

Rules vs. discretion in market surveillance: evidence from India

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Working paper

Abstract

This paper examines the manner of implementation and the impact of a new surveillance measure, called the Graded Surveillance Measure (GSM) jointly implemented by the Indian securities exchanges and the Securities and Exchange Board of India (SEBI). Unique to the Indian securities market, the measure temporarily restricts trading activity in securities whose prices are not commensurate with the financial health of the firm, as pre-defined by the exchange. Using a unique hand compiled data-set of all the securities that were subjected to this surveillance action, we find that nearly a third of such securities did not satisfy the pre-specified criteria. More than half of the securities that exited the surveillance continued to exhibit the characteristics that subjected them to the restrictions in the first place, raising critical questions on the effectiveness of the measure. We find considerable ambiguity on the extent of trading restrictions imposed on such securities and the manner in which the restrictions are eased or tightened. We also find that securities which are subjected to this surveillance measure, experience a decline in stock prices and trading activity. Our paper contributes to a growing line of literature on the discretion applied by exchanges in surveillance practices and the quality of enforcement of rules.

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1 Introduction

Surveillance measures are a critical tool in the arsenal of securities markets regulators to combat manipulation in the securities market. The nature and extent of market surveillance has been demonstrated to have an impact on both the integrity and the efficiency of the market (Carol Comerton-Forde and Rydger, 2006; Cumming and Johan, 2008). Securities exchanges play an important role in the design and implementation of surveillance tools. In most jurisdictions, market surveillance is conducted in a co-ordinated manner by the securities regulator and the exchanges (IOSCO, 2009).

In this paper, we examine a unique surveillance measure introduced in the Indian securities market, which seeks to restrict trading activity in securities that are perceived to be generating returns not commensurate with the fundamentals or the financial health of the firm. In 2017, two Indian exchanges, namely, the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE) introduced the GSM framework, under which securities that witnessed abnormal price rise not commensurate with the financial health and fundamentals of the firm, are subjected to restrictive trading rules. These trading rules vary in the intensity of their intrusion. For example, the relatively less intrusive rules imposed narrower price bands on securities subjected to the GSM framework than those stipulated for other securities. Some of these restrictions are relatively moderately intrusive such as mandating physical settlement and generating alerts for brokers who attempt to trade in these securities on the exchange. The most stringent form of restrictions require brokers to deposit additional security with the exchange for every order placed by them in respect of these securities, and other restrictions restricted the number of days on which the security could be traded to one day per week or month.

The GSM departs from the common surveillance tools deployed by regulators and exchanges around the world in three important ways.

First, the GSM framework is a scrip-specific surveillance tool that relies on the health of the financial firm and its returns as a parameter. While surveillance tools deployed around the world vary in their complexity and sophistication, they are generally designed to identify some commonly known forms of manipulative practices. For example, Cumming and Johan, 2008 survey the market surveillance tools deployed by exchanges and securities commissions from 25 jurisdictions in North, Central and South America, Europe, Africa and Asia. They find that these tools are designed to generate alerts for a set of 28 practices that are commonly identified as manipulative. A survey of securities markets surveillance practices conducted across 32 emerging markets also shows that surveillance practices “target abnormal price and volume movements, concentration of trading, large open interest, front running, insider trading, wash trades and synchronised trades” (IOSCO, 2009; *also see* Carol Comerton-Forde and Rydger, 2006). They do not focus on a single trade or the fundamentals of the firm itself. They focus on trading patterns and are intended to identify manipulative trades and the market participants involved in them. The GSM framework, on the other hand, uses the financial health of the firm and its returns as the identifying criteria.

Second, the nature of the sanction built into the GSM framework distinguishes it from commonly found surveillance tools. Market surveillance tools are generally intended to alert the staff of the securities exchange of unusual patterns in trading. This allows

the relevant personnel at the exchange to identify whether the requisite conduct warrants an investigation. The investigation is conducted as per the rules of the exchange. Depending on the findings of the investigation, the outcome of the investigation may be a sanction in the form of a warning, a penalty or suspension from the membership of the exchange. The sanction is generally imposed after following the due process of giving the market participant an opportunity to present her case against the imposition of such sanction. In several jurisdictions, there is a parallel obligation on the exchange to alert the securities market regulator of the potential manipulative activity, and the regulator may thereupon commence its own investigation. Thus, surveillance is largely an ex-post function in that it monitors trades that are already placed and orders that are already executed, to identify patterns and investigate potential manipulative behaviour.

The GSM measure is ex-ante, that is, it pre-supposes the existence of manipulation and imposes a de-facto sanction on the firm by restricting trading on the stock. The firm and its shareholders are informed about the sanction a few days before the firm is subjected to it and the firm is not given an opportunity to present its case against the sanction. Shifting the stock into GSM affects not only the trading members who were potentially involved in the manipulation, but all the shareholders of the firm as the sanction applies to all trading activity on the stock. This makes GSM unique both with respect to the timing of the sanction and the kind of sanction imposed on the ground of suspected, but not proven, manipulative trading activity.

Third, the opacity of the manner in which the GSM framework is applied makes it a unique intervention. Opacity is a necessary feature in market surveillance that is intended to detect already executed manipulative trades and orders. The GSM framework, while specifies the thresholds used for shortlisting the firms into the framework, the criteria for inter-stage movement is not clear, which adds a lot of ambiguity and uncertainty amongst market participants trading in such securities.

It is in this context that we study the implementation of this unique surveillance tool and its impact on the prices of the securities that are subjected to it. Our research specifically seeks to answer two questions. First, whether the GSM framework is consistently applied to the firms that are subjected to it or do the exchanges exercise any discretion in its application. The GSM presents a unique opportunity to study the consistency of application of a surveillance tool as the identity of the firms that are subjected to it is known in advance, unlike other surveillance actions where the identity becomes public knowledge only once the investigation commences or the entity is asked to show cause against the imposition of a sanction. Second, we examine the impact of the sanction on the prices and trading activity of the firm.

We do not question the propriety of the GSM or its overall impact on stock market development. Answers to these questions are important, but require a more thorough investigation of the data which is currently unavailable. At the same time, the available data allows us to answer critical questions on the manner and immediate impact of the intervention on the quality of the securities subjected to it.

Our research contributes to the existing literature and discourse on law and the securities markets, in two ways. First, it is the first level impact analysis of a unique surveillance measure implemented by a jurisdiction with an equity market of non-trivial size and proportion. Second, our findings hold some preliminary insights on the conflict-

ing role of for-profit exchanges in implementing surveillance-linked sanctions. On the one hand, the exchanges' revenues are linked to trading volumes. Restricting trading activity in a set of firms for an extended period of time, therefore, can potentially impact the exchanges' revenue. It may also impact the decision of firms to list themselves on a given exchange depending on the extent to which it enforces the in-built sanctions in the GSM framework. We also examine whether the firms that exit GSM during our study period continue to exhibit characteristics that pushed them into GSM to begin with. If these firms continue to display these characteristics, then arguably the exchanges are not implementing the sanction consistently.

We begin by hand-collecting the data on the list of securities admitted under the GSM framework on the NSE for a period of two years beginning March 2017 until March 2019. The NSE periodically issues circulars listing the securities that are included, excluded or retained under the GSM framework.¹ This list is based on a quarterly review of securities done by the exchange. For shortlisting and reviewing the securities under the GSM framework, the exchanges have specific detailed criteria in terms of net worth, net fixed assets and price to earnings ratio. Securities that meet the criteria are included under the GSM framework, and the ones that do not meet the criteria in the quarterly review are moved out of the framework.

We examine if the securities included in the framework satisfied the criteria specified by the regulator. This helps us determine the extent to which the security selection is done based on rules versus discretion. High discretion in securities market regulation can have unintended consequences on firm liquidity and has the potential to raise the cost of capital for such firms. We further analyse the impact of the inclusion into the GSM framework on stock returns and liquidity. We hypothesise that firms entering the GSM framework would experience negative abnormal excess returns as investors sell their holdings in such securities. Alternatively, if the inclusion into the GSM framework does not impact investors' confidence in these securities, we will not see any impact on the abnormal excess returns. In terms of liquidity, we expect a decline in trading interest in these securities as traders are alerted before placing their orders on such securities. We examine this hypothesis using a difference-in-differences framework.

To eliminate the effect of confounding factors on returns and liquidity, we match the firms included in the GSM framework (*treated*) with firms with similar characteristics but not included in the framework (*control*). By comparing these two sets of firms using an event study and difference-in-differences framework, we analyse the impact of the surveillance mechanism on stock prices and liquidity.

Our preliminary findings indicate that nearly a third of the firms that entered the GSM framework did not meet the criteria provided in the exchange circulars for consideration for the GSM framework. This indicates that there may be some discretion (based on other variables) which is exercised in identifying the securities for higher surveillance. We also find that there is significant discretion applied on the selection of firms that exit the GSM framework. This is evidenced by the fact that more than half the firms that exited the GSM framework continue to exhibit the characteristics that subjected them to GSM in the first place.

In terms of the impact on stock returns and liquidity variables, we find that firms that

¹Firms may also move from one stage to another in the periodical review.

entered the framework experienced a decline in cumulative abnormal returns as well as liquidity and trading activity after the entry. However, the cumulative abnormal returns increase significantly after the securities exit the framework. This happens with a considerable lag. Our findings raise important questions on the manner of implementation and effectiveness of the GSM framework.

The rest of the paper is organised as follows. Section 2 is a review of the literature on the impact of market interventions, with a more specific focus on interventions that are similar to the GSM. Section 3 describes the operational details of the GSM framework. Section 4 provides details of the data and the sample composition. Section 5 analyses the results of the impact of the intervention. Section 6 concludes.

2 Literature review

Our paper relates to a substantial body of work on the intersection of the law and the securities market.

One strand of literature examines the impact of securities laws on various aspects of stock market development, such as the cost of capital and the size of the market (Porta, Lopez-De-Silanes, et al., 1997; Porta, Lopez-de-Silanes, et al., 1998; Bushee and Leuz, 2005; La Porta, Lopez-De-Silanes, and Shleifer, 2006; Daouk, Lee, and Ng, 2006; Greenstone, Oyer, and Vissing-Jorgensen, 2006; Jackson and Roe, 2009). Our paper builds on this important question of the impact of securities laws and their enforcement on the development of securities markets.

A similarly long line of literature examines the linkage between legal interventions intended to curb or sanction market manipulation and the efficiency and the integrity of markets. For example, Cumming, Johan, and Li, 2011 examine stock exchange trading rules for market manipulation, insider trading and broker-agency conflict, and find that such rules significantly affect liquidity. A lot of scholarship in this area investigates the relationship between insider trading and market integrity and quality (Bhattacharya and Daouk, 2002; Beny, 2005). Cumming, Dannhauser, and Johan, 2015 provide an excellent review of the recent research on the causes and consequences of different forms of financial market misconduct and the impact of regulating such misconduct. Our research provides a foundation to analyse the connection between restrictive trading rules and market manipulation in the equity segment of the Indian securities market.

