

Rules vs. discretion: Impact of trading rules on market quality and trader behavior

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Preliminary draft

Abstract

We examine the impact of surveillance measures in the form of differential trading rules on stock returns and liquidity. Using data from the National Stock Exchange of India, we find that stocks which are subjected to higher surveillance, experience a decline in stock returns and liquidity. We also find that the rules based on which these stocks are considered for higher surveillance are not necessarily satisfied.

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1 Introduction

Protecting the integrity or the fairness of the markets, together with investor protection, are the key mandates of securities market regulators worldwide (Austin (2017)). This is important as low investor confidence in markets discourages participation, thereby resulting in low liquidity, high trading costs, and high cost of capital for listed companies (Comerton-Forde and Putnins (2013)). Thus, regulators worldwide undertake actions in the form of exchange trading rules, additional surveillance measures to govern market conduct and promote market efficiency (Aitken *et al.* (2015)).

However, regulatory actions come at additional costs. The benefits of such regulations vis-a-vis the cost continue to be a subject of academic debate (Christensen *et al.* (2016)). The empirical evidence examining the effects of securities market regulation is so far mixed. For example, while the early evidence on insider trading bans indicated that such laws failed to reduce the level of such activity in the market (Bris (2005)), recent evidence by Aitken *et al.* (2015) find that more detailed exchange trading rules and surveillance across countries and over time mitigate the frequency of suspected insider trading cases, but exacerbate the profits per case. Bushee and Leuz (2005) assess the economic consequences of disclosure requirements and find that smaller firms have to incur higher costs to comply with the same. Christensen *et al.* (2016) find market liquidity to be significantly higher in countries where rules governing securities regulation were enforced strictly.

Given the mixed evidence, the questions pertaining to the optimal level of securities market regulation remain. How these regulations impact the overall market liquidity and efficiency, along with the market value and cost of capital of public firms is a key policy question for the regulators. Additional measures, while intended at enhancing the integrity of markets, come at significant internal costs for the exchanges, traders as well as firms. This is more so in the case of small firms which pay higher costs in terms of reduced market value and higher cost of capital. Thus, the empirical evidence determining the effect of such regulations is of significant importance in informing the policy debate around such regulations. It is with this motivation that we examine the impact of a new surveillance mechanism introduced by the Indian securities market regulator on the quality of equity markets.

The new mechanism called the Graded Surveillance Measure (GSM) was announced by the regulator on February 23, 2017, and came into effect from March 14, 2017. Under the mechanism, the securities that witnessed abnormal price rise not commensurate with the financial health and fundamentals of the firm are subjected to special trading rules, such as alerts before placing the order on the exchange, additional security deposit before the placement of orders, trading on specific days of the week. The aim of this new mechanism was to alert the investors from dealing such securities which were placed under higher level of surveillance.

A measure such as the GSM increases the surveillance costs for exchanges. The policy question that arises around the implementation of such interventions is if such regulations are desirable. Do such measures improve the overall quality of the markets and increase

investor confidence? Or do they cause more harm to the firms, especially when such interventions are discretionary rather than rule-based. We aim to provide insights on these questions in this study.

We begin by hand-collecting the data on the list of securities admitted under the GSM framework on the National Stock Exchange of India (NSE). 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, a detailed criteria in terms of net worth, net fixed assets, and price to earnings ratio has been specified by the regulator. Securities experiencing abnormal returns and 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 event study and difference-in-differences framework, we analyse the impact of the surveillance mechanism on returns and liquidity.

Our preliminary findings indicate that a significant number of firms that entered the GSM framework did not meet the criteria provided in the exchange circulars for consideration into the framework. This indicates that there may be some discretion (based on other variables) which is exercised in identifying the securities for higher surveillance. In terms of the impact on stock returns and liquidity variables, we find that firms that entered the framework experienced a decline in cumulated abnormal returns as well as liquidity after the entry.

