant investors, , reducing the daily price band and issuing warnings to market participants and other traders through the terminal that stocks are included in STASM category. Though it is stated that inclusion of stock under STASM should not be construed as adverse action on the company, the inclusion announcement serves to make the investor aware that the market activity is not normal and that investors should exercise adequate due diligence while entering into trades on this stock. The unique features of this enhanced mechanism are extension of the surveillance action to the client level, discouraging manipulation by increasing capital costs, reduction of volatility by imposing lower bands, and delivery of parallel warning to other uninformed investors about the inclusion of the scrip into the ASM category. The surveillance action is pre-emptive and implemented based on identification of suspicious trade patterns that deviate from the short-term recent past trends. The scripts are allowed to exit the mechanism when they no longer exhibit the inclusion criteria specified. The action is taken based on trade-based surveillance alerts generated by the surveillance system in the exchanges. Thus, the short term ASM is a differentiated and targeted surveillance action aimed at reducing manipulative market dominance by selectively imposing additional margins on market dominant investors along with curtailing volatility. The initiative has been implemented in November, 2018.

This paper attempts to look at the impact of these measures on stock price movements and understand the broader implications of the system on trading activity and market quality. While there are many studies that evaluate the impact of regulations related to insider trading, initial public offers, buybacks, governance, disclosures, we have found that very few studies have evaluated the impact of surveillance mechanisms. Further, the ASM mechanism is unique and different from other regulatory mechanisms as explained above, and this study

attempts to make unique contribution to the literature by depicting our understanding about the effectiveness of targeted surveillance mechanisms on market quality.

The paper is organized as follows. Section 2 discusses the relevant literature and the rationale for implementation of ASM. Section 3 presents the details of the research methodology, sample and variables used in the study. Section 4 demonstrates the results and findings, and Section 5 provides conclusions and contours for further research.

2 Literature and Rationale for Additional Surveillance measures

This paper analyses enhanced surveillance mechanism titled as Short-term Additional Surveillance measure (STASM) implemented by the Indian market regulator to deal with open market manipulations more effectively. While the expected benefit of the surveillance mechanism is to protect market integrity and improve market efficiency, it can be argued that unnecessary excess surveillance has the potential to interfere with free market operations, consume resources, add to transaction costs, may send wrong signals to market, and thereby contributes to market inefficiency and impede market quality. This paper attempts to evaluate the effectiveness of this unique measure which is of interest to both the markets and regulators. This section attempts to look at the past literature and examines the rationale for implementation of ASM. Literature dealing with stock price manipulations generally cover manipulations like insider trading, fictitious orders, rumor spreading, accounting and earnings manipulation, where misconduct is evident. Academic research related to open market manipulations broadly deal with the question of whether it is possible to successfully manipulate stock prices through apparently legitimate trades without taking any observable action that can be termed as misconduct. Fitchel et. al (2018) argued that it is not possible to make profit through open market manipulation because price increases with continuous demand (purchase) of stocks and decreases with consistent supply (selling) of those stocks. Hence,

with no other fundamental reason for the prices to remain at higher levels, such trading strategies cannot be profitably deployed. Therefore, the researchers concluded that there is very low probability for manipulator to profit through open market manipulation and hence such manipulations are self-deterring in nature. Further, as trade based manipulator does not take any publicly observable action or release false information to manipulate the price, which makes it difficult to regulate and enforce. The social cost and enforcement cost of such regulation are very high; and hence, it is not essential to regulate such trades. Contrary to Fitchel's opinion, Allen and Gale (2002) in their paper concluded that in a rational and asymmetric information framework, it is possible to profitably manipulate stock prices They explain that in an asymmetric information framework, investors tracking stock price and volume movements are misled and tend to believe that large price and volume movements are because of fundamental reasons that make the stock undervalued at current prices, and that such information is available in the private domain. ,Hence, by continuously buying by a large trader can give wrong signal to others, resulting in formation of artificial price and demand for the stock. Previous studies on the same question by Hart (1977) and Jarrow (1992) show that profitable manipulation is possible only if there is 'price momentum' in the stock.

The literature on successful manipulation through the use of apparently legal trades has been contradictory. However, the possibility of successful manipulation using open market manipulation cannot be ruled out. Further, it is also felt that irrespective of the gain or loss outcomes with respect to the manipulator, any attempt that results in distorting prices, liquidity, fair supply or demand has to be regulated to preserve market integrity and quality and cannot be ignored.

Other studies on open market manipulations and surveillance broadly deal with factors and market conditions that accompany open market manipulations, critical appreciation of global regulatory practices and case examples of successful or unsuccessful market manipulations.

Flecher (2018) studied open market manipulations from a regulatory and legal perspective. SEC regulations look at "intent" as an important element that contributes toward transforming an apparently legal trade into manipulative one. They argued that both intent and harm done to the market must be considered. The accompaniment of an apparently legal trade by the intention to manipulate causes harm to the markets, i.e., impedes efficiency and liquidity, causes information asymmetry, etc., hence, it should be regarded as manipulative. Aggarwal and Wu (2004) documented that brokers, underwriters, large shareholders, market makers are likely to be manipulators of more illiquid stocks. Further, manipulation increases volatility and it exits in the presence of high liquidity that results in higher prices and higher volatility. Baoling (2021) examined 24 open market manipulation cases in the Chinese markets and concluded that the apparently legitimate transactions are likely to be classified as manipulative in case the price and quantity of the security traded is affected by the trading, and there is an intent to cause such an effect. Comerton-Forde (2013) studied instances of marking the closing price and report that stocks with high level of information asymmetry and mid to low level of liquidity are more likely to be manipulated. Based on the above studies, it can be said that market conditions commonly found to exist during manipulations are market domination, illiquidity, high price volatility, and abnormal trade volumes.

Literary evidence on the question of cost benefit of surveillance activity is inconsistent. However, various studies Cumming and Johan (2008) as well as Huang and Cheng (2015) confirmed that better regulations and implementation of surveillance procedures attract more investors into the markets and maintain

investor's confidence and market quality. With respect to open market manipulations, it is documented that the number of prosecuted cases is very few, however, it is felt that real time surveillance systems help in reducing manipulations. Aitken et. al (2015) in their study across 34 markets concluded that "closing call auctions, direct market access, specific regulations, real time surveillance procedures combined with strict enforcement assure better market integrity and enhance market efficiency".

The arguments against surveillance actions are cantered around high cost and difficulty related to enforcement through the court of law. The ST ASM is a targeted surveillance action that aims at warning both the manipulators and the unaware investors about abnormal trading activity in a stock. The ST ASM is triggered depending on widely documented effects and market conditions that accompany open market manipulations, viz., market dominance and extreme price volatility in the short term in stocks that are generally less liquid in the Indian markets. The categorization of stock as ST ASM category will result in overall increase in margin for the stock as well as specific increase in margin to the market dominant trader, which is a targeted action. This action will translate into higher cost of capital thereby deterring manipulative action. The signal to the unaware investor will also contribute toward making it harder for the manipulator to exit with profits. However, the genuine traders may still pursue the trades, as it may be based on fundamental reasons like undervaluation or other profitable trading strategies. Thus, it is expected that ST ASM categorization will deter open market manipulations. Very few studies have evaluated the impact of surveillance actions on market quality in the context of emerging markets. Hence, this study attempts to make a contribution to the literature in this less explored area.