More recent literature in this field has shifted focus from the letter of the law to the quality of its enforcement. For example, Jackson and Roe, 2009 use regulatory resources spent on enforcement as a proxy for the regulatory intensity of the securities regulator and find that financial depth significantly and robustly correlates with stronger public enforcement of securities laws. Cumming, Groh, and Johan, 2018 use expenditure on enforcement as a proxy for enforcement and find that more expenditures on enforcing securities regulation improves fraud detection and facilitates more trading and stock market participation. Our analysis, which heavily focuses on the de-facto enforcement of GSM and its impact on stock returns, contributes to this line of empirical literature on the quality and consistency of enforcement of securities laws.

Our paper also contributes to the existing literature that examines the impact of surveil-

lance practices on market quality. For example, Aitken, Cumming, and Zhan, 2015 examine the impact of surveillance measures on the perpetration of market manipulation and profits per suspected case. They find that detailed rules reduce the number of suspected cases, but increase the profits per suspected case. Carol Comerton-Forde and Rydge, 2006 present evidence on the Australian Stock Exchange surveillance effort and the characteristics of alleged market manipulation. Similarly, Cumming and Johan, 2008 conduct a cross-country comparison of surveillance practices deployed by exchanges and securities regulators in 25 countries to identify effective surveillance mechanisms. An analysis of GSM, being a unique surveillance tool, adds to this line of literature.

In terms of the nature and design of the GSM intervention, the closest literature is the work on the impact of temporary suspensions initiated by regulators on individual securities. These suspensions are triggered by the regulator in exercise of their powers under the laws constituting them. For example, Howe and Schlarbaum, 1986 examine the impact of stock-specific temporary suspensions initiated by the SEC on the returns on these securities and find “significant and prolonged negative abnormal returns” in the post-suspension period. While delisting differs from the sanction contemplated under the GSM framework, the findings of Macey, O’Hara, and Pompilio, 2008 on the NYSE and NASDAQ, are related to our work as well. As explained in Table 2, once a stock enters Stage III and above of the GSM framework, it can be traded only once a week or a month. To that extent, the GSM framework temporarily suspends trading of the stock on all days, except for one day in a week or a month.

Finally, our paper contributes to the theoretical debate on the optimal level of discretion that is desirable for a regulatory body, in particular, exchanges. Exchanges are self-regulatory bodies, with the power to sanction the conduct of firms listed or trading on them and the conduct of trading members. Subrahmanyam, 1995 argues that closures triggered at the discretion of exchange officials can be more effective than price-triggered closures. On the other hand, Macey, O’Hara, and Pompilio, 2008 argue against conferring discretion on exchanges, due to the inherent conflict of interests in their dual role as for-profit corporations and self-regulatory bodies. While the theoretical debate on the question of rules versus discretion is more broad based in terms of the optimal amount of discretion that must be allowed to regulatory agencies, empirical evidence for supporting a rules based framework or a discretion based framework, is relatively thin (Becker, 2013 and Posner, 2013). Our work is a step in the direction of empirically analysing the extent to which discretion is applied in implementing surveillance tools in the form of trading rules. This can potentially contribute to the theoretical understanding of the importance and fallouts of building in discretion in the writing of rules and laws in financial regulation.

Our paper adds to the existing literature by specifically examining the impact of *differential* trading rules across securities as an additional measure of surveillance and how it impacts market quality and trader behavior. To the extent that it deals with a new policy intervention, our paper generates fresh insights into the manner in which different surveillance mechanisms function, the impact of such mechanisms on firms, the overall impact of the framework on market quality and stock market participation.

3 The GSM framework

The regulatory framework governing the securities market in India states that the 'protection of investors' is one of the primary objectives of the market regulator, SEBI, and emphasizes the notion of market integrity. This is in line with securities regulatory frameworks around the world which similarly state market integrity, fairness and investor protection as objectives of securities market regulators (Austin, 2017).

In furtherance of this objective, SEBI and the Indian securities exchanges have previously used surveillance measures that restrict trading in over-priced or volatile equity securities as a regulatory technique. For example, in 2001, SEBI implemented market-wide circuit breakers, which were triggered to halt trading in equity spot and equity derivatives on a 10%, 15% or 20% movement in the Nifty or Sensex, the two main equity indices in the country (SEBI, 2013). Similarly, in 2006, to detect abnormalities in trading patterns and market behavior, SEBI also introduced the Integrated Market Surveillance System (IMSS).² Further, various corrective actions are undertaken based on the monitoring system. These include movement of securities to trade for trade segment,³ and price bands of 2, 5, and 10 percent for securities satisfying a specific criteria.

In addition to the existing surveillance measures, on 23rd February, 2017, SEBI and the exchanges jointly introduced the GSM framework aiming to protect investors by raising alerts on securities witnessing abnormal price rise not commensurate with the financial health and fundamentals of the firm (NSE, 2017). The framework, jointly discussed and agreed upon between SEBI and the securities exchanges, was announced through circulars issued by the two exchanges. The text of the framework in the circulars issued by the exchanges is identical.⁴ As per the circular published by the NSE, the main objectives of the GSM framework are to:

1. alert and advice investors to be extra cautious while dealing in these securities; and
2. advice market participants to carry out necessary due diligence while dealing in these securities.

The rationale underlying the design of the GSM has been explained in the Annual Report of SEBI, as follows:⁵

“[I]n the case of many companies which have low capital bases / poor fundamentals and infrequent trading history, the equilibrium price so discovered was not in sync with their financial health and / or operational performance. This happened as certain market participants could abuse the stock exchange trading systems. Concerned about such misuse of the stock exchange platforms, it was felt that certain preventive measures need to be taken to put a check on the abnormal increases in the prices of scrips,

²See SEBI Annual Report 2006-07 https://www.sebi.gov.in/sebi_data/commondocs/part3_p.pdf.

³Under the trade for trade segment, no netting off is allowed and physical settlement (after $T + 2$ days) is mandatory.

⁴In this paper, we will be relying on the NSE circular dated 23rd February, 2017.

⁵See SEBI Annual Report 2016-17 https://www.sebi.gov.in/reports/annual-reports/aug-2017/annual-report-2016-17_35618.html.

more particularly in the case of companies which have poor fundamentals. Subsequent to discussions with stock exchanges it was decided to introduce graded surveillance measures (GSMs). These measures work as pre-emptive steps to reduce/check instances of market manipulation in identified scrips. GSMs are intended to deal with the abnormal increases in share prices of companies which are apparently not in line with their disclosed fundamentals or business models, more particularly companies which have poor fundamentals.”

Under the GSM framework, stock exchanges impose restrictions on the identified securities. Once placed in the GSM, the securities price movements are monitored. The kind of trading restrictions depends on the stage of GSM in which the firm is placed. The framework is divided into seven stages.⁶ While specific shortlisting criteria have been stipulated for Stage 0 and Stage I, the criteria⁷ for transition from these two stages into the remaining five stages have not been specified.⁸ Table 1 lists the shortlisting criteria for Stage 0 and Stage I.⁹

Table 1 Criteria for placing firms under Stage 0 and I of the GSM framework

| | Criteria |
|---------|---|
| Stage 0 | <p>Firms with:</p> <ul style="list-style-type: none"> • latest available networth (Share capital + Reserves & Surplus - debit balance in P&L) less than or equal to Rs. 10 crores; and • latest available Net Fixed Assets (Tangible Assets + Capital Work in Progress) less than or equal to Rs. 25 crores; and • P/E ratio more than twice the P/E ratio of Nifty 500 or S&P BSE 500 or firms with a negative P/E ratio. |
| Stage I | <p>Firms with:</p> <ul style="list-style-type: none"> • full market capitalization less than Rs. 25 crore; and • a P/E ratio of more than twice the P/E ratio of Nifty 500 or S&P BSE 500; or • Firms with a negative P/E ratio, for which the following should be considered: <ul style="list-style-type: none"> a. P/B value of scrip is greater than twice the P/B value of Nifty 500 or S&P BSE 500; or b. P/B value is negative |

The consequences of being placed in different stages of GSM framework, are described in Table 2. We see that unlike the other stages, the mechanism does not envisage any specific consequence for trading in securities of firms placed under Stage 0. Trading

⁶This was reduced to five stages in December 2019.

⁷The parameters used for shortlisting securities to be placed in the GSM framework were made available via a circular on July 20, 2018 (<https://archives.nseindia.com/content/circulars/SURV38389.pdf>.)

⁸Our discussions with NSE revealed that securities are moved across stages on the basis of price movements.

⁹Certain securities are exempted from the GSM framework. The criteria for exemptions are provided in the appendix.

in such securities generates alerts for investors placing their orders. The alert message flashed on the trader's screen says, "Security is under Surveillance Measure, would you like to continue?". Once a security is placed in Stage II, the buyer must pay Additional Surveillance Deposit (ASD). The ASD can be either 100% or 200% of the trade value depending on the stage in which the security is placed. The ASD is retained until the quarterly review done by the exchange for the corresponding security. The ASD is not refunded even if the buyer who deposited the ASD subsequently sells the stock while it continues to remain in GSM. The ASD is over and above the margins deposited with the clearing corporation.

The restrictions increase in severity with each stage. The consequences of the framework are much more severe if the firm is moved to Stage 3 or more, including the ability to trade only once a week or once a month for securities placed in Stages V and VI. Moreover, the NSE circular also states that the members trading in the identified securities either on their own account or on behalf of clients shall be kept under close scrutiny by the exchange and any misconduct shall be viewed seriously NSE, 2017.

The exchange reviews and updates the list of securities on a quarterly basis and shares it with the market participants atleast one week before the updated list comes into effect. Due to the quarterly review, a stock that enters the GSM framework continues to remain in GSM for atleast a quarter.

As part of the review, firms may move from lower stage to higher stage or may exit the framework altogether. The exchange also releases a tentative calendar for publication of securities eligible for GSM framework applicable for next quarter at the beginning of the financial year.

4 Data

Our analysis focuses on the data from the NSE. Comprising 75% of entire market share, the NSE is the dominant platform for equity trading in India.¹⁰ As of September 2019, the number of companies listed on the platform stood at 1,955. Trading on the NSE is conducted through an anonymous, electronic limit order book market with price-time priority on the orders placed during the trading day. Trading starts at 9:00 am in the morning with a call-auction mechanism, after which the market enters the continuous phase at 9:15 am and trades till 3:30 pm. The exchange is regulated by the SEBI.

There are no designated market makers for trading of individual securities on the exchange. In the past, various surveillance measures have been deployed by the exchange to keep market abuse in check. These include rumour verification and clarification in case of spurt in price or volume, price bands, periodic call auctions for illiquid securities, and enlisting the securities into trade for trade segment.

4.1 Summary statistics

We begin by compiling the list of securities that entered into the GSM framework over the two year period from March 2017 to March 2019. For this purpose, we hand collect the information on GSM securities from the circulars published on the NSE website

¹⁰The other 25% market share is with the Bombay Stock Exchange.