Our paper relates to a substantial body of work in securities market regulation that explores the question of how securities laws and their enforcement facilitate market liquidity and efficiency with greater integrity. La Porta *et al.* (2006) examine the effect of securities

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

law on the issuance of new equity, and find a positive link between the two. Cumming *et al.* (2011) examine stock exchange trading rules for market manipulation, insider trading and broker-agency conflict, and find that such rules significantly affect liquidity. In addition to exchange trading rules, Aitken *et al.* (2015) examine the impact of surveillance measures on 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. Cumming *et al.* (2018) find that more expenditures on enforcing securities regulation improves fraud detection and facilitates more trading and stock market participation. Cumming *et al.* (2015) provides 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 paper adds to the existing literature by specifically examining the impact of *differential* trading rules across stocks 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.

The rest of the paper is organised as follows. Section 2 and 3 lay down the institutional arrangement and the operational details of the GSM mechanism. Section 4 describes the data and sample composition. Section 5 provides details of the empirical strategy. Section 6 discusses the results and details further work.

2 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 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.

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.

In addition to the existing surveillance measures, on 23rd February, 2017, SEBI and the exchanges jointly introduced a new surveillance mechanism, called 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. The framework, jointly discussed and agreed upon between SEBI and the securities exchanges, was announced through circulars issued by the exchanges.⁴ As per the circular published by the NSE introducing the GSM framework, 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.

Under the GSM framework, stock exchanges are required to monitor and identify securities that are subjected to special trading rules. The kind of trading rules that are followed depends on the stage in which the firm is placed. The framework is divided into seven stages. While specific eligibility criteria have been prescribed for Stage 0 and Stage 1,⁵ the criteria for transition from these two stages into the remaining five stages have not been specified. Table 1 lists the eligibility criteria for Stage 0 and Stage 1.⁶

The consequences of being placed in different stages of the 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 in such securities generates alerts for investors placing their orders. The consequences of the framework are much more severe if the firm is moved to Stage 3 or more.

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. 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.

3 Institutional details

Our analysis focuses on the data from the National Stock Exchange, India (NSE). Comprising 75% of entire market share, the NSE is the dominant platform for equity trading in India.⁷ As of September 2019, the number of companies listed on the platform stood at

⁴The text of the framework in the circulars issued by the exchanges is identical. In this paper, we will be relying on the NSE circular dated 23rd February, 2017.

⁵This is conditional on price movements.

⁶Certain securities are exempted from the GSM framework. The criteria for exemptions are provided in the appendix.

⁷The other 25% market share is with the Bombay Stock Exchange.

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

Criteria	
Stage 0	Firms with: • latest available networth 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 1	Firms with: • 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: 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

1,955. Trading on 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 securities market regulator, Securities and Exchange Board of India (SEBI).

There are no designated market makers for trading of individual stocks 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 Data details

4.1 Sample construction

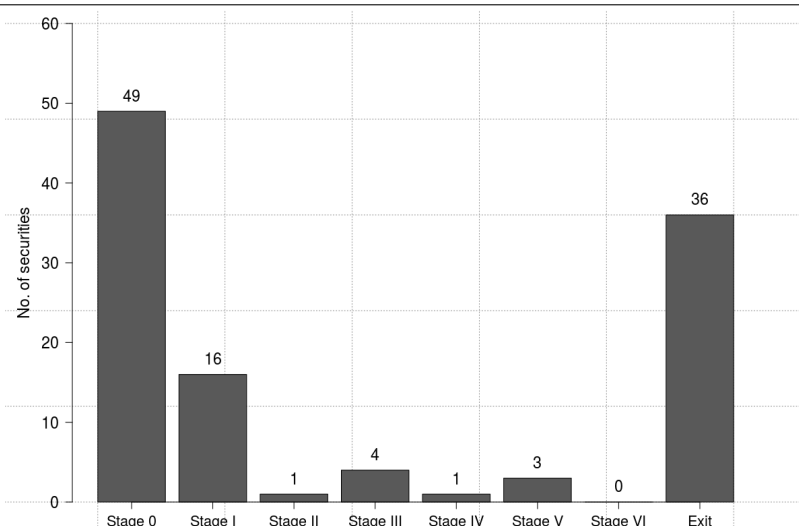
We begin by compiling the list of securities that entered into the GSM framework over the two year period from March 2017 to March 2019. For this purpose, we hand collect the information on GSM securities from the circulars published on the NSE website under the surveillance and investigation category. 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 surveillance was released in March 2017. In our sample period of two years, we get a total of 110 securities that entered the GSM framework.