2.1 Short term ASM regulations

Table 1 provides the details of inclusion criteria, surveillance actions and review mechanism for ST ASM

Table 1 - Inclusion Criteria, Surveillance Action and Review

Inclusion criteria	Surveillance Action	Review and exit criteria
When a stock meets any one of the Price volatility and market dominance conditions specified, the stock is included into STASM. 1. When close to close price variation calculated for a period of 5 trading days is greater than aggregate of +/25% and stock beta times Nifty 50 variation in the same period and When top 25 client accounts hold more than 30% of the combined trading volume of both NSE and BSE in 5 trading days. OR 2. When close to close price variation calculated for a period of 15 trading days is greater than aggregate of +/-40% and stock beta times Nifty 50 variation in the same period and When top 25 client accounts hold more than 30% of the combined trading volume of both NSE and BSE in 15 trading days.	Margin rate for the shortlisted stock is increased to 1.5 times the current margin or 40% whichever is higher subject to maximum of 100%. Additionally, the top 10 clients who have a gross traded value of more than 10 lakhs will be levied 100% margin on the gross traded value at the End of the Day.	The surveillance action will be applicable for a period of 5-15 days and will be reviewed from 6 to 16 days onwards. If the stocks do not meet the inclusion conditions, the stocks will be allowed to exit from ASM category.

The objectives of this study are:

a. To ascertain the impact on the announcement of the inclusion of stock into STASM category on stock returns, traded volumes
b. To analyse the impact of exclusion of stock from STASM category on stock returns, traded volumes. This is done in order to understand the effectiveness of the surveillance action post exit from the STASM.
c. To examine the impact on liquidity and speculative interest when a stock is included into STASM category as part of surveillance action by exchanges.

3 Research methodology

We use Event Study methodology to understand the impact of inclusion of stock into STASM on returns and trading volumes. We further examine the impact post exclusion of the stock from STASM category, in order to understand if there are any significant changes to returns and traded volumes once the restrictions imposed through STASM are removed. The impact of announcement of inclusion and exclusion is examined across the event windows of five days and ten days' period.

To examine the impact of inclusion on market quality we measure liquidity and analyse the speculative interest surrounding the inclusion event. This is done using Regression. The detail methodology is explained in this section.

3.1 Data and sample

The National Stock Exchange (NSE) is the largest exchange in India and offers trading products across equity, equity derivatives, currency, commodity and debt market securities. The exchange has 2023 companies listed with a market capitalization of $3.52 Trillion [1] . The exchange accounts for daily average trading volume of 3378.5 million shares. The exchange offers both the delivery

[1] As on 5th October 2021. Conversion rate 74.5 Rs/USD

and intra-day trading products in the equity cash market segment. Trading opens with a preopen call auction session for the listed securities between 9.00 and 9.15 am and the normal market sessions between 9.30 and 3.30 pm followed by a post closing session from 3.30pm to 3.45 pm. The exchange runs a central limit order book that matches orders based on the price time priority order matching rule in the continuous market trading session.

STASM has been implemented by the exchanges in November 2018. NSE's surveillance department issued its first circular categorizing companies into STASM on 21st November, 2018, that has become effective from 22 November, 2018. For the purpose of this study, the data of companies included or excluded from STASM along with the date of inclusion and exclusion is provided by the surveillance department of NSE. To study how the inclusion and exclusion event affect trading activity, price and market quality, a sample set of 245 events of inclusion announcement and exclusion announcements made in the first 3 months of implementation, i.e., from 21 November, 2018 to 28th February, 2019 is used. From the sample size of 245 events, we have excluded events related to companies that have carried out mergers or acquisitions in the preevent estimation window and finally we have a sample of 218 events and 188 unique companies. It is seen that the companies entering into STASM was generally spread across various sectors. The top sectors having more than 10% of the companies in the sample are IT, financial services, metals and construction sector companies. However, these companies are included into STASM category on various dates spread across the 3 months and no clustering of companies in the same sectors is seen.

The number of days spent by companies in the STASM category before exclusion is given in Table -2.

Table 2 – Days spent in STASM

Days in ASM	up to 10 days	11-20 days	21-30 days	31-40 days	41-60 days	61-70 days	71-80 days	> 80 days	Total
Number	107	53	21	31	nil	2	3	1	218

For these 218 events , the trading activity data of adjusted closing price, shares traded, number of transactions, shares deliverable as percentage of shares traded is collected for a period of 150 days before the event and 10 days after the exclusion from the CMIE (Center For Monitoring Indian Economy) prowess database. The database showed instances of days without any trading for some companies in the sample. The price data for such days was forward filled with the closing price of the last traded day and the volume data was filled with 0.00025 in order to ensure that log10 of the number is not undefined.

3.2 Description of Measures

This paper measure impact of STASM on volume based liquidity and speculative interest in the stocks surrounding the inclusion event. The measures and their calculations are provided.

3.2.1 Shares deliverable as % of shares traded

The equity cash market products available for trading in the National stock exchange include delivery trading and intra-day trading. Intraday trading involves the use of intraday price movements and leveraged trades for making profits by taking both the short and long positions in equities depending upon expected stock price movement during the day. The NSE provides data of volume that are delivery based and those that are intraday trades for the each stock. The data of percentage shares traded for delivery shows the investor interest in shares, and the intraday trades represent the speculative interest in the shares. Hence, if the percentage of shares traded for delivery reduces, it can

be said that the speculative interest in the share has increased. We have not found the use of this variable in literature examined by us. The changes to shares deliverable as a percentage of shares traded (psd) across the event window of $(5,+5)$ is useful in understanding the speculative interest surrounding the event. It is calculated as below: percentage shares deliverable

$$psd = \ln\{\frac{1}{n}\sum_{n=5}^{n} psd\} \quad ..(1)$$

where psd is the daily percentage of shares deliverable in the event period stock i and time t, -5 or +5 days.

3.2.2 Volume based liquidity measures

The study uses popular measures of volume based liquidity measures found in literature to analyse the impact of STASM on liquidity. The details about the measures are listed. *Turnover ratio (stso):*

We use turnover ratio to measure the liquidity which is as calculated similar to Lesmond (2005).

$$stso = \ln\{\frac{1}{n}\sum_{n=5}^{n}\frac{shares\ traded}{shares\ outstanding}\} \quad ..(2)$$

Trade size (tradesize):

Trade size represents the quantity traded per transaction executed on the day. Increases in trade size can be interpreted as market depth improvement. It means more volumes could be exchanged per transaction, implying increase in order quantity per order and better liquidity. Trade size is calculated as below,

n

$$stso = \ln\{ \frac{1}{n} \sum_{n=5} \frac{shares\ traded}{number\ of\ transactions} \} \quad ..(3)$$

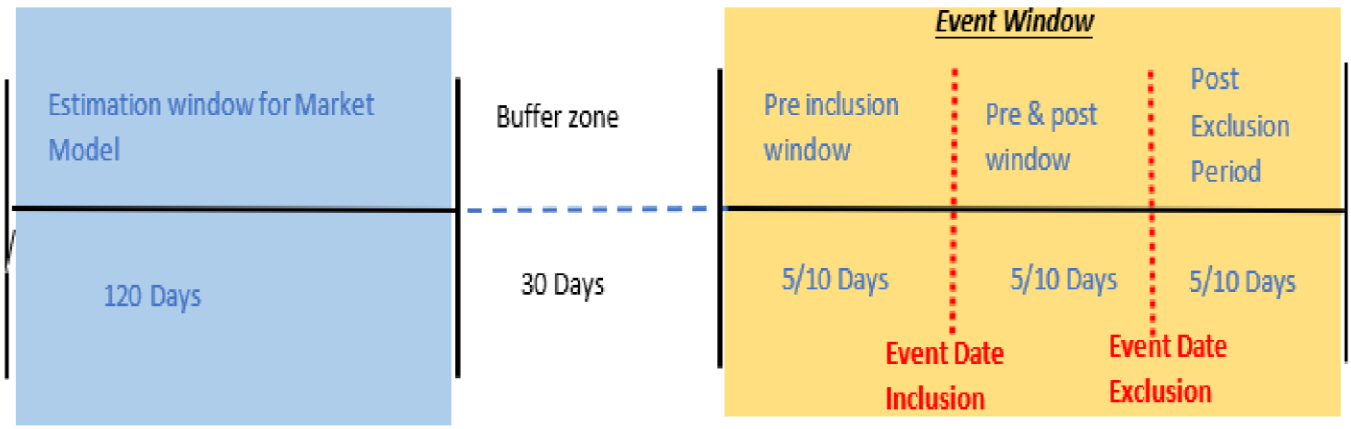
Size (lsize) :