Table 2 Trading restrictions across various stages for securities placed in GSM

| Stage | Consequences |
|-------|---|
| 0 | Market participants are advised to be extra cautious and diligent when dealing in these securities. |
| I | The securities of such firms are transferred to the Trade for Trade window of the exchange with a price band of 5% or lower, as applicable. |
| II | <ol style="list-style-type: none"> 1. The securities of such firms are transferred to the Trade for Trade window of the exchange, with a price band of 5% or lower as applicable; and 2. The buyer must make an ASD of 100% of the trade value with the exchange. |
| III | <ol style="list-style-type: none"> 1. Trading in the securities of such firms is permitted once a week; and 2. The buyer must make an ASD of 100% of the trade value with the exchange. |
| IV | <ol style="list-style-type: none"> 1. Trading in the securities of such firms is permitted once a week. 2. The buyer must make an ASD of 200% of the trade value with the exchange. |
| V | <ol style="list-style-type: none"> 1. Trading in the securities of such firms is permitted once a month. 2. The buyer must make an ASD of 200% of the trade value with the exchange. |
| VI | <ol style="list-style-type: none"> 1. Trading permitted once a month with no upward movement in the price of the security. 2. The buyer must make an ASD of 200% of the trade value with the exchange. |

under the surveillance and investigation category. Each circular consists of an annexure which lists down the names, trading symbols and ISIN of securities entering, exiting or moving between various stages. Using this information, we curate a dataset of all securities which entered the surveillance mechanism since its introduction in February 2017, along with the date of inclusion, exclusion and movement within stages. We also record the announcement and implementation date for these securities. The first list of securities that were pushed into GSM was released in March 2017.¹¹

We use the Prowess database maintained by the Centre for Monitoring Indian Economy (CMIE) to collect information on financial and accounting variables for our sample set.

¹¹In August 2017, the market regulator added a list of a list of ‘suspected’ shell companies to the GSM framework. However, several firms later were excluded from this list after re-considerations. The rationale behind the inclusion of these firms into the GSM was entirely different, and hence we do not include them in our analysis.

Prowess provides information on financial statements, industry groups, ownership data based on the quarterly and annual reports for companies in India. It also provides daily data on financial market variables such as stock prices, floating stock, market capitalization, traded volumes for publicly listed companies. We collect data from Prowess for a period of one year prior to the inclusion of a firm into the GSM framework.

In our sample period of two years, we get a total of 121 securities that entered the GSM framework. Out of these 121 securities, 10 had exited and re-entered GSM during the study period. Thus, we have a list of 111 unique securities that were subjected to GSM during the study period. At the end of the study period, out of the 121 securities, 74 were still in GSM and 47 had exited GSM. Ten of these firms were completely suspended from trading while they were in GSM.

Table 3 shows the stage at which each of the 121 securities entered (or re-entered) and exited GSM. The third row shows the stages at which each of the 74 firms continued to remain GSM at the end of our study period. It must be noted that once a security enters GSM, it may move across different stages at the end of each quarter, as shown in Table 5.

Table 3 Number of securities that entered, re-entered and exited in GSM as of March 31, 2019

The table shows the number of securities that entered, exited and re-entered into GSM as of March 31, 2019. The table also shows the corresponding stage of these securities at the end of the sample period.

| | Stage 0 | Stage I | Stage II | Stage III | Stage IV | Stage V | Stage VI |
|----------|---------|---------|----------|-----------|----------|---------|----------|
| Entry | 55 | 56 | 0 | 0 | 0 | 0 | 0 |
| Re-entry | 7 | 3 | 0 | 0 | 0 | 0 | 0 |
| Exit | 4 | 25 | 10 | 6 | 1 | 0 | 1 |

Out of the 121 securities, we observe that about 52% (62) entered GSM in Stage 0 and the remaining about 48% (59) entered GSM directly in Stage I, that is, they were directly placed in the trade for trade segment (implying mandatory physical settlement) and subjected to price bands of 5% or less. A little less than 50% of the firms that had entered GSM during the study period had exited the framework at the end of the study period. We find that while bulk of the firms enter the GSM framework in Stages 0 and I, there is no pattern to the exit stages and nearly 50% of the firms exited from Stage I.

Table 4 Stage-wise distribution of securities in the GSM framework

The table shows stage-wise distribution of securities that were placed into GSM during the sample period from March 2017 and March 2019.

| Stage | No. of securities |
|-----------|-------------------|
| Stage 0 | 55 |
| Stage I | 96 |
| Stage II | 40 |
| Stage III | 27 |
| Stage IV | 10 |
| Stage V | 7 |
| Stage VI | 4 |

Table 4 indicates the stages in which the 111 unique securities were placed during the study period. There were in total 239 firm-events in which these 111 unique firms

moved across stages. We find that the largest proportion of firms (40%, 96) that were in GSM during the study period were placed for atleast one quarter in Stage I implying mandatory physical settlement and a price band of 5% or lower for these securities. The next largest block is for Stage 0 implying that for nearly 23% of these securities, for atleast one quarter, the system generated a warning every time an order was sought to be placed in respect of these securities. This is followed by Stage II which was experienced by 17% of the sample. About 11% of the securities experienced the rigours of Stage III, which imposes a restriction of trading only once a week, along with an ASD of 100% of the order value. Four firms were moved to Stage VI, which allows the stock to be traded only once a month along with an ASD of 200%.

Table 5 shows the movement of securities across different stages once they are admitted to GSM. This is critical as with every move in a different stage, the set of restrictions on the stock changes. Further, the exchanges do not specify the criteria for the movement of securities across stages. If the move is an upward move (say, Stage II to Stage III), the restrictions on trading in that stock are tightened, and if it is a downward move (say, Stage III to Stage II), the restrictions are loosened.

The matrix must be read from left to the relevant column header. The right most column indicates the stage *from* which the stock moved *to* the stage indicated in the header row. For example, the first row shows that 43 securities moved from Stage 0 to Stage I and 4 firms exited from Stage 0.

Table 5 Stage-wise movement of securities

The table shows the movement of securities from one stage to another during the sample period. The matrix can be read from the left to right.

| | Stage 0 | Stage I | Stage II | Stage III | Stage IV | Stage V | Stage VI | Exit |
|-----------|---------|---------|----------|-----------|----------|---------|----------|------|
| Stage 0 | - | 43 | 0 | 0 | 0 | 0 | 0 | 4 |
| Stage I | 0 | - | 56 | 0 | 0 | 0 | 0 | 25 |
| Stage II | 0 | 29 | - | 36 | 0 | 0 | 0 | 10 |
| Stage III | 0 | 0 | 20 | - | 11 | 0 | 0 | 6 |
| Stage IV | 0 | 0 | 0 | 5 | - | 8 | 0 | 1 |
| Stage V | 0 | 0 | 0 | 0 | 4 | - | 5 | 0 |
| Stage VI | 0 | 0 | 0 | 0 | 0 | 4 | - | 1 |
| Retained | 15 | 50 | 1 | 4 | 1 | 3 | 0 | - |
| Re-entry | 7 | 3 | 0 | 0 | 0 | 0 | 0 | - |

We observe that large proportion of the securities in Stage I are from Stage 0, and some of them are from Stage II. Similarly, a significant proportion of the securities in Stage II are from Stage I and some of them are from Stage III. Very few securities from the overall sample (17%) are shifted to Stages IV, V and VI. At the end of our study period, we find that none of the securities were in Stage VI and a bulk of the securities were in Stage I.

Overall, more securities shifted upwards (that is, to the more restrictive stages) than downwards during the sample period. We also observe that securities are not made to skip stages and that their upward or downward movement is in the immediately preceding or following stage.

We next examine the number of days that a security stayed in a particular stage. This

would indicate the stickiness within each stage. Table 6 shows the average number of days spent by a security in a particular stage.

Table 6 Time spent per stage by a firm in different stages

| Stage | Days in surveillance |
|-----------|----------------------|
| Stage 0 | 53 |
| Stage I | 97 |
| Stage II | 51 |
| Stage III | 72 |
| Stage IV | 49 |
| Stage V | 56 |
| Stage VI | 87 |

We find that on an average, securities spent about 97 days once in Stage I. The next most sticky stage seems to be Stage III, followed by Stage VI. This implies that even if Stage VI is applied to only a few securities, it is fairly sticky in that a stock continues to remain in Stage VI for a relatively longer duration.

We next analyse the characteristics of the firms that were put under the surveillance mechanism in terms of industry, geographical location, and financial variables. Figure 1 shows the industry distribution of the sample firms. Most firms that entered the GSM framework belong to manufacturing and trading categories such as fund based financial services and wholesale trading. The others category includes firms belonging to industrial construction, textile processing, steel, retail trading and the garment industry, to name a few. Geographically, about 24 percent of the firms in the sample are located in Maharashtra, followed by Tamil Nadu, Telangana and New Delhi.

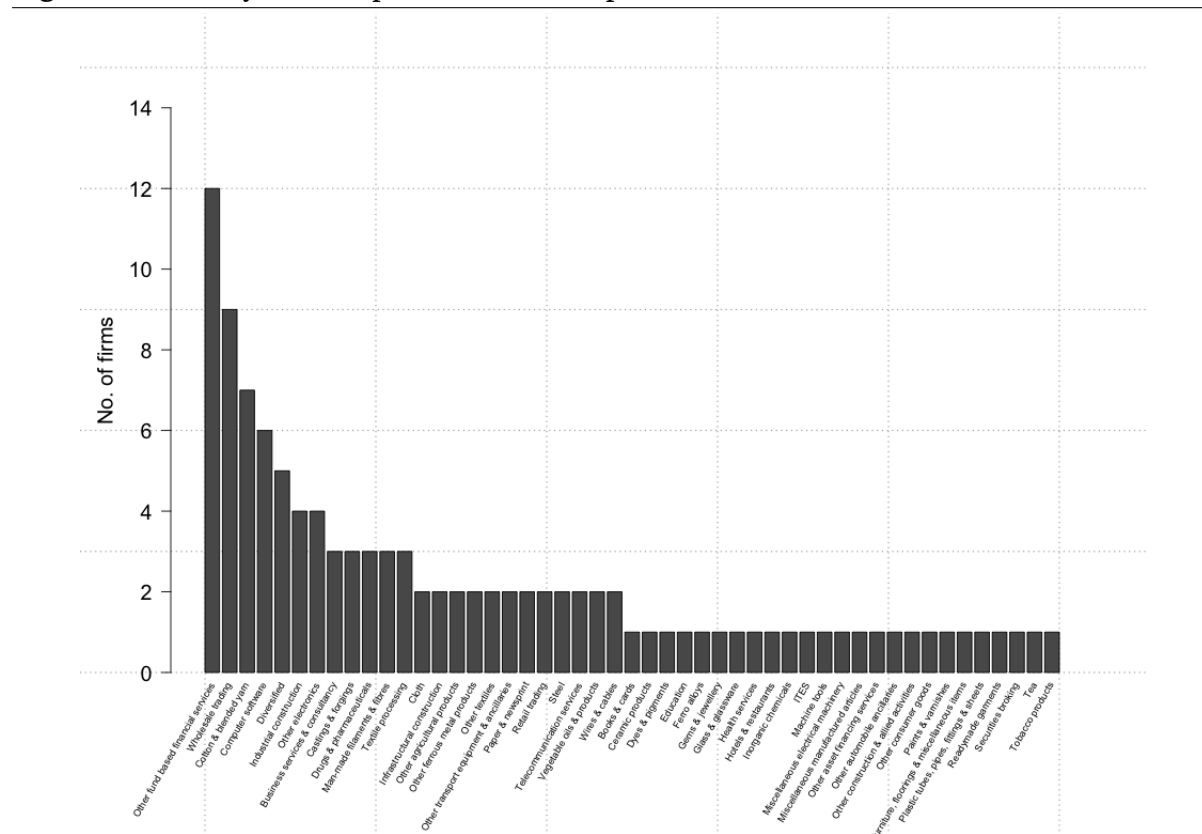
Table 7 provides summary statistics for select market and balance sheet variables for the securities that were placed in GSM. The statistics are based on the values one quarter prior to their entry into the framework. For market variables such as the closing price, traded quantity, traded value, number of transactions, market capitalization, we take the median value in the last quarter.