We use the Prowess database maintained by the Centre for Monitoring Indian Economy (CMIE) collect information on financial and accounting variables for our sample set. 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 period one year prior to the inclusion of a firm into the GSM framework.

Figure 1 provides a snapshot of the number of firms across different stages as of March 2019. Out of the 110 securities, we observe that about 50 percent were in Stage 0. A large number of firms that entered into the framework were able to exit out of the mechanism by March 2019. At the end of our sample period, no firm was in Stage 6. However, in this period, firms occasionally entered and moved out of this stage. As of March 2019, 9 firms were in Stage 3 or more, in which the consequences are more severe in terms of the trading days. Out of the 110 securities that entered into GSM, 36 exited, while 8 re-entered the process within this time frame.

Figure 1 No. of firms in the GSM framework at each stage as on March 2019



We next examine the number of days that a firm stayed in a particular stage. Table 3 shows the average amount of time (in terms of number of days) spent within each stage of the GSM process by a firm. We observe that the most of the firms stayed in Stage 0 during our sample period, followed by Stage 1. In the two year period of our analysis, 92

days were spent being in Stage 0. Between stage II to VI, the average time spent is nearly the same.

Table 3 Time spent per stage by a firm under the GSM framework

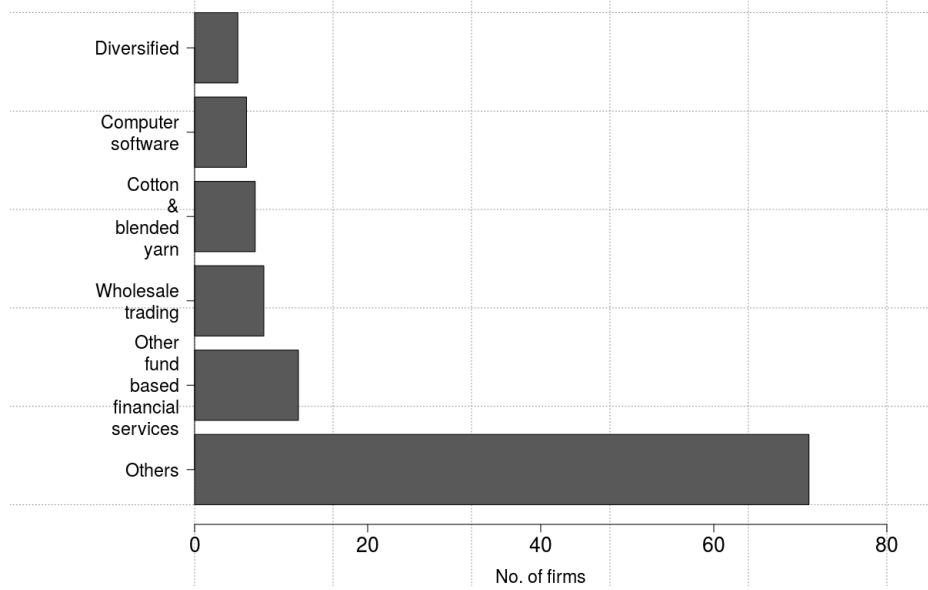
	Stage	Days in surveillance
1	Stage 0	92
2	Stage I	53
3	Stage II	38
4	Stage III	34
5	Stage IV	34
6	Stage V	33
7	Stage VI	37

We next analyse the characteristics of the firms that were put under the surveillance mechanism in terms of age, size and industry. We find that the oldest firm in our sample was incorporated in 1936 and the latest in 2014. This essentially means that the age of the firms in our sample varies from being as young as 5 years old, to as old as being 83 years old. The median age is 32 years. The year of listing for these securities ranges between 1994 to 2016. Most securities were listed around 2005-06. Figure 6 shows the industry distribution of our sample firms.⁸ 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 4 provides summary statistics for select market and balance sheet variables of the sample firms based on one quarter ending prior to the entry into the GSM framework. For market variables such as the closing price, traded quantity, traded value, number of transactions, market capitalization, we take the median value for the last quarter. We observe that the closing price for these securities fluctuates between 10 paisa and Rs. 244, with a median of Rs. 5.7. At the same time, total traded value of these securities is low, indicating low liquidity in these securities. The number of trades on these securities range between 6 per day to 118.