Size of the company is measured as the natural log of the market capitalization as on 1st April 2019 for all the companies in the sample

3.3 Hypothesis and Event study

The study uses the market model specified by Fama et.al. (1969) and Brown and Warner (1985) to estimate the abnormal returns in the pre and post inclusion and exclusion periods. While estimating the returns for the market model, the estimation window is considered as 120 days. The buffer period of 30 trading days was kept between the estimation window and trading window. Event window was set for 5 days and 10 days before and after the events with respective stock price inclusion or exclusion from the STASM mechanism as shown in Figure 1. For calculating the expected return, the stock prices of estimation window was regressed with Nifty50 index.

Figure 1- Event Study Conceptual Design



3.3.1 Price Impact study

The following hypothesis were tested:

1. H_0= Inclusion of Stock into the ST-ASM category does not affect the stock price abnormal return.

2. H_0= Exclusion of Stock from the ST-ASM category does not affect the stock price abnormal return.

Stocks are included in STASM category only when they exhibit high abnormal returns in the preevent period of 5 or 15 days. Hence, it is expected that on inclusion the prices will revert back to normal returns in the post event period. Stocks included into STASM are excluded only with the stabilization of the prices and market domination by a few investors is absent. Hence, in the preexclusion period, it is expected that the stock returns are in the normal range and the same is expected to continue after exclusion.

For estimating the average abnormal return of event window for sample stocks using the market model, the following steps have been followed. The expected return on the stock is estimated using equation (4).

$$ER = \alpha i + \beta i.\, R_{Nifty\_index} + \varepsilon it \qquad (4)$$

Here, ER is expected return, α is intercept for $_i$ β_i is the slope indicating a market risk of return of NSE Nifty50 index ($_{Nifty50}$), ε_{it} is error term with finite variance.

The abnormal return (AR) is calculated as follows:

$$AR_{it} = R_{it} - ER \qquad (5)$$

AR is abnormal return for observation ith company at time t, which is calculated as the difference between expected return derived from equation (4) and actual return (Rit). Cumulative abnormal return (CAR) has been calculated by adding up each abnormal return AR_{it} with its subsequent return, as follows.

$$CAR_{it} = \sum_{t=t1}^{t2} AR_{it} \quad ..(6)$$

To evaluate the overall impact of an event, we have averaged all return for time t and calculated the average abnormal return AAR_{it} as per the following equation (7).

$$AAR_{it} = \frac{1}{N} \sum_{t=t1}^{N} AR_{it} \quad \ldots(7)$$

Cumulative average abnormal return $CAAR_{i,-tn}$ for n days event window has been calculated as per equation (8).

$$CAAR_{i,t-t5} = \frac{1}{N} \sum_{t=t1}^{N} CAR_{i,t-t5} \quad \ldots(8)$$

3.3.2 Volume Impact study

The following hypothesis were tested to understand changes to daily trading volume surrounding inclusion and exclusion event.

3. H_0= Inclusion of Stock into the STASM category does not affect the stock volume.

4. H_0= Exclusion of Stock from the STASM category does not affect the stock volume.

The turnover ratio calculated is similar to the calculation done by Campbell, C.J. and Wasley, C.E. (1996). Turnover ratio is the ratio of shares traded to shares outstanding. The log10 of turnover ratio is taken to ensure that the data

is normal and ratio is calculated as per equation 9. Increase in the ratio of shares traded to shares outstanding represents more volumes and vice versa.

$$V_{i,t} = log\left(\frac{n_{it}+0.00025}{s_{it}} * 100\right) \quad \ldots \quad (9)$$

where, n is the number of shares traded for company $_i$ at time *t*. The constant 0.00025 is added to avoid log value from becoming zero. s_{it} is the number of outstanding shares as on 30th September, 2018, the half year before November, 2018.

The abnormal volume (Av_{it}) and (CAv_{it}) cumulative abnormal volume are arrived by using the market model similar to price study with Nifty50 as the benchmark index. The abnormal volume and cumulative abnormal volume is calculated using equations (10) to (13) detailed below. The significance of daily abnormal volume is tested using one sample t test.

$$Av_{it} = Vt - V_{it} \quad \ldots\ldots (10)$$

$$CAv_{it} = \sum_{t=t1}^{t2} AR_{it} \quad \ldots\ldots (11)$$

$$AAv_{it} = \frac{1}{N}\sum_{t=t1}^{N} Av_{it} \quad \ldots\ldots (12)$$

$$CAAv_{i,t-t5} = \frac{1}{N}\sum_{t=t1}^{N} CAv_{i,t-t5} \quad \ldots\ldots (13)$$

Where, AAv_{it} and $CAAv_{i,t-t5}$ is average abnormal volume and cumulative average abnormal volume.

By design, inclusion of the stock into STASM implies existence of extreme price volatility and market dominant investors contributing to and more than 30% of the trading volumes across the exchanges in the past 5-15 days preceding the

inclusion. Hence, it is expected that the pre-event stock trading volumes may be high. Inclusion into STASM is expected to reduce the surge in volumes and on exclusion, the volume should continue to be at the normal level.

3.3.3 Event Study Tests

Event study methodology assumes that the market is efficient and there are no other confounding events. There are some statistical issues while conducting test statistics for AAR & CAAR (Binder,1998; Kolari 2011). The use of market model for estimation of abnormal returns may pose some problems in hypothesis testing due to reasons such as abnormal return estimators that may be cross sectionally correlated or have different variances across firms as pointed out by Brown and Warner (1985). Through the clustering of all events, the changes of standard deviation cross sectionally is induced, which result into very high standard error. As standard error is a part of t statistics, then it may become inflated. These problems are addressed by the use of tests like the cross-sectional t test (Brown and Warner, 1985), and adjusted Patell Z test. Additionally, the study also uses the non-parametric rank test (Cowan, 1991;Charles J. Corrado;Terry L. Zivney, 2016).

3.4 Regression Analysis – Analysing liquidity and speculative interest

Key characteristics of manipulated stocks documented in studies by Baoling. (2021), Huang CY et. al (2005) are large spike in stock prices, high volatility, upward spike in trading volumes, short term price continuation and long term price reversals. Manipulated stocks are also generally mid or small cap stocks with low liquidity. The stocks included in STASM include stocks with both positive and negative abnormal returns which have both continuation and reversal price patterns. Impact of liquidity on different stock with varying price momentum characteristics and varying size may be heterogeneous. We apply dummy variable regression analysis similar to one applied by Rong et.al (2021)

to understand the impact on liquidity, for the sample set of companies differentiated based on continuing and reversing price patterns. We use an event case analysis method developed by Kim and Rhee (1997) and classify the sample based on the direction of CAR in the pre and post inclusion period of five days. We compare the CAR in the pre-inclusion period with CAR in the post inclusion period, over the 5-day event window. If the direction of movement of CAR in the post event window of five days is same as the pre-event window of 5 days, then it is treated as a continuation pattern. If the direction changes then it is defined as a reversal pattern.