Table 7 Summary statistics one quarter prior to entering GSM for sample firms

The table shows firm characteristics of the securities placed in the GSM framework during the sample period. The values are based on one quarter before the entry of these securities in GSM.

| Indicator | 1st Qu. | Median | Mean | 3rd Qu. | sd |
|---------------------------------|---------|----------|----------|----------|-----------|
| Close price (Rs.) | 2.6 | 5.8 | 15.0 | 13.9 | 29.6 |
| Adj. close price (Rs.) | 2.6 | 5.8 | 14.1 | 13.4 | 28.8 |
| Traded quantity | 1,588.8 | 20,132.0 | 65,529.7 | 59,427.9 | 146,360.7 |
| Traded value (Rs. Mn) | 0.0 | 0.1 | 0.9 | 0.4 | 3.0 |
| No. of trades | 6.0 | 51.8 | 132.0 | 123.9 | 286.8 |
| Market cap (Rs. Mn) | 90.1 | 209.3 | 883.6 | 445.8 | 4601.3 |
| P/E ratio | -2.9 | -0.4 | 10.9 | -0.1 | 161.5 |
| P/B ratio | 0.5 | 1.6 | 4.0 | 4.4 | 7.6 |
| Shareholder's funds (Rs. Mn) | -3015.8 | -712.2 | -3215.2 | 44.1 | 9774.3 |
| Net fixed assets (Rs. Mn) | 85.5 | 356.7 | 1394.4 | 1226.7 | 3018.1 |
| Age since listing (years) | 7.5 | 12.0 | 13.1 | 18.5 | 7.1 |
| Age since incorporation (years) | 22.5 | 32.5 | 38.7 | 48.7 | 23.1 |

Figure 1 Industry break up of firms in sample



The table shows that the closing price for the GSM securities ranges between Rs. 2.6 and Rs. 29.6, with a median of Rs. 5.8. At the same time, the average daily total traded quantity of these securities is low, indicating low liquidity in these securities. The number of trades on these securities range between 6 to 287 per day. The P/E ratio of most of these firms is negative, with the P/B ratio also being very low in general. The oldest firm in our sample was incorporated in 1922 and the latest in 2014. In general, the age of the majority of firms in the sample is between 23 to 49 years. The year of listing of these securities ranges between 1994 to 2016¹², with most securities were listed around 1995-96 and 2007-08.¹³

The equity ownership structure of the sample firms is reported in Table 8. We do not observe a major change in promoter and non-promoter holding during the sample period. On average, non-promoters hold more than 50% share in the companies under surveillance while promoters hold about 40% of it. The largest share is owned by non-promoter non-institutions implying that individuals have a larger holdings in these firms.

¹²The NSE commenced its operations in 1994

¹³24% of the firms were listed in 1995 and 1996, while 32% were listed in 2007 and 2008.

Table 8 Equity ownership pattern for firms in sample (in %)

| Quarter | Promoters | Indian promoters | Foreign promoters | Non-promoters | Non-promoter institutions | Non-promoter non-institutions |
|----------|-----------|------------------|-------------------|---------------|---------------------------|-------------------------------|
| Jun-2017 | 42.75 | 40.79 | 2.19 | 57.25 | 6.00 | 51.25 |
| Sep-2017 | 41.74 | 40.39 | 2.45 | 58.26 | 5.90 | 52.14 |
| Dec-2017 | 42.16 | 40.38 | 1.95 | 57.84 | 5.28 | 52.54 |
| Mar-2018 | 41.50 | 39.73 | 1.90 | 58.50 | 5.91 | 52.40 |
| Jun-2018 | 41.86 | 40.12 | 1.99 | 58.14 | 5.39 | 52.73 |
| Sep-2018 | 44.14 | 42.18 | 2.17 | 55.86 | 4.37 | 51.28 |
| Dec-2018 | 41.96 | 40.21 | 1.95 | 58.04 | 5.38 | 52.61 |
| Mar-2019 | 41.90 | 40.09 | 2.25 | 58.10 | 5.43 | 52.47 |

4.2 Satisfaction of the shortlisting criteria

The NSE circular of February 23, 2017 that was shared with the market participants regarding the introduction of GSM stated that securities shall be shortlisted based on the pre-defined objective criteria. The criteria was made public via a circular on July 20, 2018. Additional surveillance measures will be based on price movements (which is not public information). The circular also mentions that a periodic review of securities under GSM framework is done on quarterly review, and the review shall be done based on the objective criteria. In this section, we examine how many firms met the shortlisting criteria based on which GSM security selection was done.

Table 9 lists the three criteria specified in the circular along with the number of firms from our sample that satisfied that criteria. All the three conditions must be satisfied for a firm to be subjected to the GSM framework (Table 1). The first column of Table 9 indicates the criterion to be satisfied for entry into Stage 0; the second and third columns respectively indicate the number of firms that satisfy or do not satisfy the relevant criterion; the fourth column indicates the number of firms for which the data required to compute the relevant parameter is missing for the relevant period is missing in our database; and the last two columns respectively indicate the percentage of firms in our sample set which satisfied and did not satisfy the relevant criterion. The last row of the Table indicates the number of firms that satisfied and did not satisfy all the three criteria simultaneously and were therefore eligible or not eligible for entry into GSM.

Table 9 Number of firms that met the shortlisting criteria for Stage 0 of GSM

| Criterion | Yes | No | NA | Total | Yes (%) | No (%) |
|---------------------------------------|-----|----|----|-------|---------|--------|
| Net worth \leq Rs. 10 crores | 48 | 3 | 4 | 55 | 87.3 | 5.5 |
| Net fixed assets \leq Rs. 25 crores | 45 | 1 | 9 | 55 | 81.8 | 1.8 |
| P/E $>$ 2*Nifty 500 or -ve PE | 46 | 9 | 0 | 83.6 | 16.4 | |
| All | 37 | 9 | 9 | 55 | 67.3 | 16.4 |

Table 10 contains our findings on the shortlisting criteria for firms that entered Stage I of GSM.

Table 10 Number of firms that met the shortlisting criteria for Stage 0 of GSM

| Criterion | Yes | No | NA | Total | Yes (%) | No (%) |
|--|-----|----|----|-------|---------|--------|
| Market cap \leq Rs. 25 crores | 41 | 15 | 0 | 56 | 73.2 | 26.8 |
| PE $> 2 \times$ Nifty 500 or Neg. PE & (PB $> 2 \times$ Nifty PB or neg. PB) | 43 | 12 | 1 | 56 | 76.8 | 21.4 |
| All | 30 | 25 | 1 | 56 | 53.6 | 44.6 |

We find that out of the sample of 55 unique firms that entered Stage 0 of GSM, about 16.4% of the firms did not satisfy the criteria stipulated for entry into GSM. We also find that out of the 56 unique firms that entered Stage 0, 44.6% firms did not satisfy the criteria stipulated for entry into Stage I of GSM. This implies that 34 out of the 101 unique firms that entered the GSM framework did not satisfy the stipulated criteria.

4.3 Characteristics of firms that exit GSM

The NSE circular of June 2018 specified that in the quarterly review, the securities that do not meet the inclusion criteria shall be move out of the GSM framework.

In this section, we examine the characteristics of securities that exited the GSM framework in terms of the inclusion / shortlisting criteria. Table 11 contains our findings on the number of unique firms that exited the GSM framework, but continued to display criteria that subjected them to the framework to begin with.

Table 11 Characteristics of firms that exited GSM

| Criterion | Yes | No | NA | Total |
|---|-----|----|----|-------|
| Net worth \leq Rs. 10 cr. | 25 | 14 | 1 | 40 |
| Net fixed assets \leq Rs.25 cr. | 28 | 8 | 4 | 40 |
| PE $> 2 \times$ Nifty PE or - PE | 30 | 8 | 2 | 40 |
| Market cap \leq Rs. 25 cr. | 31 | 9 | 0 | 40 |
| -ve PE & (PB $> 2 \times$ Nifty PB or -ve PB) | 16 | 18 | 6 | 40 |

We find that a substantial number of firms that exit the GSM framework continue to exhibit the same characteristics at the time of exit that made them eligible for GSM to begin with. For example, more than half the firms continued to have a networth that was equal to or less than Rs. 10 crores, net fixed assets equal to or less than Rs. 25 crores and market capitalisation less than or equal to Rs. 25 crores, and more than three-fourth of the exiting firms had a negative PE ratio at the time of their exit.

This raises critical questions on the implementation of the GSM framework and the manner in which the exchanges determine the firms that will cease being subjected to it.

5 Empirical analysis

5.1 Matched sample

We examine the impact of the GSM framework on stock prices and liquidity of firms using an event-study framework. We compare the returns and liquidity of firms that entered the GSM framework (*treated*) firms with that of a matched set of firms (*control*) that were similar to the treated firms in terms of certain characteristics prior to their entry into the framework. The matched sample approach ensures that the impacts observed on stock price and liquidity could be attributed to the entry of firms into the GSM framework, and is not due to some omitted variables.

The GSM framework relies on four major attributes for inclusion of firms into the mechanism: market capitalization, net worth, net fixed assets, and P/E ratio. We incorporate these into our matching framework as additional covariates for estimating the distance metric. We also use price, number of transactions and non promoter holding in our set of covariates to ensure good quality of matches. The values of all covariates are taken for one period prior to the firm's inclusion into the GSM framework for the treated firms.¹⁴

We start by building a comparison set of firms which were never included in the GSM. We also eliminate firms that did not have sufficient data for the purpose of the analysis. This filtering criteria leaves the number of firms in the comparison set to 1370. We use two distance metrics: propensity score and the Mahalanobis distance. Once we estimate our distance metrics, we use the nearest neighbor algorithm with one to one matching (with replacement) and a caliper of 0.05 to identify control firms similar to the treated firms.

We get two sets of matched treated and control firms: one based on the estimated propensity scores as the distance metric, and the other based on the Mahalanobis distance. The propensity score matching based final sample returns 54 treated firms matched to 43 control firms. The Mahalanobis distance metric based matched sample returns 99 treated firms matched to 69 control firms. Table 12 characterizes the quality of the matching procedure based on univariate comparisons of the pre-treatment characteristics of firm variables along with the corresponding t-statistics.

None of the observed differences between the treatment and control firms' characteristics is statistically significant in the pre-treatment period for the sample based on propensity score matching (PS-matched). In particular, the two set of firms had similar market cap, stock price, as well as traded volumes before the treatment. Further, the two sets were also similar in terms of the three attributes used for GSM eligibility: P/E, net fixed assets as well as net worth. Overall, these diagnostic tests confirm that the propensity score matching removes the observable differences across the two sets. The sample based on the Mahalanobis distance also matches well on all the variables except the net worth. The advantage of this matched sample over the PS-matched sample is the larger number of matched treated firms. In the analysis, we use both the matched samples to examine the effect of inclusion into the GSM framework on stock prices and liquidity.

