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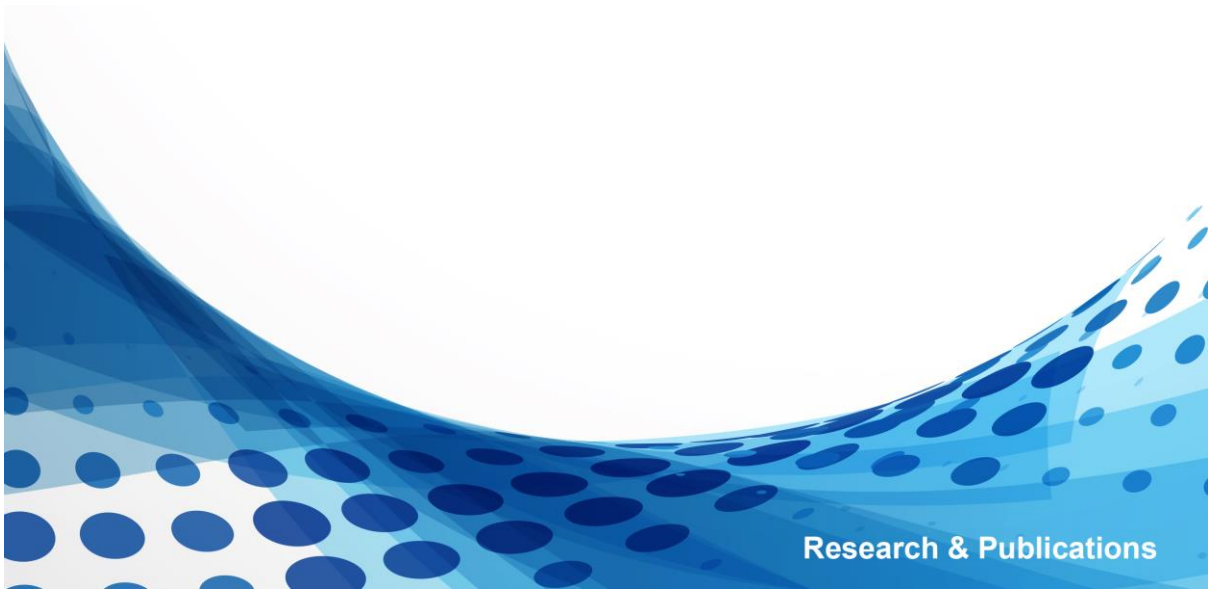

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Abstract

The paper investigates the impact of the imposition of a minimum buyback requirement on open market repurchases in India. We find that the regulatory change has led to a significant increase in the abnormal stock returns earned by buyback firms on announcement. In complementary findings, we observe a significant improvement in the long-run operating performance of the announcers in the post-regulatory reform period. We also find that the extent of market timing in buyback execution is lower with the mandate of a minimum buyback. These findings suggest that the regulation has strengthened the signalling role of open market buybacks. Furthermore, implying a significant decline in the option value associated with open market buybacks after the regulatory change, we also document an increase in the propensity of firms with lower stock liquidity and higher institutional holdings to buyback through fixed price tenders. Our findings suggest that the regulatory change has lowered the "cheap-talk" motives associated with the announcement of open market buybacks.

Key words: Open market buyback; India; Tender offers; Signaling; Repurchases

JEL classifications: G35, G38, G32

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1 Introduction

Open market repurchase programs (OMRs) do not usually involve any commitment to buyback a certain quantity of a firm's equity. Empirical evidence suggests that the completion rates of the OMRs are well-below the announced repurchase program size. For instance Manconi, Peyer, and Vermaelen (2019) document that the average repurchase is only 40% (85%) of the program size in two-years of the announcement in non-US countries (the US). Bhattacharya and E. Jacobsen (2016) find that completion rates of firms follow a bi-modal distribution with firms either buying back all or none of the announced amount. Furthermore, there is evidence that OMRs can be employed by firms as a means of cheap talk to extend price support (see, Liu & Swanson, 2016). By allowing firms to hold an option to buyback their shares rather than a commitment, OMRs are contended to have only a weak or no valid signalling role (see Babenko, Tserlukevich, & Vedrashko, 2012; Grullon & Michaely, 2004; Lakonishok & Vermaelen, 1990). Against this backdrop, we examine the impact of a regulatory change which imposes a non-trivial cost on firms announcing OMRs by setting a minimum buyback threshold. The regulatory change also mandates the completion of the program within a shorter period. We expect the regulation to strengthen the role of OMRs as an information signal.