The sample is classified into four categories based on the direction of price momentum using CAR.

The details of the sub samples is given in the Table 3.

Table 3: Classification based on Price momentum in pre/post event inclusion period

	No	**CAAR -5D**	**CAAR +5D**	**Total %**
Upward Momentum	151	22.96%	-0.02%	69%
Continuation in up move	59	19.74%	10.26%	39%
Reversal in prices	92	25.02%	-9.21%	61%
Downward Momentum	67	-17.99%	1.80%	31%
Continue fall	28	-24.30%	-9.82%	42%
Reversal of fall	39	-13.44%	10.16%	58%
Total	218			

From the table, it can be seen that 69% of the stocks in the sample record an upward price momentum of 22.96% on an average in the five days window during the preinclusion period and reverse on an average to -0.02% in the post inclusion period of five days. Only 31% of the stocks enter the STASM category with a fall in average CAAR by 17.99% and record a reversal of CAAR to 1.80% in the post inclusion period of five days. It is interesting to note that, 40% of the stocks exhibit a

continuation of price momentum patterns in the post STASM inclusion period.

3.4.1.1 Cross sectional regression analysis

We use a cross sectional regression analysis with the data of 5 day event window to understand the relationship between Cumulative Abnormal returns (CAR) and Cumulative Abnormal Volume (CAV), turnover ratio (lnstso), speculative interest (lnpsd), trade size (lntradesize), and size (lsize) surrounding the event. This is done using the following regression equation across the full sample of events before and after inclusion into STASM.

$$Y_{it} = \beta_0 + \beta_1 \, lnstso_t + \beta_2 \, lnpsd_i + \beta_3 \, lntradesize_i + \beta_4 \, lsize_i + \varepsilon_{it} \ldots\ldots\ldots (14)$$

Where Y_{it} is CAR for stock i in time t., lnpsd is measure of percentage shares delivered, lnstso is the natural log of turnover ratio, lntrade size is the natural log of trade size and lsize is the log of market capitalization of company.

3.4.1.2 Regression Analysis – Heterogeneity in Liquidity impact based on price patterns

The liquidity measures outlined in section 3.2 are calculated for each stock for the event period (-5,+5) on inclusion. The cross sectional means of the measures are calculated and tested for significant difference using paired t test. Further, the study uses ordinary least square dummy regression framework to test if the liquidity is affected differently with respect to stocks that have a continuation price trend as compared to those that show reversal, to conclude on the

effectiveness of the STASM measures.. The OLS regression as per Eq (15) with dummy variables is done to understand the impact heterogeneity of STASM on market quality in the pre and post inclusion period and across different price trends. 4 sets of regressions are done with each of the liquidity measures as dependent variable. The price pattern combinations analysed include stocks with positive CAR on entry and continuation trend after inclusion, stocks with negative CAR on entry and continuation trend after inclusion, stocks with positive CAR on entry and reversal after inclusion and stocks with negative CAR on entry and reversal after inclusion. The interpretations are based on the sign and significance of the beta co-efficient of the respective independent variables. The equation used for the analysis is given

$$Y_{it} = \beta_0 + \beta_1 Post_t + \beta_2 preCAR_i + \beta_{3inter} Post_t * preCAR_i + \beta_{4\,inter} Post_t * preCAR_i * contd_i + \varepsilon_{it} \ldots (15)$$

Yit represents lnstso (natural log of turnover ratio) or lntrade size (natural log of trade size), preCAR represent the sign of CAR when the stock was included. i.e. stock was included with positive or negative CAR (price spike) on entry. Positive CAR is coded 1 and negative CAR is 0

Postt represents dummy variable 1 for the post inclusion period and 0 for the pre inclusion period. Contd is the continuation pattern of CAR for the stock which may be continuation or reversal.

3.4.1.3 Regression Analysis – Heterogeneity in Speculation interest based on price patterns

The interest in speculation as measured using shares deliverable as % of shares traded (psd) (as in section 3) is calculated for pre inclusion and post inclusion period of 5 days for each of the stock. The cross sectional means of psd before and after inclusion are tested for significance using paired t test. The impact heterogeneity with respect to speculative activity surrounding the inclusion

event for each of the price patterns is measured using the regression framework specified in equation 15. Where psd is the dependant variable. The different price patterns described above are repeated for this study also.

3.4.1.4 Regression Analysis – Size impact on liquidity and speculative interest

This section also looks into heterogeneity in size measured using market capitalization of firms. Analysis is done to understand if there is any difference in the way in which the liquidity is impacted between the large and small firms. We have classified the companies into large and small companies by taking into account the top and bottom 30 percentile based on market capitalization. We have eliminated 40% of the samples that fall in between the top and bottom 30%. It looks at how difference is Size affects both liquidity and speculative interest among the STASM stocks.

$$Y_{it} = \beta_0 + \beta_1 Post_t + \beta_2 Size_i + \beta_{3inter} Post_t * Size_i + \varepsilon_{it} \ldots\ldots\ldots (16)$$

Y_{it} is or Turnover ratio or trade size or percentage stock delivered for stock i in the period t. $Post_t$ represents dummy variable 1 for post inclusion period and 0 for pre inclusion period. Size is the dummy variable 1 for large market cap companies.

The sign of the coefficient of the interaction dummy β_{3inter} will show the impact of large companies in the post inclusion period on different measures. Negative sign indicates fall and vice versa.

4 Results and discussion.

4.1 Price event study results

Table 4 reports the changes in AAR, and CAAR, with respect to the pre and post inclusion and exclusion of stock in STASM. The result shows that AAR and CAAR increased sharply before inclusion and fall steeply after inclusion. The difference is larger for five days event window as compare to 10 days period. It shows that stock inclusion in STASM have sharp short-term reaction on prices.

Table 4 - Event window Pre & Post summary

	5 days Event Window			10 days Event Window		
event	*Pre event*	*Post event*	*Difference*	*Pre event*	*Post event*	*Difference*
	1	2	3=1-2	1	2	3=1-2
AAR- Inclusion	2.10%	-0.15%	2.25%	0.90%	0.15%	0.75%
CAAR- Inclusion	10.51%	-0.92%	11.43%	8.96%	1.68%	7.28%
AAR- Exclusion	-0.20%	0.12%	-0.32%	0.73%	0.08%	0.65%
CAAR-Exclusion	-1.10%	0.73%	-1.83%	7.33%	0.86%	6.47%

To evaluate the impact of the event on CAAR, we tested the event study hypothesis with parametric and non-parametric tests whose results are presented tin Table 5. The inclusion event CAAR is significant for 1 day, 2 days, 5 days and 10 days event window, implying that there is a significant difference in CAAR across pre event and post event period. The results are significant across all different parametric and non-parametric tests applied. In case of the exclusion event it can be seen that in the 1 day, 2 days and 5 days event window the results are not significant as expected this shows that the CAAR stabilizes in the post inclusion period and continue to remain stable even after exclusion.

However, in the 10 days window it can be seen that the CAAR is significant. The time spent by companies in STASM shows that 107 events have spent less than 10 days in STASM post inclusions. Hence, the data of preexclusion period can overlap into the pre-inclusion window of exclusion, where the prices were more volatile. So the exclusion event window may be showing significant CAAR in the 10 day window period.