¹⁴Several papers previous have used the matched sample approach to estimate the impact of regulatory interventions. See for example, Alexander and Peterson, 2008, Boehmer, Jones, and Zhang, 2013.

Table 12 Differences in pre-treatment characteristics between treated and control firms

The table shows univariate characteristics of the matched treated and control set along with t -statistic and p -value for test of the equality of means of the two sets. The matched sets are obtained from two distance metrics: estimated propensity scores and Mahalanobis distance.

| | Propensity scores | | | | Mahalanobis distance | | | |
|------------------------|-------------------|---------|-----------|------------|----------------------|---------|-----------|------------|
| | Treated | Control | t -stat | p -value | Treated | Control | t -stat | p -value |
| Market cap (log) | 20.01 | 19.97 | 0.39 | 0.70 | 19.33 | 19.76 | -0.57 | 0.57 |
| Price (log) | 2.49 | 2.56 | -0.72 | 0.47 | 1.79 | 2.09 | -0.82 | 0.41 |
| Traded Value (log) | 12.31 | 12.27 | -0.12 | 0.91 | 11.45 | 11.93 | -0.59 | 0.55 |
| P/E | -2.03 | 16.70 | -1.26 | 0.21 | 14.50 | -8.67 | 1.17 | 0.24 |
| Net Fixed Assets (log) | 19.15 | 19.48 | -0.08 | 0.94 | 19.52 | 18.91 | 0.22 | 0.83 |
| Net Worth (Rs. Mn) | -2377.34 | -531.44 | -1.11 | 0.27 | -3512.65 | 1134.93 | -4.27 | 0.00 |
| # of firms | 54 | 52 | | | 99 | 93 | | |

5.2 Impact on stock prices

We assess the impact on stock returns using the standard event study methodology (Brown and Warner, 1985). For each firm in the matched sample, we compute the cumulated abnormal returns (CAR) based on the market model. We use the Nifty 50 index as the market index.¹⁵ The market model is estimated for 120 days prior to the inclusion of the firm into the GSM. We then compare the CARs of the matched treated and control firms for two different event windows of five and ten days.

We start with a graphical overview of the event-study analysis for the two event windows. We conduct the analysis separately for the announcement date as well as the effective date. The average difference between the announcement date and the effective date of the entry of the firm into the GSM is ten days. Figure 2 shows the announcement effect of the inclusion of a firm into the GSM framework on CAR for both the event windows. The first and the third row show the CARs for PS-matched sample, while the second and the fourth row shows the CARs for the Mahalanobis distance based matched sample. Since some firms entered in Stage 0, while a few in Stage I, we do the analysis for both set of entries separately. This is because the consequences of entry into Stage I are more severe than that of Stage 0 (Table 2).

We do not observe much difference in the CARs of the treated and control firms for either of the two samples (PS-matched or Mahalanobis distance matched) post the announcement of firms into the GSM framework. This is true for entry into Stage 0 as well as Stage 1. Small differences start emerging between the CARs of the treated and control firms in the extended event window of 10 days after five days. The subsequent days are closer to the effective date (i.e the date on which the firm enters the GSM) of entry into the GSM framework, and thus the observed divergence could be the result of the effective date.

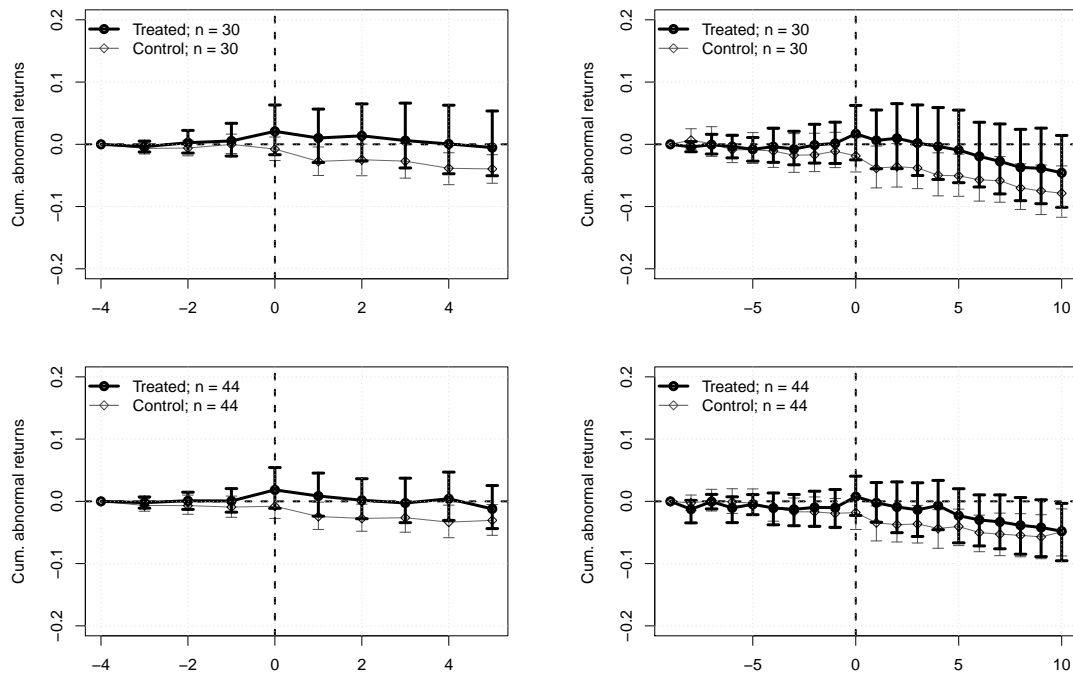
Next, we examine the CARs for the two samples with the event-date as the effective date (Figure 3). As before, the analysis is done for both a five day and ten day event window. For Stage 0, we observe marginal differences in the decline of the CARs of the treated firms relative to the control firms in the five day event window. These differences disappear in the 10-days event window. However, these results do not

¹⁵We redo the analysis using the Fama-French Factors. Our results remain the same.

Figure 2 CAR for treated and control sample after announcement of entry into Stage 0 or Stage I

The graph shows CAR for treated and control sample five and ten days prior to and post the announcement of their inclusion into the GSM framework. The vertical lines show the 95% confidence intervals. The first and the third row show the CARs for PS-matched sample for Stage 0 and Stage I entry, while the second and the fourth row show the CARs for the Mahalanobis distance based matched sample.

Stage 0



Stage I

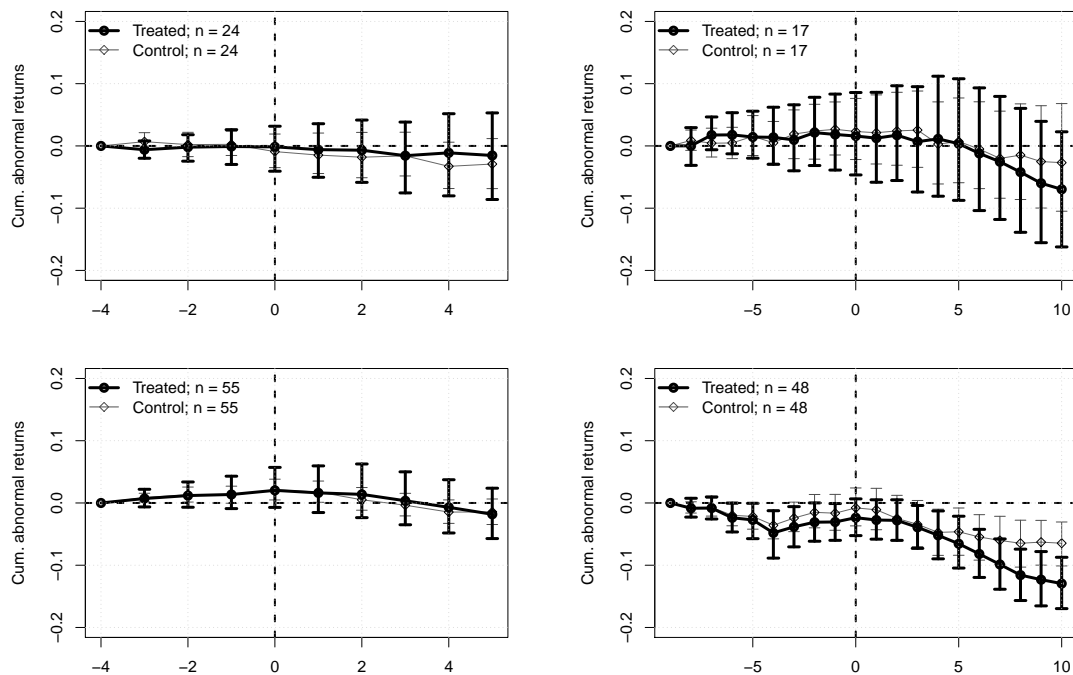
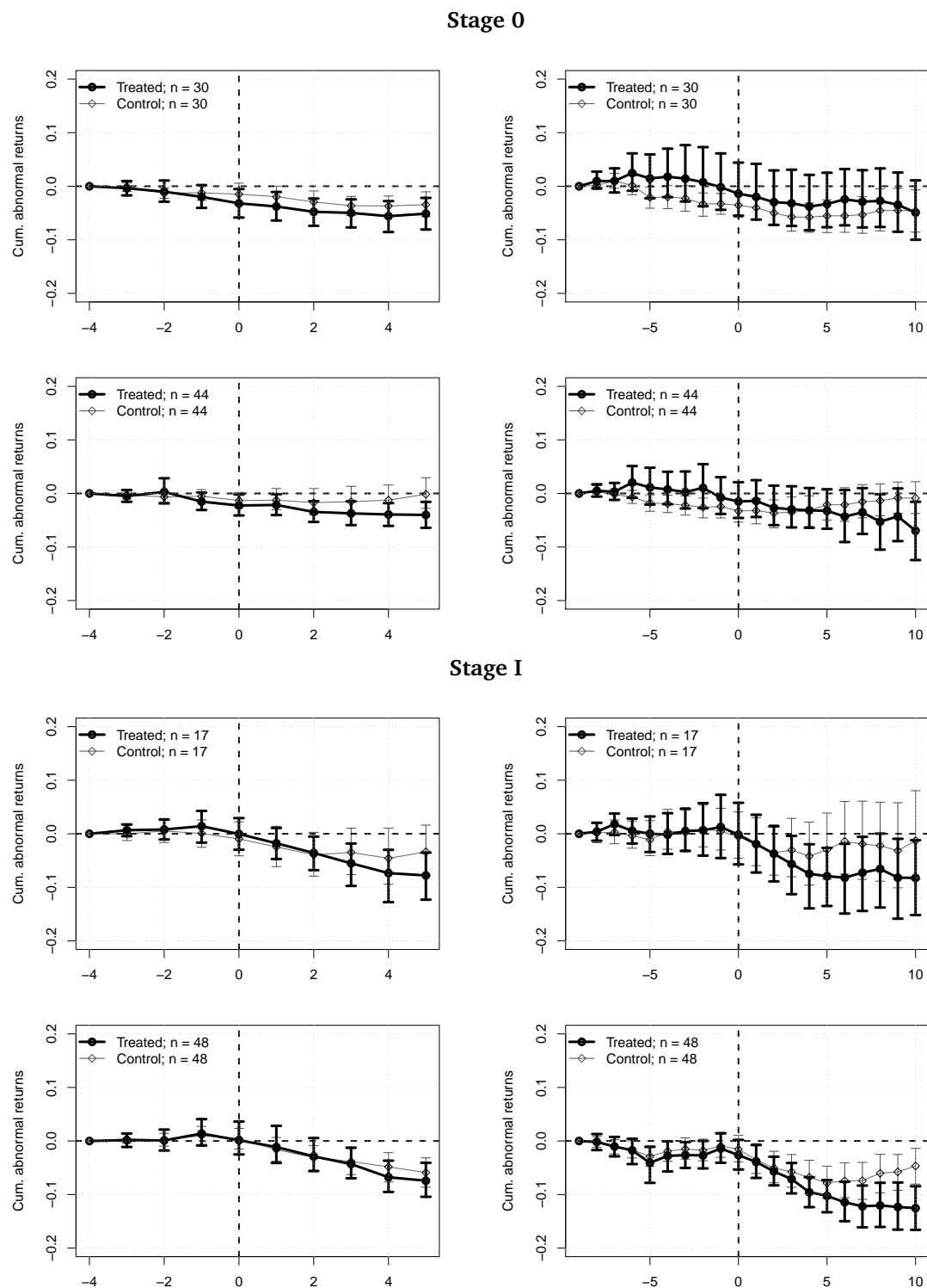