Research on OMRs that do not involve any minimum buyback commitment has brought out several interesting features suggesting its less compelling role as a signal. First, there is evidence that firms announcing OMRs do not show any significant improvement in their operating performance. For instance Grullon and Michaely (2004) find that the operating performance of the firm does not improve after open market repurchases in the US and the announcement period market reaction is largely due to the distribution of cash that is likely to be over-invested. Lie (2005) finds that the performance improves for a subset of announcers that actually repurchase their shares. Hence, research documents that an improvement in operating performance is related to the actual buyback execution, rather than just announcement. Second, the buyback through OMRs is associated with earnings management by firms. Gong, Louis, and Sun (2008) finds that the firms announcing OMRs have a greater tendency to manage their earn-

ings before the announcement, which in turn leads to a superior operating performance in the post-buyback period. In related research, it is found that the firms manage the information environment prior to the buyback announcements. For instance, Brockman, Khurana, and Martin (2008) find that firms increase the frequency of bad news a month prior to the OMR announcement. Third, the completion rate of the OMRs is significantly lower than the target announced, as discussed in Manconi et al. (2019). Additionally, Bhattacharya and E. Jacobsen (2016) argue that the low completion rate could be on account of a quick adjustment of the share price of to the announcer's fair price for a fraction of firms that are significantly under-priced. Finally, the firms that announce OMRs are known to strategically time their repurchase execution to benefit the long term shareholders at the cost of the selling shareholders.For instance, De Cesari, Espenlaub, Khurshed, and Simkovic (2012) find that a firm that announced an OMR is able to time the market both within and across the months where the buyback remains open. The preceding evidence suggests that it could be argued that the flexibility associated with OMRs in the timing of the execution and the amount of the actual buyback render it a weak signalling device.

In our paper, we examine the impact of a change in buyback regulation brought about in India, on the behaviour of the firms that announce a buyback and the market. Specifically, in August 2013, the Securities and Exchange Board of India (SEBI) mandated that firms that announce an OMR would be required to buyback at least 50% of the announced amount. The regulator also mandated that the buyback is to be completed within six months from the date of the announcement, instead of a year, as was the case earlier. This is expected to impose an additional cost on the firms that go on to announce OMRs, as they have an obligation to buyback half of the announced amount. Also, as the buyback had to be executed within a smaller time interval, market timing ability is expected to become more challenging for firms. Hence, we test several hypotheses as an outcome of the regulatory change. First, we expect the signalling power of an OMR announcement to increase and accordingly the market reaction to an OMR announcement to be higher after the regulatory change, as there is expected to be a reduction

in "cheap-talking" of firms announcing buybacks. Second, we hypothesise that the long term operating performance of the firms should be higher in the post-regulatory reform period, as the firms are more likely to undertake buybacks with a signalling motive . Third, as the buyback window is shortened and a minimum amount of buyback is mandated, we also expect the market timing ability of the firms to weaken in the post reform period. Finally, as the market timing ability is expected to be weakened, we hypothesise that firms with ex-ante lower ability to time the market, that is, firms whose stocks have lower market liquidity and firms with higher institutional ownership, will prefer tender offers instead of OMRs in the post-regulation period. This switching is likely to occur as tender offers involve a fixed price buyback and are generally cheaper to execute.

We find encouraging empirical support for our hypotheses. First, we find that the announcement returns significantly increase. For instance, during the 21 day announcement window, the cumulative abnormal return increases by about 6.71% during the post regulation period. A comparable increase (4.41 %) is also observed for CAR based on the four factor model. The increase in CAR is significant and is likely to be associated with a stronger signalling OMR announcement, as a consequence of the regulatory change. Second, we observe that the improvement in the operating performance (ROA) in the four quarters following the announcement, compared to the four quarters preceding the announcement, is higher by 0.6% per quarter, in the post regulation period, relative to the pre-regulation period. The improvement in the operating performance is consistent with stronger signalling through OMRs in the post regulation period. Third, we show that firms in the post regulation period have a higher program completion rate (77%) compared to 55% before the regulation. This is expected as a direct consequence of the regulation and it shows that the regulation is effective in reducing 'cheap talk'. Moreover, we find support, albeit weak, for the hypothesis that the market timing ability of firms weakens in the post-regulation period. Specifically, we show that in the period allowed for the completion of buyback, the average firm buys back less cheaply in the post-regulation period, relative to the pre-regulation period. In the post-regulation period, compared to the average daily market closing price, the the average firm buys at a discount which is