The ownership structure of the sample firms is reported in Table 5. Across quarters, we observe a consistent trend in the stakes held by promoters and non promoters. 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.

⁸A more detailed graph of industry composition is provided in the Appendix.

Figure 2 Industry break up of firms in sample**Table 5** 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	42.32	41.10	1.22	57.68	6.95	50.73
Sep-2017	46.67	44.98	1.69	53.33	5.89	47.41
Dec-2017	41.63	39.47	2.16	58.37	3.61	54.71
Mar-2018	45.03	42.05	2.98	54.97	4.09	50.84
Jun-2018	41.98	39.98	2.01	58.02	4.04	53.91
Sep-2018	42.36	40.21	2.15	57.64	7.51	49.77
Dec-2018	41.66	38.91	2.75	58.34	4.22	54.11
Mar-2019	45.93	43.04	2.89	54.07	5.41	48.14

4.2 Eligibility criteria

The criteria laid down by SEBI for eligibility of securities to be considered into the GSM framework have been discussed in section 2. In this section, we assess whether the firms that entered the mechanism satisfied the eligibility criteria specified in the exchange circular. This helps us determine whether the sample GSM firms were included into the mechanism based on rules or by discretion. Table 6 lists the three criteria specified in the NSE circular along with the number of GSM firms that satisfied that criteria based on values in the last quarter.

Table 6 No. of firms satisfying the eligibility criteria for GSM rules to be applicable

Criterion		Applicable	Not applicable	% Applicable	% Not applicable
I	Net worth $\leq$ Rs. 10 crores	96	13	88.1	11.9
II	Net fixed assets $\leq$ Rs. 25 crores	48	56	46.2	53.8
III	Negative P/E ratio	92	16	85.2	14.8
IV	P/E $>$ 2*Nifty 500 P/E ratio	0	109	0.0	100.0
V	I and II apply	41	63	39.4	60.6
VI	I, II and III apply	37	68	35.2	64.8

We find that about 88% of the firms that went into the GSM framework satisfied the Net Worth and P/E criteria when considered on an individual basis. Only 46% of the firms had net fixed assets less than or equal to Rs. 25 crores. No firm had a P/E ratio greater than twice that of the Nifty 500 index.

The NSE circular for selection of securities under the GSM framework makes it mandatory for the first three conditions to be fulfilled for trading restrictions to be applicable. Within the criterion for P/E, either the ratio has to be negative *or* greater than twice the P/E ratio of Nifty 500 index. Since no firm is eligible as per the latter rule, we look at the first three conditions to be jointly met. We find that only 35% of the firms in the sample satisfied the criteria laid for inclusion into the GSM framework. This implies that 65% of the firms were pushed into the GSM framework, not by rule, but probably based on other factors not specified in the circular.

5 Empirical strategy

We examine the impact of the GSM framework on stock returns and market quality variables by using an event-study framework. We compare the returns and market quality 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 specific characteristics prior to their entry into the framework. For the current analysis, we focus only on Stage 0 conditions as the eligibility criteria. The framework relies on three major attributes for inclusion of firms into the mechanism : net worth, net fixed assets, and P/E ratio. We start by building a comparison set of firms which were never included in the GSM mechanism. Our comparison is restricted to firms whose net worth and P/E ratio are in the range of the treated firms. This filtering criteria reduces the number of firms in the comparison set from 1454 to 1179. We then use propensity score matching to identify our final set of matched treated and control firms.