Figure 3 CARs for treated and control sample after entry into Stage 0 or Stage 1 of the GSM

The graph shows CAR for treated and control sample five and ten days prior and post the entry of the treated firms into the GSM framework. The vertical lines show the 95% confidence intervals.



hold for firms that entered Stage 1. Based on both the PS-matched and Mahalanobis-distance based matched sample, we observe an increasing divergence between the CAR of the treated and control firms after the event across both the event windows. The divergence gets larger as the number of days post the entry into Stage 1 increase. The analysis indicates that the entry into Stage 1 of the GSM framework has a significant impact on the treated firms' stock price.

5.3 Impact on liquidity

In this section, we examine the impact of a firm's entry into the GSM on stock liquidity and trading activity. We use three measures to assess these market quality variables: Amihud's illiquidity ratio, number of trades and traded volumes. All measures are calculated at daily frequency. As before, we begin with a graphical analysis to gauge the impact of the GSM framework on the firm's liquidity and traded activity.¹⁶

Figure 4 presents the results for the impact of the entry into GSM framework on the illiquidity ratio. The top (middle) row shows the trend in the illiquidity ratio of the treated and control firms for the two matched samples ten days prior and post the announcement (effective) date. The left panel shows the results for the PS-matched sample, while the right panel shows the results for the Mahalanobis-distance based matched sample. To eliminate the announcement date effects, we also do the analysis by removing the days between announcement and effective date. Alongside, we also remove five days before the announcement to remove any anticipation effects of stocks to be included into the mechanism. The illiquidity ratio without anticipation and announcement effects are plotted in the bottom panel of Figure 4, labeled as "Effective date with gap".

We notice that the illiquidity ratio of the control firm remains more or less stable for the 10-days event window across all three events, with the events defined as: announcement date, effective date and effective date with gap. However, the illiquidity ratio of the treated firms fluctuates considerably after their entry into the framework. The effects are more pronounced after the effective date. The graphs indicate that relative to the control firms, the liquidity of the treated firms worsens after their entry into the GSM framework.

We next examine the graphs on trading activity, as measured by traded volumes and number of trades. Figure 5 presents the results pre and post 10 days after the announcement date, effective date and effective date with gap for the PS-matched sample for the treated and control firms.¹⁷ The left panel shows the treated firms, while the right panel shows the control firms.

We observe that the trading activity of the control firms remains stable in the 10-day event window after the announcement date. However, the traded volumes as well as the number of trades for the treated firms fall considerably in the period after the announcement (top panel, left graph). We also notice a considerable fall in the trading activity of the treated firms post the effective date, relative to the 10-day period prior

¹⁶To eliminate the effect of outliers, we winsorize all liquidity measures at 1%.

¹⁷The trading activity graph for the Mahalanobis-distance based matched sample is shown in Figure 9 in the appendix.

Figure 4 Illiquidity ratio for treated and control sample after entry into Stage 0 or Stage I

The graph shows the illiquidity ratio for treated and control sample for ten days prior and post their inclusion into the GSM framework. The top panel shows the impact on illiquidity ratio after the announcement date, the middle panel shows the impact after the effective date, and the bottom panel shows the impact after the effective date with the pre-event period defined as ten days prior the announcement date, minus the anticipation effects of five days prior the announcement. The left panel shows the impact for the PS-matched stocks, while the right panel shows the impact on the Mahalanobis-distance based matched stocks.

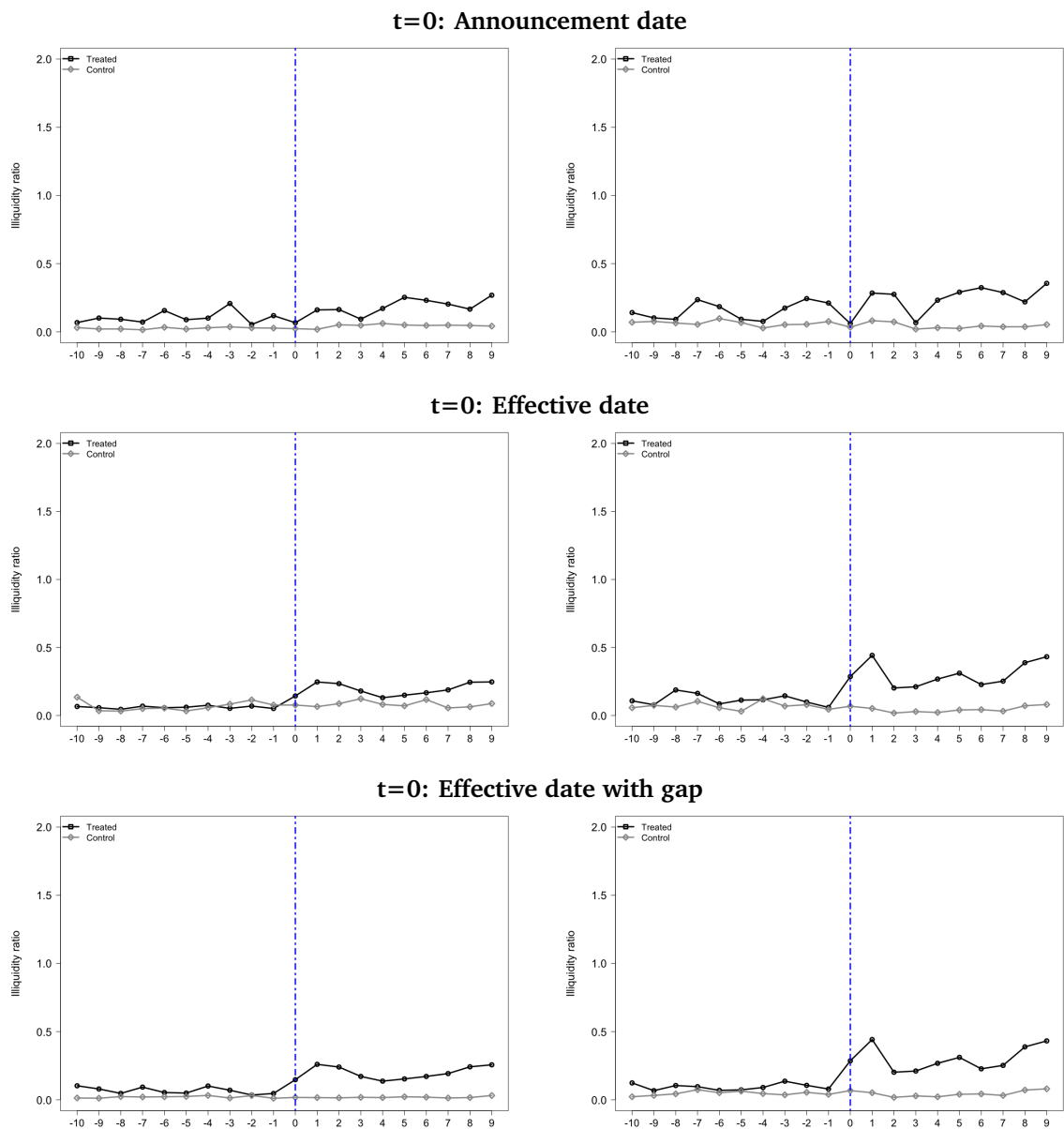
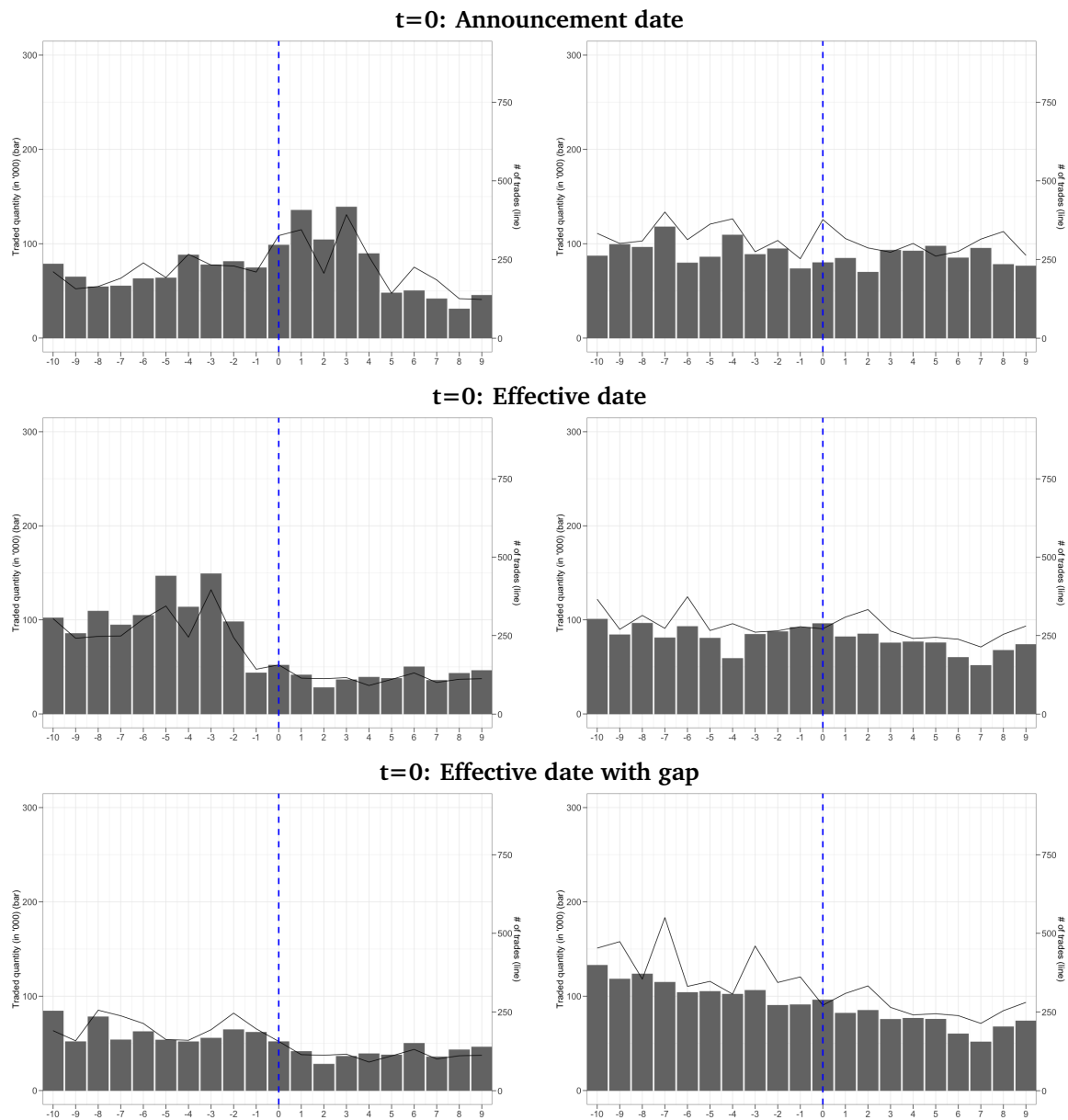


Figure 5 Trading activity of treated and control sample after entry into Stage 0 or Stage I for the PS-matched sample

The graph shows the two measures of trading activity: traded volumes (bars) and number of trades (line graph) for treated and control sample for ten days prior and post their inclusion into the GSM framework for the PS-matched sample. The effects are shown for the event defined as the announcement date, effective date and effective date with gap. The effective date with gap shows the graph for ten days post the announcement, and ten days prior the announcement date, minus the anticipation effects of five days prior the announcement. The left panel shows the measures for the treated firms, while the right panel shows the measures for the control firms.



the effective date (middle panel, left graph). There is a slight decline in the trading activity of the control firms as well, after the effective date.