10% less than the same discount in the pre-regulation period. More interestingly, the within month market timing ability of firms, i.e., the ability of a firm in the months that it actually buys back from the market, is not different in the post regulation period from the pre-regulation period. We conjecture that the reduced overall market timing is due to a reduced window of buyback and a minimum buyback requirement, whereas within the active months, the firm's market timing ability is not different from that in the earlier regime. Lastly, we show that in the post-regulation period, illiquidity of a firm's stock and its institutional ownership become important factors in determining the choice between open market and tender-offer buybacks. Firms with more illiquid stocks and higher institutional ownership exhibit a greater preference for tender offers compared to OMRs. It is likely that this is on account of the lower ex-ante market timing ability of such firms, which becomes increasingly crucial in the post-regulation period. This is because of a smaller window for completing at least 50% of the announced buyback amount, as a consequence of the regulatory change.

The paper is situated in several strands of literature related to payout choice. First, by examining the impact of the unique regulatory change in the execution of open market repurchases, we are able to evaluate the signalling role that could be played by OMRs. Particularly, our work develops theoretical predictions on the signalling role of OMRs by extending framework (Oded, 2005) and offers empirical evidence directly linked to the outcomes on account of the imposition of a minimum buyback rule. In particular, the paper shows that as against the case of OMRs without a minimum buyback criteria, the imposition of the requirement of minimum buyback elevates the role of OMRs as a signalling device. The paper, therefore extends the research of Ikenberry and Vermaelen (1996), Bhattacharya and E. Jacobsen (2016) and several others on the role of open market repurchases in firm-level signalling.

Secondly, the paper is intimately related to the research on the market timing ability of firms executing open market buybacks. For instance De Cesari et al. (2012) document that the holding shareholders significantly benefit from the execution of OMRs through successful market timing in the execution of buybacks. Chan, Ikenberry, and Lee (2007)

find that managers are able to time open market buybacks owing to their information advantage. Our research documents that the market timing ability is significantly lower with the imposition of a minimum buyback criteria and also with the shortening of the time window allowed for execution of buyback.

Lastly, the paper, by examining the choice between the tender repurchases and OMRs with a minimum buyback criteria following the regulatory change in India, is able offer deeper insights on the factors that drive the choice between the two primary modes of repurchases and extends the work of Vafeas (1997), Oded (2011) and several others. Particularly, the paper documents that firms which are likely to face lower market timing ability, such those with lower liquidity and higher institutional ownership are more likely to switch to tenders-offers in the post-regulatory reform period. Overall, the paper presents novel evidence of the significant change on the impact of open market repurchases with the imposition a minimum buyback rule.

The remainder of the paper is as follows. Section 2 develops the conceptual framework to examine OMRs with a minimum buyback requirement and develops the empirical predictions. Section 3 discusses the empirical approach and describes the data. Section 4 presents the findings and discusses their implications. The last section concludes with the policy implications of our findings.

2 Conceptual background and motivation

The open market buyback in India, allowed ever since the year 1997, follows stricter regulations relative to that followed in the US in terms of disclosure needs and flexibility allowed in execution. Each buyback firm is expected to make a public announcement of the buyback, with the buyback commencing within seven days from the date of the announcement. Furthermore, firms undertaking OMRs in India have to disclose the amount bought back on a daily basis unlike in the US where the disclosure is quarterly. Prior to the regulatory change in 2013, firms had to complete the execution of buyback within a period of 12 months. Moreover, firms had to wait over a cooling period of one-

year before any re-issue of shares. These measures were targeted to weaken the incentive for price manipulation by executing a buyback.