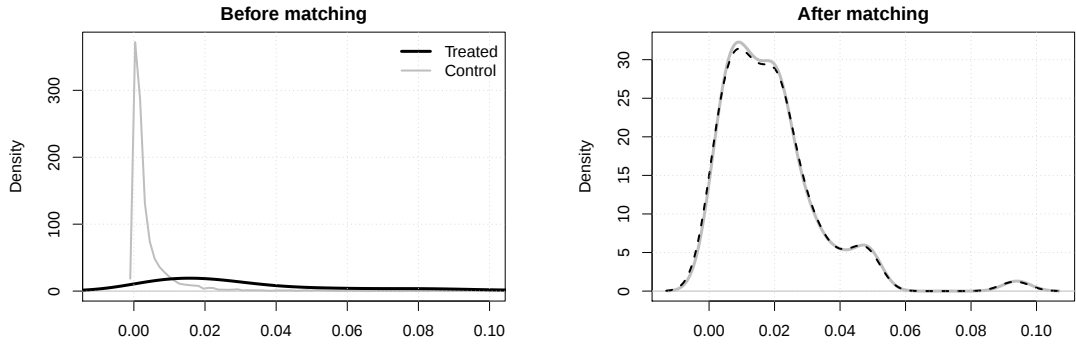
The propensity score matching is based on estimation of a probit model estimated for treated and comparison set of firms. The dependent variable equals one if the firm entered into the GSM framework (in any particular month and year), and zero otherwise.

The two covariates, market cap and adjusted closing price are included in the probit specification as per the standard practice in literature (Davies and Kim (2009)). The values of

the covariates are taken for one period prior to the firm’s inclusion into the GSM framework for the treated firms. Based on the estimated propensity scores for the treated and control firms, we use the nearest neighbor algorithm with one to one matching and caliper of 0.05 to identify control firms similar to the treated firms.

Figure 3 Empirical distribution of the estimated propensity scores before and after matching

The graphs show the density plot of estimated propensity scores of the initial and final sample before and after matching for the treated and control sets.



Our final sample comprises 72 treated firms matched with 65 control firms. Figure 3 shows the distribution of the estimated propensity scores of the treated and control firms, before and after matching. The distribution of the propensity scores for the two groups (matched treated and control) after matching is very similar, indicating a good match on the estimated propensity scores.

We next report the univariate comparisons between the matched treated and control firms’ pre-treatment characteristics and their corresponding t-statistics in Table 7. None of the observed differences between the treatment and control firms’ characteristics is statistically significant in the pre-treatment period. 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. We notice the differences in the P/E and net worth values across the two sets. Overall, these diagnostic tests confirm that the propensity score matching removes the observable differences across the two sets.

We use the matched treated and control sample of firm to estimate the effect of inclusion into the GSM framework on stock returns and market quality. We assess the impact on stock returns using the standard event study methodology (Brown and Warner (1985)). For each firm, using Nifty 50 as the market index, we compute the cumulated abnormal returns (CAR) based on the market model. The market model is estimated for 120 days prior to the inclusion of the firm into the GSM mechanism. We then regress the CAR on a

treatment group dummy variable and control variables over the event window to estimate the impact. The regression specification is given as:

$$CAR_i = \alpha + \gamma D_{\text{treated}_i} + \sum_j (\lambda_j \times X_j) + \epsilon_i \quad (1)$$

Here D_{treated_i} is the treatment group dummy which takes value one for treated firms, and zero otherwise. The coefficient γ captures the treatment effect over the event window, that is, the effect of the entry into GSM framework. We include market capitalization and P/E ratio as control variables.

The impact on stock liquidity is evaluated using a difference-in-differences (DiD) approach. The methodology enables us to compare the liquidity of treated firms with that of the control firms, before and after their inclusion into the GSM mechanism. The DiD methodology takes care of the omitted trends that may be correlated with stock liquidity. We use traded value and number of trades as measures of liquidity. We also report the share turnover ratio an additional measure of liquidity.

6 Results

6.1 Impact on stock returns

We start with a graphical overview of the event-study analysis based on an event window of five and ten days. The analysis is conducted separately for the announcement date as well as the effective date. The average difference between the announcement date and the effective date is ten days. Figure 4 shows the announcement effect of inclusion into the GSM framework on CAR for both the event windows. We observe a declining trend post the event not only for the treated firms but also for the control firms. Hence the absolute decline in the CAR for the treated firms cannot be attributed to the inclusion into the GSM mechanism. No significant difference is noted between the CAR of the treated and control firms immediately following the inclusion announcement. The CAR for both the groups move together, prior to and post the announcement, upto five days. However, with a longer event window of ten days, we start seeing some divergence between the two groups after five days of the inclusion announcement. The subsequent days are also closer to the date of entry (effective date) into the GSM framework.