Table 5-A: Significance test price study

Grouping	Inclusion Event Window		Exclusion Event Window	
CAAR Type	(-1, 1)	(-2, 2)	(-1, 1)	(-2, 2)
Number of CARs considered	218	218	216	216
Parametric Tests				
Patell Z	-2.799**	***	0.820	1.130
	5.487			
Csect T	-2.241 *	2.691 **	0.578	0.488
Non-Parametric Test				
Gen SignZ	-1.027***	3.038 ***	0.313	0.914
Rank Z	-2.062 **	0.645	-0.002	0.207
Gen Rank T	-1.384	2.0282 *	0.554	1.605

P-values: *** p<0.01, ** p<0.05, * p<0.1,

Table 5-B: Significance test price study

Grouping	Inclusion Event Window		Exclusion Event Window	
CAAR Type	(-10, 10)	(-5, 5)	(-10, 10)	(-5, 5)
Number of CARs considered	218	218	216	216
Parametric Tests				

Patell Z	10.0554 ***	12.6934 ***	7.455 ***	-0.3912
Csect T	5.7281 ***	5.6983 ***	5.0729***	-0.0947

Non-Parametric Test

Generalized Sign Z	6.5616 ***	6.8327 ***	6.0239***	-0.7427
Rank Z	2.251 **	2.9395 **	2.1476**	-0.6775
Generalized Rank T	6.8352 ***	6.8837 ***	6.7382***	0.6467

P-values: *** p<0.01, ** p<0.05, * p<0.1,

As hypothesized and expected, it can be seen that the CAAR has fallen from 10.51% to negative of 0.92% in the five days event window of inclusion study. The difference in CAAR in the pre and post inclusion periods are significantly different at 1% level of significance as per all the tests prescribed. Further, the exclusion window of five days also shows that in the pre-exclusion period, the average CAAR is -1.10%, which has increased to 0.73% in the post event period and is not significantly different as hypothesized.

The return pattern of AAR and CAAR across the inclusion and exclusion event window of -5, +5 and -10, +10 is shown in figures 2-5. The inclusion of stocks in STASM leads to significant decline of AR (refer Figures 2,3) whereas, the exclusion from STASM insignificantly affect the AR during the post five days, but small increases are seen post eighth day of exclusion (refer Figure 4,5)