On observing that a sizable fraction of the announcers ended up buying back a significantly lower amount relative to the program size, the regulator imposed a minimum buyback criteria. In its amendment in June 2013 [1], SEBI mandated that firms announcing OMRs need to buyback at least 50% of the target amount. The amendment also shortened the completion window from twelve months to six months. The minimum buyback amount and the shortened window of execution are anecdotally known to significantly reduce the option value attached to OMRs.[2]. The regulation had some visible impact on buybacks in India. First, the OMR completion rate went up from about 55% to 77% in the 6 year period following the regulatory change. This indicated that the regulation was effective in achieving its objective of increasing the completion rates of OMRs and hence ensuring a reduction in non-serious OMR announcements. Second, as we show later, illiquid firms, that are known to have a lower market timing ability (see De Cesari et al., 2012; Oded, 2011), preferred tender offers for buybacks more than OMRs. Popular media also hailed the regulation as allowing only the 'more serious' companies to announce OMRs [3].The regulation, hence, is an important intervention that is expected to change the buyback behaviour of firms.

Oded (2005) has modelled OMRs as a signalling mechanism and has examined its validity under different set ups, assuming that firms hold a valuable call option to purchase their stock. In a set up with a 'Good' and a 'Bad' firm which vary on their expected return and volatility, he proves that buyback announcement can amount to a valid signal and an associated jump in market value of a firm. This occurs as the option value is greater in the case of the 'Good' firms facing higher volatility.

His set up assumes that there is no minimum commitment of buyback for 'Bad' firms which attempt to mimic the behaviour of the 'Good' firms. We modify the model to

[1]The circular could be found at : https://www.sebi.gov.in/sebi$_data/attachdocs/1375961931576.pdf$

[2]Open market buyback in India is executed through market orders placed with 'all or none' quantity condition. The order placed by the company for the buyback reveals the identity of the firm as the intended buyer, unlike regular anonymous orders.

[3]Link to an Economic Times article

generate new implications, in the context of the regulatory change, where a minimum buyback criteria is specified. The framework we follow is elaborated in the following.

In the setup, which we borrow from Oded (2005), we have three time periods, t_0, t_1 and t_2. There two states of the world at time t_1, good and bad and the probability of a good state unfolding is denoted by q There are two firm types, "good" and "bad", denoted by G and B, respectively. It is assumed that the firms know their own type. The terminal value of the firms is given by:

$$V_i = (\theta + C_i) \tag{1}$$

where, V_i is the value of the firm i at time t_2,where $i \epsilon \{G, B\}$. θ and C_i denote the non-random and random components of firm value, respectively. It is assumed that $C_G > C_B$ and that the good state has a probability $q > 0.5$, which means that while the good firm has a higher expected value, it also has a higher variance. At t_1, the state is revealed to the firm, but not to the market. The buyback program announcement takes place at t_0 and the actual buyback takes place at t_1, once the state is known to the firm.

For each firm, there are N shares outstanding at t_0. At time t_1, irrespective of the program announcement, K of the original shareholders of both the good and the bad firm sell their shares as they require liquidity for their shares. The program size of is denoted by γ, which represents the number of shares targeted to be bought back. It is also assumed that the program size is less than K. P_1 denotes the buyback price at t_1 for both types of firms, including if the bad firms chose to mimic the good firm.

As we closely follow the model of Oded (2005), the intermediate steps are avoided. We modify the original setup by introducing a minimum buyback criteria. Specifically, for a buyback involving γ shares, announced at t_0, the required minimum buyback is $\gamma/2$ shares at t_1.

With the modified set up, we analyse the impact of the regulatory change on the wealth of the bad firm's shareholders. Specifically, we show that in two states of the buyback price P_1, the shareholders of the bad firm have short-term gains. But as the long-term shareholders' losses are not completely externalised, part of the short-term

shareholders' gain is at the expense of the long-term shareholders.

In this section, we use the following subscripts to represent the final payoffs to shareholders under different combinations of: (a) firms (b) shareholder type (c) outcome type (d) announcement state, and (e) buyback regime type:

Shareholder type: LT for long-term shareholders and ST for short-term shareholders.

Firm type: G for Good and B Bad firms as earlier

Outcome type: G for Good, B for Bad and U for unknown outcomes.

Announcement state: A for announced state and NA not-announced state.

Regime type: O for old or no minimum buyback regime and N for new or minimum buyback.

Accordingly, $Payoff_{ST/G(G/A/N)}$ represents the payoff to the short-term shareholders of good firms in a good state having announced buyback under the new regime. The notation for all the other combinations follow an analogous convention.