Next, we examine the CAR with the event-date as the effective date i.e the date on which the firm enters the GSM mechanism. As before, the analysis is done over both a five year and ten year period. Across both the event windows, we see divergence between the CAR of the treated and control firms after the event, where event is defined as a firm's entry into the GSM mechanism. The divergence gets larger as the number of days post the entry into the mechanism increases. This indicates that the entry into the framework has a significant impact on the treated firms' stock price.

Figure 4 CAR for treated and control sample after announcement

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.

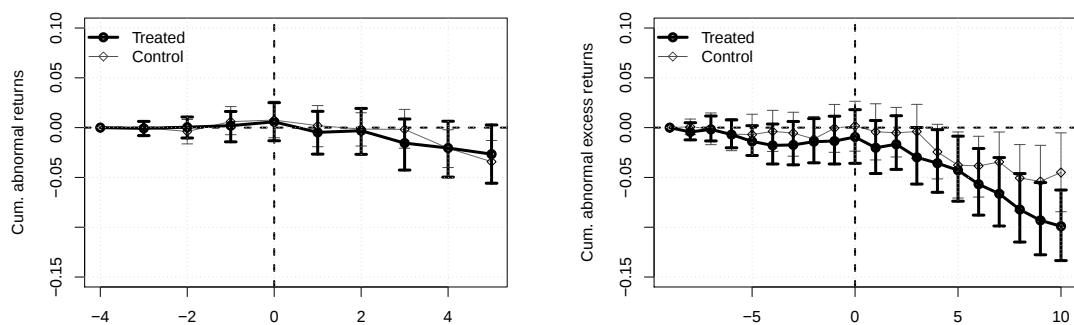
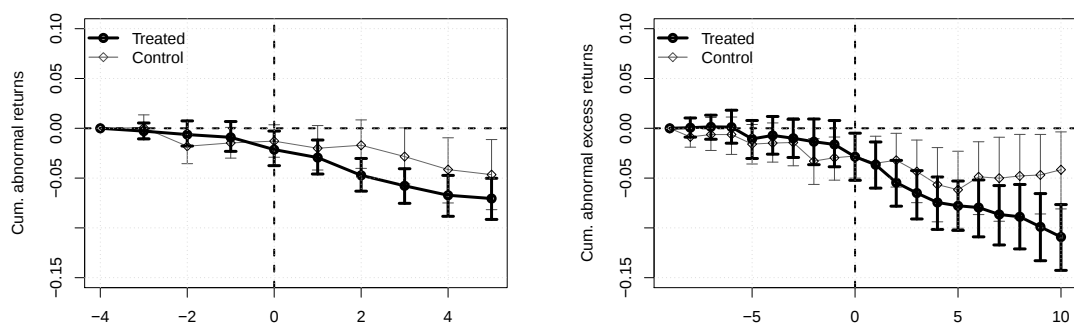


Figure 5 CAR for treated and control sample after entry into GSM mechanism

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.



The regression estimates for the specification given in equation 1 are reported in Table 8. The results are reported for event windows of five and ten days around the event of entry into the GSM framework (effective date). For both the event windows across all specifications, we find that the coefficient associated with the treatment dummy is negative and significant, indicating a negative impact on the CAR for firms that entered into the framework. This is in confirmation with the event-study graphical results and shows that the effects hold even after controlling for differences in the P/E ratio and market capitalisation. The results show that firms which enter into the GSM mechanism experience a decline in prices after the event of entry into the GSM framework.

Table 8 Treatment effects on CAR after inclusion into GSM framework

The table reports regression estimates for specification 1 for event windows of five and ten days around the entry of treated firms into GSM framework. Models 1-4 present the results for CAR computed over 5 day event window, while Models 5-8 present the results for CAR computed over 10 day event window. The values in parentheses show the standard errors adjusted for heteroskedasticity. ** indicates significance at 5% level.