The bottom panel graph shows the trading activity after the exclusion of announcement and anticipation effects. Here, we observe, that unlike the middle panel, the treated firms do show a decline after the effective date relative to the period prior the announcement date (minus five days for anticipation effects). However, the decline is not as substantial as what we saw relative to ten days prior the effective date (middle panel, left graph). We also notice that relative to the period prior the announcement and anticipation date effects, the control firms also experience a substantial decline in trading activity after the effective date.

The graphical analysis thus far shows that the entry of a firm into the GSM framework has a considerable impact on all the three measures: illiquidity ratio, number of trades as well as traded volumes. We next quantify the magnitude of this impact using difference-in-differences (DiD) framework. The DiD framework compares the liquidity measures of treated firms with that of the control firms, before and after their inclusion into the GSM. The DiD framework takes care of the omitted trends that may be correlated with stock liquidity.

Table 13 reports the DiD measure for three measures of stock liquidity: traded volumes as measured by traded quantity, number of transactions and the illiquidity ratio.¹⁸ We report the results for different event windows ranging from 3 days to 10 days before and after their entry into the framework, while accounting for announcement and anticipation effects¹⁹

Across all three measures and event windows, the results for treated stocks indicate a worsening of liquidity and reduction in trading activity in the period post the effective date, relative to the ten day period prior announcement date (minus five days for anticipation effects).²⁰ This is true for cross-sectional averages as well as median. However, the variability in the sample is very high, and the results do not turn out to be statistically significant. In addition, we also observe a decline in the control set trading activity measures after the event relative to the prior event period (Column 5-6). Yet again, the differences are not statistically significant.

The difference-in-differences measures reported in the last two columns of Table 13 indicates that relative to the control stocks, liquidity worsened for the treated stocks after they entered the GSM framework (Panel A). The results are statistically significant for the extended windows of 7 and 10 days.²¹ The median difference-in-differences estimate also shows a worsening of liquidity of the treated stocks after the event.

We next turn to the discussion of results for traded volumes and number of transactions. The difference-in-differences measure based on the differences in cross-sectional averages of treatment and control set pre and post period changes shows a negative and significant value for the event windows of 3 and 5 days. This holds true for the

¹⁸The table shows the results for PS-matched sample, while Table 14 in the appendix reports the results for the Mahalanobis distance based measure. The results are qualitatively similar.

¹⁹This corresponds to the graphs plotted as “Effective date with gap”.

²⁰See Columns 2 and 3 in Table 13.

²¹We repeat the analysis with 15 and 22 days as the window, and the results are similar to 7 and 10 days event window.

Table 13 Difference-in-differences measure on liquidity and trading activity measures after entry into the GSM framework after the effective date

The table reports DiD measure for three liquidity variables: traded volumes as measured by daily traded quantity, daily number of transactions and the illiquidity ratio for the PS-matched sample. The results are shown only for the effective date, after accounting for the announcement and anticipation effects (effective date with gap). The measure is reported for different event windows of 3, 5, 7 and 10 days before and after the entry of the firm into the GSM framework. In addition to the cross-sectional averages, we also show the results for the median for each set. ** indicates significance at 5% level. *t*-test is conducted for differences of the means between two sets, while Wilcoxon signed-rank test is used for differences in the medians.

| Event Window | Treated Difference (After - Before) | | | Control Difference (After - Before) | | | Diff-in-diff (Treat Diff - Control Diff) | |
|----------------------------|--|--------|---------|--|--------|---------|---|----------|
| | Mean | Median | SD | Mean | Median | SD | Mean | Median |
| Panel A: Illiquidity ratio | | | | | | | | |
| (-3,3) | 0.17 | 0.01 | 0.62 | -0.00 | 0.00 | 0.04 | 0.17 | 0.01** |
| (-5,5) | 0.13 | 0.01 | 0.45 | -0.01 | 0.00 | 0.03 | 0.14 | 0.01** |
| (-7,7) | 0.12 | 0.01 | 0.34 | -0.00 | 0.00 | 0.03 | 0.12** | 0.01** |
| (-10,10) | 0.13 | 0.01 | 0.33 | -0.00 | 0.00 | 0.02 | 0.13** | 0.01** |
| Panel B: Traded volumes | | | | | | | | |
| (-3, 3) | -20,230 | -5,399 | 80,259 | -8,157 | -636 | 99,615 | -12,073** | -4,763** |
| (-5,5) | -18,133 | -4,383 | 92,304 | -15,909 | -482 | 83,313 | -2,224** | -3,900** |
| (-7,7) | -17,015 | -3,867 | 105,817 | -23,225 | -410 | 85,191 | 6,209** | -3,457** |
| (-10, 10) | -20,836 | -3,137 | 104,901 | -34,420 | -1492 | 118,458 | 13,584** | -1,644** |
| Panel C: # of transactions | | | | | | | | |
| (-3, 3) | -84 | -15 | 279 | -83 | -9 | 485 | -0.59 | -5.50** |
| (-5, 5) | -73 | -12 | 244 | -80 | -2 | 372 | 6.23** | -9.90** |
| (-7, 7) | -82 | -14 | 329 | -114 | -3 | 382 | 31.42** | -10.86** |
| (-10, 10) | -86 | -14 | 292 | -133 | -15 | 466 | 47.20** | 1.05** |

differences in the medians of these two sets as well, indicating that immediately after the inclusion into the GSM framework, the matched treated stocks experienced a significant decline in trading volumes. However, for the extended window of 5 and 7 days, we find that the average decline in the control set is more than that of the treated set, resulting in a positive and significant DiD estimator. The differences based on the median value of the treated and control set pre and post period changes, continues to be negative and significant for these event window.

We observe similar effects on the number of transactions. The treated and control stocks, both experience a decline in the period post the effective date of implementation of the GSM mechanism. The DiD estimator based on the differences in the means is negative (though insignificant) for an event window of 3 days, but positive and significant for the remaining windows. The median based differences across the two sets, however indicate a negative and significant impact, implying an adverse impact on the treated set for the first seven days of the implementation.

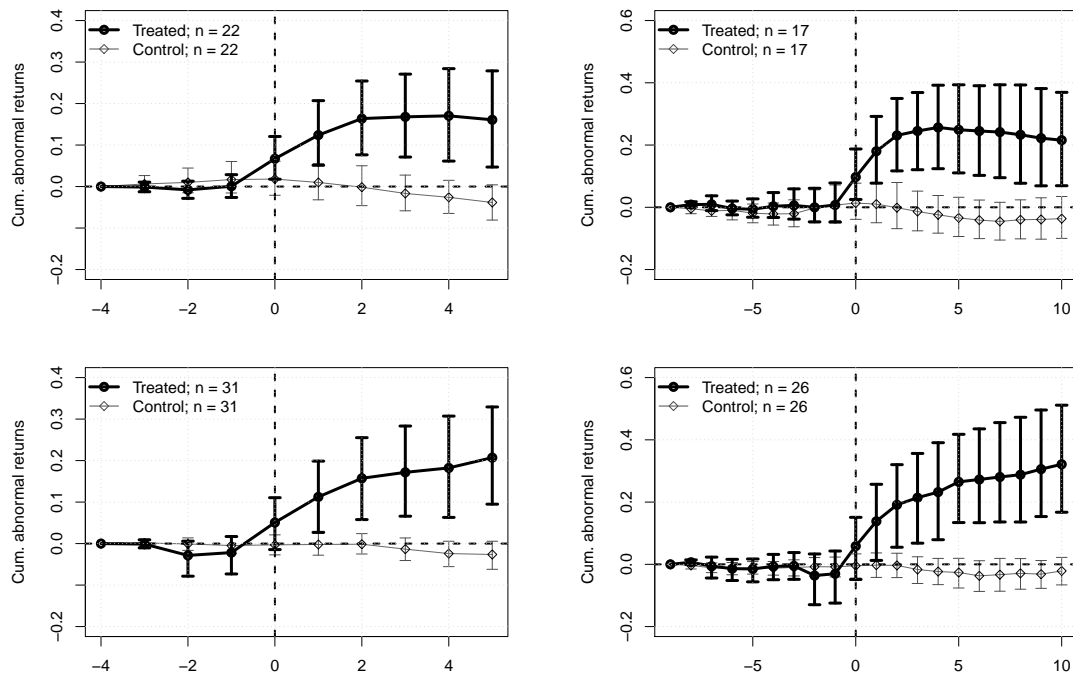
5.4 Further analysis: What happens after a firm exits GSM

In Section 4, we discussed that some of the firms exited the GSM framework based on the quarterly review by the exchange. In our matched samples, we have 22 such firms in the PS-matched sample, and 31 such firms in the Mahalanobis-distance based matched sample. In this section, we analyse the impact of exits on stock price and liquidity of treated firms relative to the matched control firms.

Figure 6 plots the CARs for the two event windows for both the samples. The event is the effective date on which the firm exits the GSM framework.²² The CARs for the PS-matched sample is shown in the first row, while the CARs for the Mahalanobis-distance based matched sample is shown in the second row. We observe that relative to the control sample, on average, the treated firms experience an increase in stock prices after they exit the GSM framework. This finding holds true for the event window of ten days as well, with the results being statistically significant.

Figure 6 CAR for treated and control sample after exit from GSM

The graph shows CAR for treated and control sample five and ten days prior and post the exit of the treated firms into the GSM framework. The first row shows the CARs of the PS-matched sample, while the second row shows the CARs for the Mahalanobis-distance based matched sample.