We first consider the bad firm, B which tries to mimic the good firm G and announces a buyback at t_0 of size γ. At time t_1, the bad firm buys back at a price P_1. The short-term shareholders, who collectively hold K shares of the bad firm, sell in the market at t_1 at the prevailing market price P_1 and hence get a payoff:

$$Payoff_{ST/B(U/A/N)} = P_1 \times K \tag{2}$$

Now, consider a case where,

$$P_1 > (\theta + C_b)/N \tag{3}$$

as in Oded (2005). As the buyback price P_1 of the bad firm is greater than its share price in the good state, if there was no requirement of minimum buyback (under the old buyback regime), the bad firm would have announced but not bought back any shares.

However, as under the new regime (N) the firm has to buyback $\gamma/2$, the long-term shareholders of the bad firm receive a payoff depending on the realization of the state at time t_1. In the state of good realization their share of the firm value would be:

$$Payoff_{LT/B(G/A/N)} = [(\theta + C_B - \gamma/2 \times P_1)(N - K)/(N - \gamma/2)] \quad (4)$$

This is because, as a result of the buyback at t_1, a value $P_1 \times \gamma/2$ has to be bought back by the firm, irrespective of the realisation of the state. If, however, there was no requirement to buyback a minimum proportion of the announced amount, the payoff to the long-term shareholders would instead be

$$Payoff_{LT/B(G/A/O)} = [(\theta + C_B)(N - K)/N] \quad (5)$$

If the firm did not announce, as in Oded (2005), the payoff of the long-term shareholders would not change and would still be given by Equation 5. As Equation 3 holds, the firm's short-term shareholders are better off with a buyback announcement in the absence of a minimum buyback rule, while the long-term shareholders' wealth is not impacted. Hence, the bad firm would always announce a buyback.

Under the new regime, however, the long-term shareholders' terminal wealth is given by Equation 4. We show that under the minimum buyback rule, the announcement results in a decrease in the terminal wealth of the long-term shareholders compared to a case of non-announcement. The difference in the payoff of the long-term shareholders in the bad firm is given by

$$Payoff_{LT/B(G/A/N)} - Payoff_{LT/B(G/NA/N)} = (N - K)[\gamma/2 \times (\theta + C_B - P_1 \times N)] \quad (6)$$

which is the amount by which the long-term shareholders are worse off with an announcement under the minimum buyback regime. This is because, by assumption Equation 3, $\theta + C_B$ is less than $P_1 \times N$. Hence the long-term shareholders suffer a loss, unlike an announcement in the old regime.

Similar steps will show that the $Payoff_{LT/B(B/A/N)} - Payoff_{LT/B(B/NA/N)}$, is also negative. Effectively, the terminal wealth of the long-term shareholders of the Bad firm in *any* state of realization is lower with an announcement of buyback relative to the case of

no announcement, if Equation 3 holds.

Then we consider the case where P_1 lies in the range

$$(\theta - C_b)/N < [(2q-1)C_B + \theta] <= P_1 < (\theta + C_b)/N \tag{7}$$

Since in this case, under the state of good realisation, the market price of the firm at t_1, is less than the value per share, the firm buys back the entire announced amount and hence the outcome is identical to that of Oded (2005), where

$$Payoff_{LT/B(G/A/N)} = (N-K)/(N-\gamma)(\theta + C_B - \gamma P_1) \tag{8}$$

However, in the bad state of realisation, the firm would only buyback the stipulated minimum amount. Hence the payoff in the bad state of the long-term shareholders would be,

$$Payoff_{LT/B(B/A/N)} = (N-K)/(N-\gamma/2)(\theta - C_B - \gamma/2 \times P_1) \tag{9}$$

If the firm had not announced a buyback, the payoff to the long-term shareholders in the bad state would be

$$Payoff_{LT/B(B/NA/N)} = (N-K)/(N)(\theta - C_B) \tag{10}$$

Equation 9 and Equation 10, suggest that the long-term shareholders would face a loss with a buyback announcement relative to no announcement, in case of a bad state of realisation. Specifically, the difference is

$$Payoff_{LT/B(B/A/N)} - Payoff_{LT/B(B/NA/N)} = (N-K)[\gamma/2(\theta - C_B - P_1 \times N)]/(N-\gamma/2)N \tag{11}$$

By Equation 7, the numerator in Equation 11 is negative.

Hence, we can conclude that when Equation 7 holds, in the good state of the world, the payoff to the long-term and the short-term shareholders of a bad firm is identical to

the case with no minimum buyback. On the contrary, in the bad state, the payoff to the long-term shareholders is lower. Hence, in some states of the world, the short-term shareholders gain at the expense of the long-term shareholders, if an announcement is made in the new buyback regime.