Figure 2: AAR & CAAR Event Window (-10,+10) Inclusion to STASM

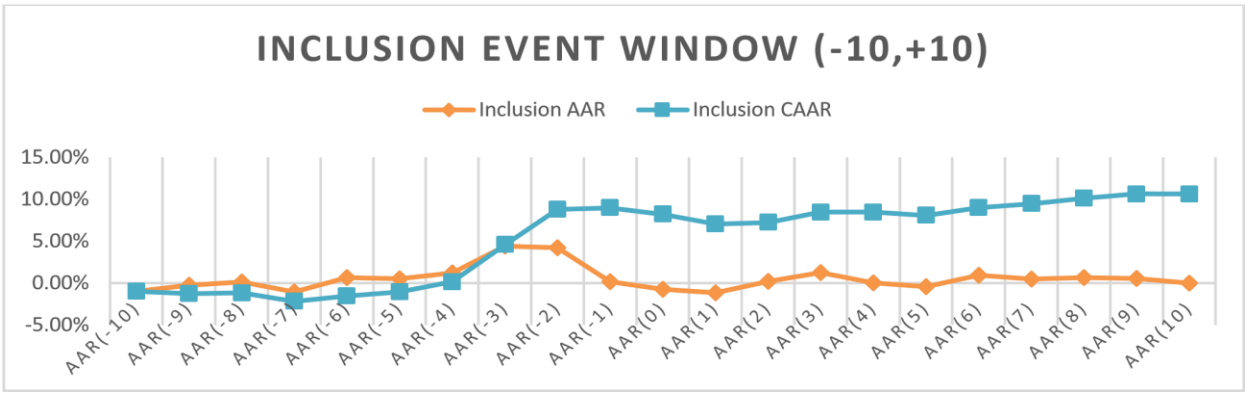


Figure 3: AAR & CAAR Event Window (-5,+5)- Inclusion to STASM

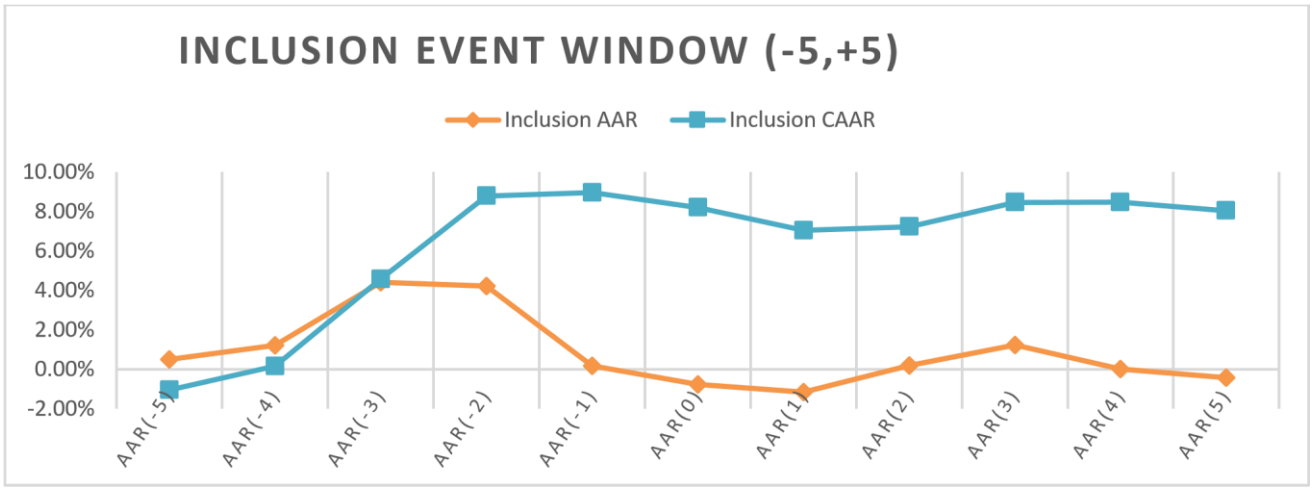


Figure 4: AAR & CAAR Event Window (-10,+10) Exclusion from STASM

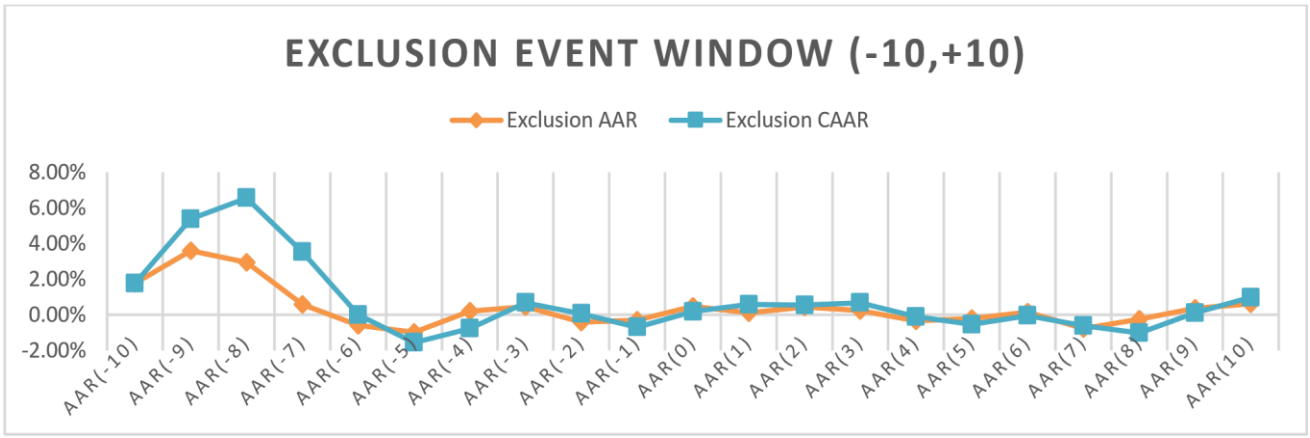
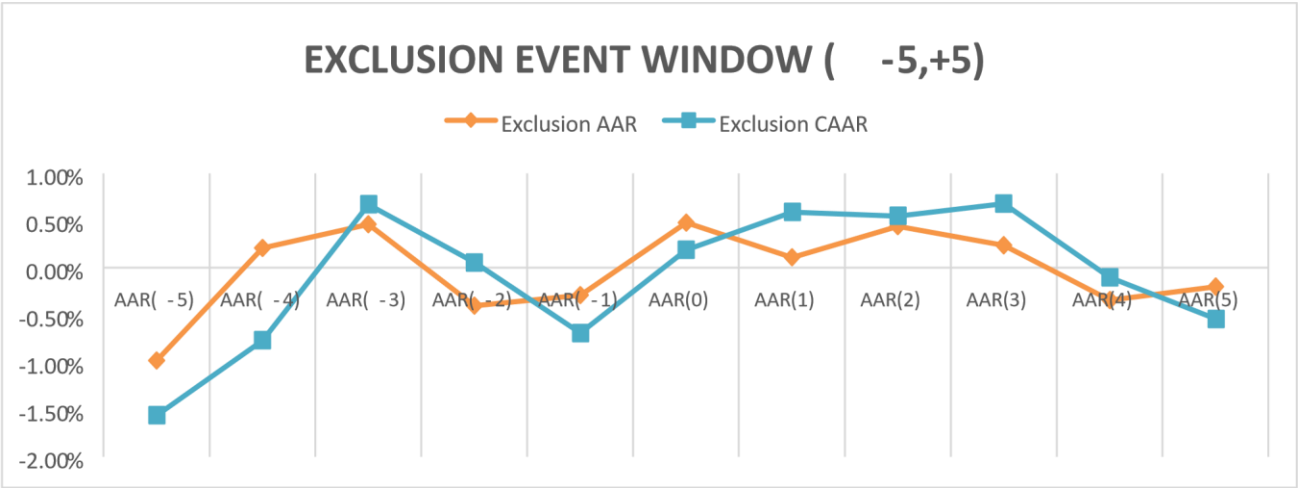


Figure 5: AAR & CAAR Event Window (-5,+5)- Exclusion from STASM



Hence, it can be said that the inclusion of stocks into STASM helps to control the price momentum among the stocks in the post inclusion period and the prices continue to remain stable even after exclusion of the stock from the STASM category.

4.2 Volume Event study results

The result of volume event study shows that the average abnormal volume is significantly high before inclusion (refer Figure 6) and low after the inclusion of stock to STASM as shown in the descriptive statistics in Table 6. While the average abnormal volume decreases sharply post inclusion to STASM during

five days window. In case of exclusion, the difference in case of AAV and CAAV is not much, but the volume increases gradually in case of 10 days event window.

Table 6: Event window pre and post summary-Volume study

	5 days Event Window			10 days Event Window		
	Pre Event	*Post Event*	*Difference*	*Pre event*	*Post event*	*Difference*
	1	*2*	*3=1-2*	*1*	*2*	*3=1-2*
AAV- Inclusion	*0.948*	*0.386*	*0.562*	*0.513*	*0.268*	*0.245*
CAAV- Inclusion	*4.740*	*2.317*	*2.423*	*5.133*	*2.956*	*2.177*
AAV- Exclusion	*0.352*	*0.211*	*0.141*	*0.591*	*0.157*	*0.434*
CAAV-Exclusion	*1.757*	*1.266*	*0.491*	*5.901*	*1.729*	*4.172*

The test result (refer table 7)shows that Abnormal volumes are insignificant only after 7 days post inclusion. This may be because out of the sample set of events, only 107 events are excluded from STASM in a period of less than 10 days. More than half the events spend more than 10 days in STASM before they are excluded. Though the price action happens faster, volumes are probably taking longer to get back to normal levels. However, post exclusion the volume decreases significantly (Figure 7).

Table 7: Significance test results – Volume Study

Cross Sectional t test Average Abnormal Volume						
	Inclusion			Exclusion		
Exclusion	t-stat	p-value		t-stat	p-value	
-10	0.098	0.923	8.920	0.000 ***	-0.095	0.925	10.375
-9	0.000 ***					
-8	0.087	0.931	10.603	0.000 ***		
-7						

-6	1.687	0.093		6.674	0.000 ***
-5	2.393	0.018	***	6.632	0.000 ***
-4	4.557	0.000	***	4.351	0.000 ***
-3	10.008	0.000	***	3.725	0.000 ***
-2	12.162	0.000	***	3.026	0.003 ***
-1	11.523	0.000	***	3.193	0.002 ***
0	7.555	0.000	***	4.802	0.000 ***
1	6.088	0.000	***	3.682	0.000 ***
2	5.762	0.000	***	3.185	0.002 ***
3	4.192	0.000	***	2.788	0.006 ***
4	2.679	0.008	***	1.494	0.137
5	2.934	0.004	***	2.187	0.030 ***
6	3.808	0.000	***	1.558	0.121
7	2.216	0.028	**	1.211	0.227
8	1.731	0.085		1.311	0.191
9	2.444	0.015	**	0.401	0.689
10	1.241	0.216		1.696	0.091
	1.316	0.236		1.521	0.224

Following Figures 6 and 7 summarize the price and volume relations during the pre and post inclusion and exclusion to STASM. AAR is presented in the secondary Y axis and AAV is presented in the primary Y axis.

Figure 6: Price and volume- Inclusion window

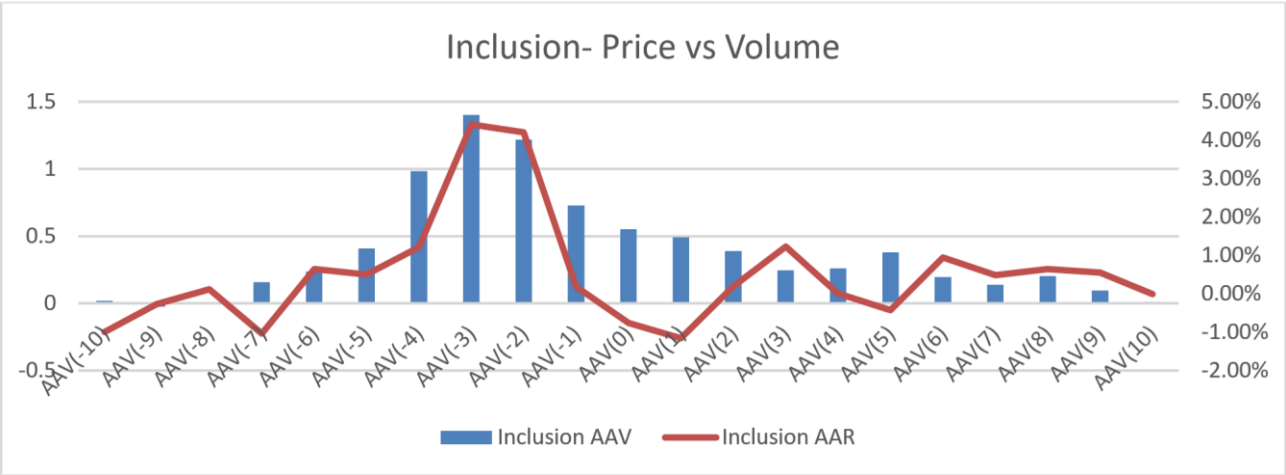
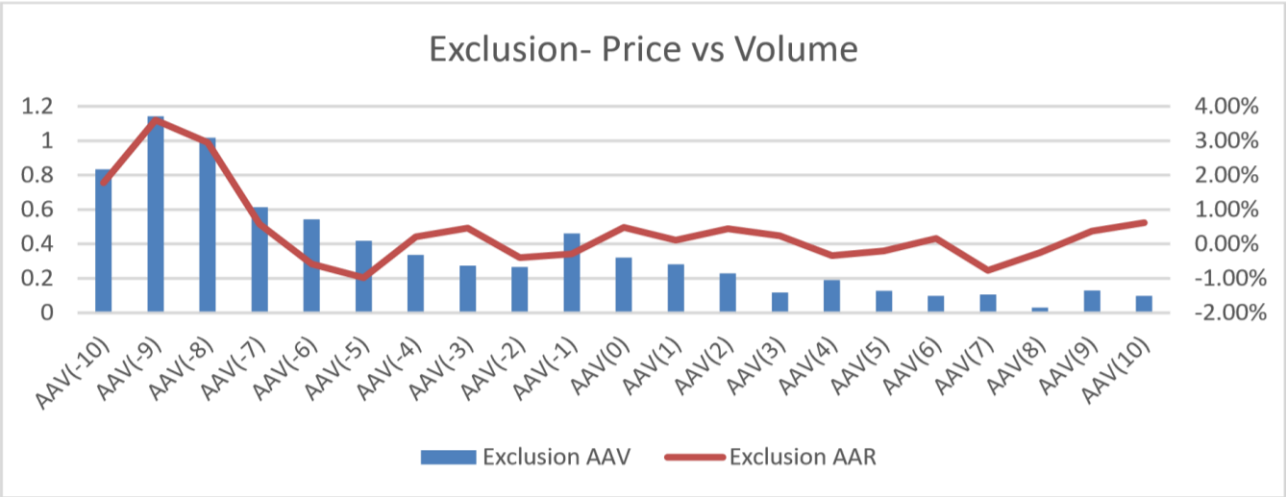