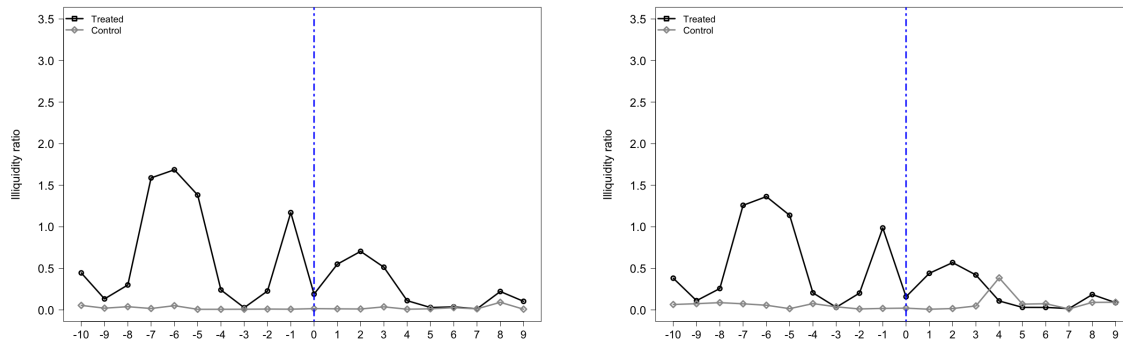
We next examine the illiquidity ratio of the firms of the two matched samples after these firms exit the GSM framework. Similar to the CARs, we observe a decline in the illiquidity ratio after the firm exits the GSM framework.

We also observe a positive impact of the exit in the trading activity of the treated firms. The left panel in Figure shows the traded volumes and number of trades for the treated firms in both the samples in the pre and post exit period. In contrast, we do not observe

²²The average difference between the announcement of exit and the effective date of exit is of three days. Hence we do not conduct an event study for the announcement date.

Figure 7 Illiquidity ratio of treated and control sample after exit

The graph shows the illiquidity ratio for the matched treated and control sample for ten days prior and post their exit from the GSM framework. The left panel shows the effect on the PS-matched sample, while the right panel shows the effect on the Mahalanobis-distance based matched sample.



any such impact on the control firms, which confirms that the observed improvement is indeed due to the exit of the treated firms from the GSM framework.

In summary, the analysis indicates that after the firms exit the GSM framework, they experience a positive impact on stock prices and trading activity.

6 Conclusion

Protecting the integrity or the fairness of the markets, together with investor protection are the key mandates of securities market regulators worldwide. This is important as low investor confidence in market discourages participation, thereby resulting in low liquidity, high trading costs and high cost of capital for listed firms (Carole Comerton-Forde and Putnins, 2013). Hence market regulators (along with the exchanges) take several measures to curb market manipulation.

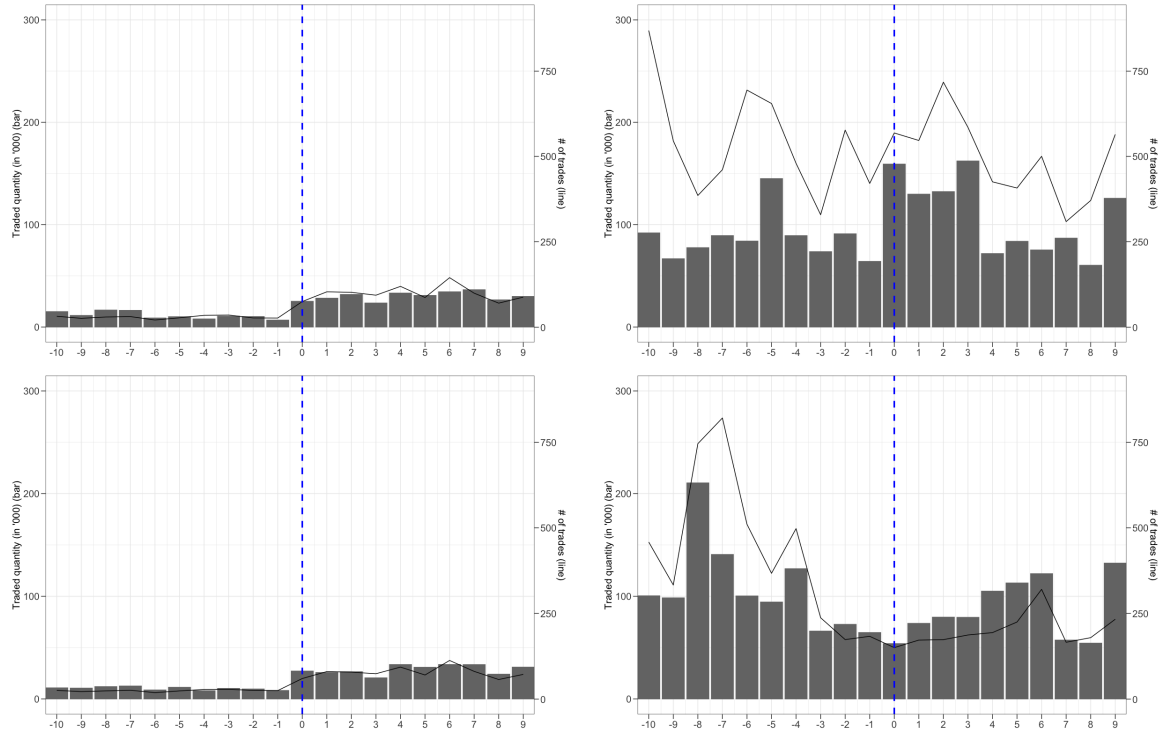
However, such measures come at additional costs. Not only do surveillance measures require exchanges and regulators to deploy additional resources to track market misconduct, but they could also adversely impact listed firms and investor confidence if such measures are not well-targeted. Thus, an analysis of surveillance measures implemented by exchanges becomes essential.

In this paper, we analyse a newly introduced surveillance measure on the Indian exchanges, the Graded Surveillance Measure (GSM). Unlike the surveillance measures used worldwide, the GSM is unique in that it relies on the financial health of the firm as the shortlisting criteria for selection of firms into the framework. Our analysis of a unique hand-collected dataset of securities that were subjected to this surveillance action suggests that nearly a third of those securities did not satisfy the pre-defined criteria of inclusion. We also find that more than half of the securities that exited the surveillance continue to exhibit the same pre-defined characteristics.

In terms of the impact of stock prices and trading activity of such firms, we expect a decline in the two following the inclusion. This is because in addition to various trading restrictions that are placed on such firms, the activity of members trading on

Figure 8 Trading activity measures for treated and control sample after exit

The graph shows the trading activity measures for treated (left panel) and control (right panel) sample for ten days prior and post their exit from the GSM framework. The first row shows the measures for the PS-matched sample, while the second row shows the measures for the Mahalanobis-distance based matched sample.



these firms is also monitored. Thus, we expect that an inclusion of a firm into this framework will result in a decline in stock prices, and reduced trading activity. We test for these patterns, and find evidence in support of the hypothesis. Firms that enter the GSM framework, experience a decline in stock prices relative to that of matched control firms. We also find evidence of reduction in trading activity and liquidity of such firms. Firms that exit, on the other hand, show a positive impact on stock prices. Our findings indicate considerable ambiguity on the way such restrictions are placed, and raise critical questions on the effectiveness of such measures.

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A Exemptions from the GSM framework

1. Securities where the price discovery is yet to take place as per the provision of SEBI circulars CIR/MRD/DP/01/2012 and CIR/MRD/DP/02/2012 dated January 20, 2012.
2. Securities already under suspension;
3. Securities on which derivative products are available;
4. Securities as a part of any index (NSE or BSE);
5. Public Sector Enterprises and its subsidiaries, if applicable;
6. Securities listed during last 1 year through Initial Public Offering (IPO);
7. Securities which have paid dividend for each of last three preceding years;
8. Securities with Institutional holding greater than 10% only if following conditions are met:
 - If the promoter entity has not offloaded any share in the last 5 years; and
 - the current trading price of the security is within the range of High and Low price in last 3 years of the security.
9. Securities listed through Scheme of Arrangement involving Merger / Demerger during last 1 year, subject to the following conditions:
10. If the parent company is under the purview of GSM, the resultant demerged company shall also attract GSM.
11. If the parent company is not under the purview of GSM, the resultant demerged companies shall not be part of GSM at the time of the demerger.

Table 14 Difference-in-differences measure on liquidity and trading activity measures for Mahalanobis-distance based matched sample

The table reports DiD measure for three liquidity variable: traded volumes as measured by daily traded quantity, daily number of transactions and the illiquidity ratio for the Mahalanobis-distance based matched sample. The measure is reported for different event windows of 3, 5, 7 and 10 days before and after the entry of the firm into the GSM framework. ** indicates significance at 5% level.

| Event Window | Treated Difference (After - Before) | | | Control Difference (After - Before) | | | Diff-in-diff (Treat Diff - Control Diff) | |
|----------------------------|--|----------|--------|--|--------|---------|---|----------|
| | Mean | Median | SD | Mean | Median | SD | Mean | Median |
| Panel A: Illiquidity ratio | | | | | | | | |
| (-3,3) | 0.20** | 0.03** | 0.70 | 0.00 | -0.00 | 0.06 | 0.20** | 0.03** |
| (-5,5) | 0.18** | 0.03** | 0.46 | -0.01 | -0.00 | 0.07 | 0.20** | 0.03** |
| (-7,7) | 0.18** | 0.02** | 0.44 | -0.01 | 0.00 | 0.07 | 0.20** | 0.02** |
| (-10,10) | 0.21** | 0.03** | 0.41 | -0.00 | 0.00 | 0.05 | 0.21** | 0.03** |
| Panel B: Traded volumes | | | | | | | | |
| (-3, 3) | -15,427 | -4,393 | 74,277 | -2,667 | -1,000 | 180,394 | -12,759 | -3,393** |
| (-5,5) | -17,121 | -4,139 | 67,310 | -13,433 | -600 | 184,472 | -3,688** | -3,539** |
| (-7,7) | -15,595 | -3,800 | 71,812 | -32,012 | -1,018 | 206,423 | 16,417** | -2,781** |
| (-10, 10) | -19,007 | -3,173** | 71,338 | -39,651 | -2,156 | 197,267 | 20,643** | -1,016** |
| Panel C: # of transactions | | | | | | | | |
| (-3, 3) | -44.26 | -7.33** | 168.27 | 5.05 | -4.67 | 302.45 | -49.30** | -2.67** |
| (-5, 5) | -42.96** | -8.60** | 140.52 | 2.36 | -3.60 | 235.60 | -45.32** | -5.00** |
| (-7, 7) | -37.81** | -8.71** | 140.32 | -12.21 | -3.57 | 212.64 | -25.59** | -5.14** |
| (-10, 10) | -41.80** | -12.60** | 124.01 | -18.49 | -3.50 | 217.31 | -23.32** | -9.10** |

Figure 9 Trading activity of treated and control sample after entry into Stage 0 or Stage I for the Mahalanobis-distance based matched sample

The graph shows the two measures of trading activity: traded volumes (bars) and number of trades (line graph) for treated and control sample for ten days prior and post their inclusion into the GSM framework for the Mahalanobis-distance based matched sample. The effects are shown for the event defined as the announcement date, effective date and effective date with gap. The effective date with gap shows the graph for ten days post the announcement, and ten days prior the announcement date, minus the anticipation effects of five days prior the announcement. The left panel shows the measures for the treated firms, while the right panel shows the measures for the control firms.