The preceding setup motivates the idea that compared to the regime with no minimum buyback, the regime which insists on a minimum buyback achieves a greater separation between the good and the bad type of firms. In the two cases considered above for the range of the prevailing market price at t_1, P_1, their appears to be a clear separation between the two types of firms. However, it is likely that in some states of the price P_1, there may not be a separation between the two types of firms. Furthermore, the assumptions of the model, particularly the firms know their own type with with certainty and managers act rationally in the interest of all the original shareholders could be tenuous in the real-world.

Therefore, it is reasonable to expect that the repurchase announcers also include the bad type of firms, even in the post-regulatory period. Our set up simply suggests that the cost of OMR announcement is greater for bad firms under the new regime, and not complete cessation of announcements by such firms.

Therefore, it can be argued that under the new regime, the OMRs are less likely to be announced by firms with poor financial prospects in their attempt to mimic the good firms. As OMR announcements are well-documented to be accompanied by positive abnormal returns (see for instance Ikenberry & Vermaelen, 1996; Manconi et al., 2019), we would expect higher abnormal returns for stocks of announcers in the minimum buyback regime relative to those in the no-minimum buyback regime. Hence we hypothesize that:

Hypothesis 1: *The abnormal stock returns on the announcement of OMRs should be greater in the minimum buyback regime compared to the no minimum buyback regime.*

It had been argued that firms involved in OMRs should exhibit a significant improvement in the operating performance, as it is likely to be employed by firms as a signalling device (see for instance, Lie, 2005). However, research on the impact of OMRs on operating performance has largely remained inconclusive. For instance, Grullon and Michaely

(2004) find that there is no significant increase in the operating performance of the US firms. Nonetheless, as the imposition of the minimum buyback criteria is expected to strengthen the role of the OMRs as a valid information signal, by forcing a minimum actual buyback, consistent with Lie (2005), we expect firms in the post-regulatory reform period to exhibit a significant increase in their operating performance. Hence, we hypothesize that:

Hypothesis 2: *The post-buyback operating performance should be higher for firms announcing buyback in the minimum buyback regime relative to the no minimum buyback regime.*

Research has documented that firms executing OMRs exhibit significant market timing ability by opportunistically buying back from the market. For instance, De Cesari et al. (2012) show that the US firms end-up repurchasing shares at about 2.3% lower price relative to a naive buyback benchmark. The evidence of market timing by the repurchase firms indicate that the long-term shareholders profit at the expense of the short-term shareholders. We expect the market timing ability of the firms significantly decline for buybacks executed under the minimum buyback regime. This is on account of two changes in the minimum buyback regime. First, as there is a regulatory minimum amount to be bought back, a firm has to buyback even at a lower profit from the prevailing prices. Second, the program has to be completed within 6 months of the announcement, down from a year. Hence, there is a possibility that the firm needs to buyback a larger amount than it would have, had there been no minimum buyback. Additionally, this amount needs to be bought back in a smaller time window. Also, it is likely that repurchasing firms in the new regime employ buybacks primarily as a signalling device, therefore the execution is less likely to be strategic. Therefore, we hypothesize that:

Hypothesis 3: *The market timing ability of firms during the open market buyback should be lower in the minimum buyback regime compared to that in the no minimum buyback regime.*

It is well-documented that firms announcing OMRs show a significant long-run ab-

normal returns (see, Bonaime & Ryngaert, 2013; Manconi et al., 2019, for instance) The long-run abnormal returns to the stock of firms announcing OMRs has been attributed to several factors. One key explanation had been tied to the inability of the market to swiftly correct their expectations, often formed based on the over-extrapolation of past returns by investors. It is also likely that they are driven by the likelihood OMRs being employed as a means of cheap talk by firms (see Bonaime & Ryngaert, 2013; Cziraki, Lyandres, & Michaely, 2019). However, we expect that the increased cost of OMRs by way of a minimum buyback criteria, is more likely to prompt genuinely undervalued firms to announce OMRs. Therefore, we expect the market to generate greater initial market reaction on announcement of the buyback, and consequently lower long-run abnormal returns for the repurchase firms under the new regime. Hence we hypothesize that:

Hypothesis 4: *Firms announcing open market repurchases under the new regime to earn relatively lower post-announcement returns relative those in the prior regime.*