Figure 7: Price and volume- Exclusion window



4.3 Results of Cross sectional Regression analysis

The descriptive statistics of the explanatory variable included in the model is provided in Table 8 . It can be seems that shares traded, number of transactions, trade size are falling in the post event window of five days period. **Table 8 – Descriptive statistics Inclusion event**

	5 day window		
	Pre (N=218)	**Post (N=218)**	**Full sample (N=436)**
Shares traded			

Mean 605518 337529	471523		
Standard Deviation	1617159	953359	1332664
Minimum 1694 722	722		
Maximum 14336678	11601862	14336678	
Number of Transactions			
Mean	2161	986	1573
Standard Deviation	9518	2804	7032
Minimum	8	10	8
Maximum	131848	31850	131848
trade _size			
Mean	893	717	805
Standard Deviation	1705	1266	1502
Minimum	9	9	9
Maximum	9767	6686	9767
trade _size			
Mean	893	717	805
Standard Deviation	1705	1266	1502
Minimum	9	9	9
Maximum	9767	6686	9767

This percentage of shares of deliverable was lower in the 120 days estimation window and then increased in the pre-inclusion event window and further increased post inclusion. This can be interpreted as fall in speculative interest in the shares both in the pre-inclusion and post inclusion stages. Thus, trading activity in the pre and post inclusion periods are less speculative as compared to the estimation event window of 120 days.

Table 9 - Association of CAR

Description	5 Day event window (N=436)						
	Dependent variable - CAR						Adj R sq
	const	CAV-5	lnstso	lntradesize	lnpsd	lsize	
Coefficient	-0.0399	0.0094	0.0021	0.0123	-0.0012	0.021	0.073
P value	0.7510	0.0000	0.8180	0.0560	0.9730	0.2740	

Table 9 provides the summary results of analysis of association of CAR with abnormal volume and other liquidity measures and speculation activity surrounding the inclusion event across the full sample. It is seen that Cumulative abnormal return increases with increase in cumulative abnormal volume. Trade size also significantly increases with increase in CAR. Thus, increase in CAR is accompanied by increase in both volumes of trade and transaction size, which is similar to results by Huang C Y (2005).

4.4 Results – Heterogeneity in Liquidity impact based on price patterns

The results of analysis of liquidity measures trade size and turnover ratio is presented in this section. The means and the variances of the pre inclusion and post inclusion period are given in the Table 10. It can be seen that average liquidity of the cross section of events has fallen in the post inclusion period for the sample. Both market depth and volumes were significantly affected due to inclusion of stocks in STASM period. The paired T test results show that the means are significantly different across the two periods.

Table – 10 : Results t test - Paired Two Sample for Means for liquidity measures

	trade size Pre	trade size Post	Stso Pre	Stso Post
Mean	*892.8371*	*717.0153*	*0.004625*	*0.002309*
Variance	*2907833*	*1601568*	*0.000188*	*0.0005*
Observations	*218*	*218*	*218*	*218*
Pearson Correlation	*0.898324*		*0.91866*	
Hypothesized Mean Difference	*0*		*0*	
df	*217*		*217*	
t Stat	*3.264981*		*3.857288*	
P(T<=t) one-tail	*0.000636*		*0.000002*	
t Critical one-tail	*1.651906*		*1.651906*	
P(T<=t) two-tail	*0.001272*		*0.000151*	
t Critical two-tail	*1.970956*		*1.970956*	

The question of differences in liquidity impact on stocks with different price patterns is examined using dummy regression framework. Results of liquidity impact on stocks with price pattern that is CAR positive on inclusion is provided in Table 11

Table 11 - Liquidity impact on stocks with positive CAR on inclusion

	Price pattern – Positive CAR with continuation in post inclusion	
	5 Day event window (N=436)	
	Dependent variable - lntradesize	

Description		Post	posd	Post*posd	posdcontdpost	Adj R sq
Coefficient	5.4658	-0.0123	0.2383	-0.2892	0.3708	0.0000
P value	0.9610	0.2630	0.3590	0.1250		0.001
Dependent variable - lnstso						
Coefficient	-6.6083	-0.3827*	0.3756*	-0.3508	0.2341	
P value	0.0000	0.0920	0.0520	0.2200	0.2850	0.047
	Price pattern – Positive CAR with reversal in post inclusion					
Dependent variable - lntradesize						
	const	Post	posd	Post*posd	posrevpost	Adj R sq
Coefficient	5.4658	-0.0123	0.2383	0.0816	-0.3708	0.001
P value	0.0000	0.9610	0.2630	0.8070	0.1250	
	Dependent variable - lnstso					
Coefficient	-6.6083	-0.3827*	0.3756*	-0.1167	-0.2341	0.047
P value	0.0000	0.0920	0.0520	0.7010	0.2850	

The results show that liquidity as measured by turnover ratio is falling in the post inclusion period. However for companies that are categorized into STASM with a positive abnormal return on inclusion, the turnover ratio increases. Companies with positive CAR have better liquidity.

Liquidity impact of stocks with price pattern that has negative cumulative abnormal return in the pre inclusion period is provided in table 12

Table 12 - Liquidity impact on stocks with negative CAR on inclusion

5 Day event window (N=436)						
Price pattern – Negative and continuing in the post inclusion period						
Dependent variable – lntradesize						
	const	Post	neg	post*neg	negcontdpost	Adj R sq
Coefficient	5.7042	-0.1566	-0.2383	0.2023	-0.1388	0.004

P value	0.0000	0.3490	0.2640	0.5480	0.7000	
Dependent variable – lnstso						
Coefficient	-6.2327	-0.642*	-0.3756*	0.2591	0.0005	0.044
P value	0.0000	0.0000	0.0520	0.3960	0.9990	
Price pattern – Negative and reversal in the post inclusion period						
Dependent variable – lntradesize						
Description	const	Post	neg	post*neg	negrevpost	Adj R sq
Coefficient	5.7042	-0.1566	-0.2383	0.0636	0.1388	-0.004
P value	0.0000	0.3490	0.2640	0.8630	0.7000	
Dependent variable – lnstso						
Coefficient	-6.2327	-0.642*	-0.375	0.2596	0.128	0.004
Pvalue	0.0000	0.0000	0.0520	0.4350	0.698	

From the results in the table 12 it can be inferred that the liquidity measure trade size is found to be insignificant across all categories. The liquidity measure of turnover ratio is significant and is falling in the post inclusion period and for stocks with negative CAR.