	<i>Dependent variable:</i>							
	CAR _(-4,5)				CAR _(-9,10)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	-0.042** (0.020)	-0.136* (0.077)	-0.047** (0.020)	-0.124 (0.078)	-0.042** (0.020)	-0.157** (0.078)	-0.046** (0.020)	-0.150* (0.079)
D_{treated}	-0.068** (0.026)	-0.062** (0.028)	-0.064** (0.026)	-0.060** (0.028)	-0.068** (0.026)	-0.059** (0.028)	-0.065** (0.026)	-0.058** (0.028)
ln(MCap)		0.016 (0.011)		0.013 (0.011)		0.019* (0.012)		0.018 (0.012)
P/E			0.0004*** (0.0001)	0.0003** (0.0002)			0.0003* (0.0001)	0.0002 (0.0002)
Obs.	128	128	128	128	128	128	128	128
R ²	0.049	0.065	0.071	0.081	0.049	0.073	0.061	0.081
Adjusted R ²	0.041	0.050	0.056	0.059	0.041	0.058	0.046	0.058

6.2 Impact on liquidity

In this section, we examine the impact of a firm's entry into the GSM mechanism on stock liquidity. Table 9 reports the DiD estimator for three measures of stock liquidity: traded volumes as measured by traded quantity, number of transactions and turnover ratio. All measures are calculated at daily frequency. We report the results for different event windows ranging from 3 days to 10 days before and after their entry into the framework.

Across all liquidity measures and across all event windows, the results for DiD estimator are

negative. This implies that as a result of the entry into the GSM framework, on average, the treated firms experienced a decline in liquidity relative to the control firms. The decline in terms of number of transactions and turnover ratio is also statistically significant, at the 5% level. In terms of traded volumes, treated firms experienced a decline post the entry on average across all event windows. The control firms are seen to experience an increase over the event windows of three and five days, but a decline across the event windows of ten days. On average, we find that the treated firms experienced a decline in traded quantity, relative to the control firms. However, this decline is not statistically significant at 5% level.

The effect of an entry into the GSM framework is also assessed on average daily number of transactions. While the control firms experienced an increase in the number of transactions on average, the treated firms experienced mostly a decline. Overall, the treated firms experienced significant decline in average daily number of transactions relative to the control firms. We find similar results for turnover ratio.

7 Further work

Our analysis thus far is preliminary. We aim to add to the current study by applying more measures of market quality as well as robustness checks for matching the two samples. We further aim to apply a DiD regression technique that adjusts for differences across variables to support our inferences. A more rigorous analysis would require us to augment the market quality measures by using higher frequency data for liquidity and inclusion of measures for price efficiency. An analysis of differential impacts of entering the GSM framework can be done based on the stage of entry. The impact on trader behavior can also be evaluated by looking at trader category data, and examining changes in trader composition, if any, for firms included in the GSM framework. Finally, the GSM mechanism as a regulatory intervention provides for a natural setting where quasi-experimental methods such as a regression discontinuity design (RDD) can be applied. Further work on this paper will include the application of RDD technique to estimate the effect of the intervention while simultaneously ensuring that the treatment effects are not confounded by unobserved factors.

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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.