4.5 Results – Heterogeneity in speculation interest based on price patterns

Table 13 presents the results of sample data % shares delivered to total shares traded in the pre and post inclusion period. As per the results it is seen that the % shares delivered was low in pre inclusion period as compared to the post inclusion period. This means before inclusion of stocks into STASM the intraday speculation was higher and fell after inclusion for the cross sectional sample.

The fall is significant at 5% level of significance.

Table 13 – Results of t-Test: Paired Two Sample for Means % shares delivered to total trades

	Psd Pre	Psd Post
Mean	62.19686	64.203073
Variance	296.8188	273.2865
Observations	218	218
Pearson Correlation	0.656067	
Hypothesized Mean Difference	0	
df	217	
t Stat	-2.11367	
P(T<=t) one-tail	0.017843	
t Critical one-tail	1.651906	
P(T<=t) two-tail	0.035685	
t Critical two-tail	1.970956	

The question of whether the speculation interest in the stocks surrounding the period of inclusion was same across all categories and price patterns is examined and presented through dummy variable regressions results of which is given in table 14.

Table 14 – Speculation interest in stocks with differing CAR patterns

5 Day event window (N=436)						
Description	Dependent variable - lnpsd					Adj R sq
	const	Post	posd	Post*posd	posdcontdpost	
Coefficient	4.1779	0.0286	-0.1353*	-	0.121*	0.043
P value	0.0000	0.0322			0.0180	
		0.5870	0.0030	0.6280		

	const	Post	posd	Post*posd	posrevpost	
Coefficient	4.1779	0.0286	-0.1353*	0.0889	-0.121*	0.043
P value	0.0000	0.5870	0.0030	0.2090	0.0180	
	const	Post	neg	post*neg	negcontdpost	
Coefficient	4.0426	0.0438	0.1353*	-	0.0485	0.032
P value	0.0000	0.0354			0.5250	
		0.2170	0.0030	0.6200		
	const	Post	neg	post*neg	negrevpost	
Coefficient	4.0426	0.0438	0.1353*	0.0131	-0.0485	0.032
P value	0.0000	0.2170	0.0030	0.8660	0.5250	

The % shares delivered to total trades is generally less for shares with positive CAR which implies that stocks with positive CAR have more intra day trading volumes. Further, in the post inclusion period stocks that have a continuation of CAR have more delivery trades (which could be booking profits by dominant investors) and stocks that have a reversal CAR pattern show more intra day volumes.

Post inclusion continuation trend in CAR can provide room for profit booking. In case of stocks with reversal of positive CAR patterns, post inclusion show decrease in delivery trades that may signify slow profit booking by the dominant investor. Typical stock price manipulations patterns are of the form where prices are increased first, and then stocks are sold at a profit with abnormal return continuation trend or slow reversal trends. Heterogeneity in impact of % shares delivered to total shares traded across different price patterns indicates possibility of trade based manipulations in the stocks. However, such manipulations cannot be conclusively said in the absence of details of investors and other corroborative evidences..

4.3 Results – Heterogeneity liquidity and speculation interest impact based on size

Table 16 Results show that the regression results speculative interest is not significantly different for stocks with large size as compared to stocks with smaller size. However, trade size is falling for stocks with large market cap as compared to stocks with smaller market capitalization.

The result of size impact on companies included into STASM is given in Table16

Table 16 - Results of companies sorted on size measured using the market cap.

Dependent Variable	Description	5 day event window				R sqr
		Constant	β1 Post	β2 size	β3Post*size	
lnstso	Coefficient	-6.2533	-0.5165*	-0.3249	0.1744	0.036
	P value	0.000	0.022	0.143	0.578	
lnpsd	Coefficient	4.1022	0.0282	0.0108	-0.0225	0.001
	P value	0.000	0.600	0.839 -	0.764	
lntradesize	Coefficient	5.8701	0.1521	-0.5563*	0.1832	0.029
	P value	0.000	0.539	0.023	0.595	

lnStso represents ratio of share traded to shares outstanding. lnPsd represents the percentage shares deliverable. lnSze represents the trade size which is average volume per transaction.

β_1 is the coefficient of dummy variable for post and pre-inclusion period with post as 1.

B_2 is the coefficient of dummy variable for large or small companies with dummy 1 assigned for large companies.

β_3 is the coefficient of interaction dummy variable for large companies during the post inclusion period.

The turnover ratio is falling for all companies in the post inclusion period as already established in earlier regression. Additionally, we can see that the trade size is also smaller for large companies with a beta coefficient of -0.5563 and vice versa. This means for the small cap companies, higher turnover is accompanied by trades with larger quantity per trade. The interaction variable β_3 is not found to be significant for any of the liquidity volume measures or for percentage of shares delivered.

5 Conclusions

This study aims at understanding the trading implications and effectiveness of STASM introduced in India by the regulator in November, 2018. Taking a sample of 218 events across a period of 3 months, this study tries to understand the ways in which the inclusion of stock to STASM affects returns, volume, liquidity and speculative interest in the stock. Using event study methods, we examine both the price and volume impact of STASM. It is seen that CAR on the stocks fall after inclusion to STASM and the fall is sustained after exclusion with no significant change in the CAR observed. The volume event study tests for significant changes in the average abnormal volume day wise for the pre and post event days. From the test, it can be concluded that abnormal volume of stocks falls after inclusion into ASM and the fall is sustained in the post exclusion period also with signs of increase in the last 2 days. Additionally, the study also examines the differential impact of STASM on liquidity measures by classifying firms based on size and continuation or reversal price patterns using a regression framework with incorporation of dummy variables. The daily data of percentage of shares delivered is used to understand the differences in speculative interest in the stock across different price pattern trends. The key

conclusions emerging from the regression analysis are CAR increases are accompanied by increase in cumulative abnormal volumes and increase in trade size. Stocks that are included into STASM with positive CAR have better liquidity while those with negative CAR experience less liquidity in the post inclusion period. With respect to extent of speculative activity, the percentage shares delivered is less for companies with positive CAR and the delivery trades are more for companies with positive CAR and with a continuation pattern in the post inclusion period. However, for companies with positive CAR and reversal pattern in the post inclusion period the delivery trades are lower. Irrespective of whether there is price manipulation or not the pattern is suggestive of price increases that are supported by large speculative and delivery trades in the pre-inclusion period followed by profit booking in the post inclusion period. Differences in impact of % shares delivered across different price pattern will have to be corroborated with investor identity to explain events better. Currently the criteria for surveillance does not include the % shares delivered to total trade. Consistent and continuous changes to price of stocks accompanied by low or zero % shares delivered may also be useful criterion in surveillance of equity cash market trades.

Based on the results of the study, it may be said that stocks that are included in STASM have characteristics similar to stocks whose prices are manipulated. STASM has helped in curtailing abnormal price movements that are not supported by fundamentals. However, the restrictions imposed may have resulted in fall in liquidity. It is felt that, in an emerging market like India, restrictions imposed by surveillance initiative like STASM are important and help to preserve market integrity.

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