Figure 6 Detailed industry composition of firms that entered the GSM framework

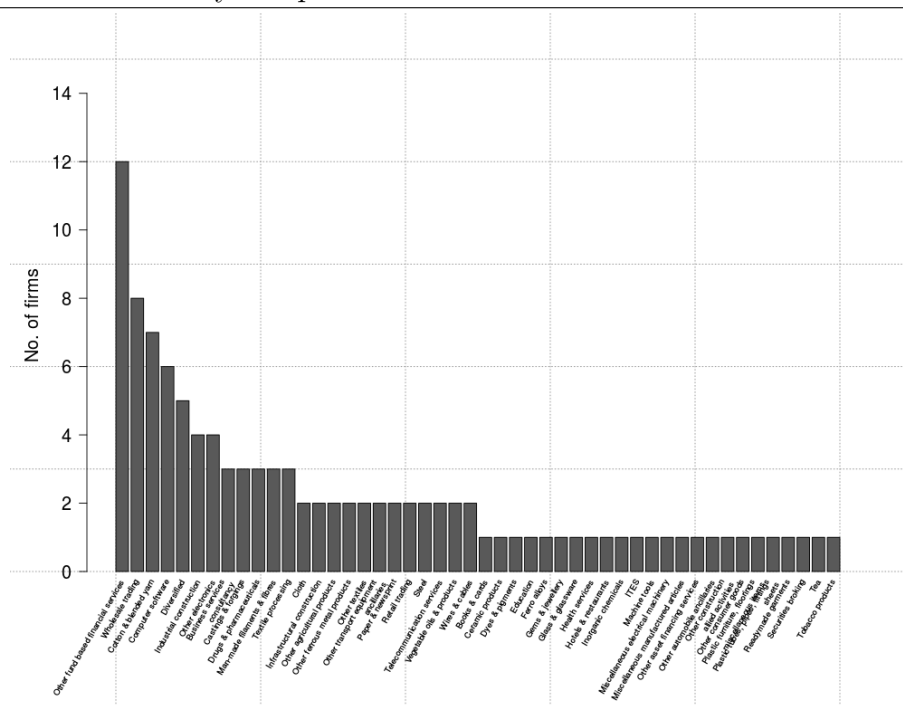


Table 2 Criteria and consequences of placed under the GSM framework

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	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	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	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	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	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.

Table 4 Summary statistics one quarter prior to entering GSM for sample firms

Indicator	1st Qu.	Median	Mean	3rd Qu.	sd
Close price (Rs.)	2.5	5.7	15.1	14.1	29.9
Adj. close price (Rs.)	2.5	5.7	14.2	13.1	29.0
Traded quantity	1,606.2	20,132.0	66,415.6	59,882.5	1,47,555.4
Traded value (Rs. Mn)	0.0	0.1	0.9	0.4	3.1
No. of transactions	6.0	51.8	133.2	117.6	289.2
Market cap (Rs. Mn)	90.2	209.3	896.6	457.4	4,643.1
P/E ratio	-2.3	-0.4	11.3	-0.1	163.0
P/B ratio	0.5	1.8	4.1	4.6	7.7
Shareholder's funds (Rs. Mn)	-3,014.2	-712.2	-3,242.5	38.8	9,859.2
Net fixed assets (Rs. Mn)	95.7	380.4	1,420.6	1,242.4	3,041.2
Age since listing (years)	7.5	12.0	13.1	18.5	7.1
Age since incorporation (years)	22.5	32.0	37.2	46.0	21.3

Table 7 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.

	Treated	Control	t -statistic	p -value
Market cap (log)	19.81	19.82	0.59	0.55
Price (log)	2.24	2.27	-1.55	0.13
Traded value (log)	12.21	11.80	0.27	0.79
Net Fixed Assets (log)	19.59	19.48	0.20	0.84
P/E	-1.07	8.18	-0.99	0.33
Net Worth (Rs. Mn)	-3742.87	-710.61	-1.82	0.07

Table 9 Difference-in-differences estimator on liquidity measures

The table reports DiD estimator for three liquidity measures: traded volumes as measured by daily traded quantity, daily number of transactions and turnover ratio. The estimator 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.

Event Window	Mean Treatment Difference (After - Before)	Mean Control Difference (After - Before)	Mean DiD Estimator (Treat - Control)	<i>t</i> -statistic for DiD Estimator
Panel A: Traded volumes				
(-3, 3)	-6722.04	41153.50	-47875.54	-1.84
(-5, 5)	-31370.66	26000.72	-57371.38	-1.91
(-7, 7)	-46399.11	-15548.41	-30850.70	-0.72
(-10, 10)	-80479.45	-14234.06	-66245.39	-0.88
Panel B: # of transactions				
(-3, 3)	21.34	132.24	-110.90	-1.94
(-5, 5)	-31.05	120.59	-151.64	-2.15
(-7, 7)	-65.85	97.43	-163.29	-2.50
(-10, 10)	-125.25	62.76	-188.01	-1.87
Panel C: Turnover ratio				
(-3, 3)	-0.0001	0.0011	-0.0013	-2.15
(-5, 5)	-0.0003	0.0010	-0.0013	-2.53
(-7, 7)	-0.0005	0.0007	-0.0012	-2.50
(-10, 10)	-0.0006	0.0005	-0.0011	-2.23