Firms that intend to buyback their stock have the option to adopt a tender-offer buyback or alternatively an open market repurchase. Research has documented that the tender repurchases with a commitment for buyback are more likely to be announced by firms that have a higher insider ownership, have a higher cash distribution motive, higher leverage and a better pre-buyback stock performance (see Vafeas, 1997). Moreover, a reduced market timing ability implies that firms with lower liquidity or a higher institutional ownership should also prefer tenders to an OMR (see Jena, Mishra, & Rajib, 2017; Oded, 2011). As argued earlier in the paper, OMRs without any commitment to buyback create a valuable option for firms to time the market Ikenberry and Vermaelen (1996); Oded (2005). However, with the imposition of the minimum buyback rule, it is likely that the option has a significantly lower value for the announcers. Therefore, we expect firms which are more likely to face a greater restriction in market timing opportunity to switch to tender buyback after the imposition of the minimum buyback rule. Such firms include those with low market liquidity and those with higher institutional holdings. Therefore, we hypothesize that:

Hypothesis 5: *Firms having stocks with low liquidity and those with high institutional ownership are more likely to adopt the tender route for buybacks in the minimum buyback regime, as compared to the no minimum buyback regime.*

3 Data and empirical approach

Data

The data of open market buyback announcements are hand collected from the filings available at the SEBI website. [4] The buyback completion rate and other related data are also obtained from the announcements filed by firms at the SEBI website. The data of OMR collected from the SEBI website has 262 announcements spanning over the period from 27th September 1999 till 12th February 2020. The sample period ends before the onset of the COVID-19 pandemic. The data of stock returns and other firm-level financial data are obtained from CMIE Prowess.

The mandated date for buyback completion is one year from the date of announcement of the buyback for the period prior to the regulatory reform in 2013. With the regulatory change it stands shortened to six months. Buybacks in India are approved by either the board of directors or by the shareholders, depending on the amount sought to be bought back. Shareholder approval is mandated for buybacks exceeding 10% of share capital. Accordingly, we take either the board approval date or the shareholder approval date as the date of the event. All the other variable definitions are provided in Table 1, along with the data sources.

The summary statistics of the sample are given in Table 2. Out of the total of 262 OMR announcements in the sample period 59 corresponds to the period with a minimum buyback requirement. The average firm that announces an OMR in our sample has a market capitalization of INR 4.68 billion. We observe an increase in the market capitalization of the announcers in the period with the minimum buyback requirement. While the increase in market capitalization could be on account of the overall growth in

[4] https://www.sebi.gov.in/sebiweb/home/HomeAction.do?doListing=yes&sid=3&ssid=22&smid=17

market valuation, we also observe a similar trend in terms of the book value of assets.

The median book-to-market ratio of the sample is 5.34%. The median book-to-market ratio of the sample of announcers in the minimum buyback regime shows a marked decline, suggesting that more growth firms announce buybacks in the post regulatory reform period. The sample of announcers has about 48% promoter ownership and the institutional ownership is about 17%. In comparison, the median NIFTY 500 firm has a book-to-market ratio of 33.9% and is about 20.2% owned by institutions.

The average firm that announces repurchase targets to buyback about 10 % of its market capitalization. Noticeably, it is significantly lower during the minimum buyback period (6.33%), possibly implying that the buyback announcements have become less aggressive with the regulatory change. The average completion rate of a buyback is about 60% of the announced buyback size. Evidently, the average completion rate has increased as a consequence of the regulation. The completion rate in the post regulation period is about 77% compared to about 55% in the period without the minimum buyback. The market timing ability of firms proxied by the effective buyback execution price relative to a naive benchmark of average price during the repurchase period (*Mkt. Timing(O)*), shows a decline during the period with a minimum buyback requirement. While in the no minimum buyback period the market timing has an average of 12.98%, it shrinks to 4.34% in the later period. It is interesting to notice that the market timing ability shrinks despite an increase in the liquidity of the average firm's stock. The comparison of the buyback characteristics between the two sub-periods suggests a reduced market timing ability and a significantly higher intent to actually buyback shares.

The summary statistics of the estimate of the abnormal stock returns associated with the buyback announcements are given in Panel C of Table 3. The average cumulative abnormal returns (CAR) based on the market model for the 21-day announcement window is 3.96% (*CAR market*) for the sample without the minimum buyback regulation. In comparison it jumps to 7.65% for the sample in the period with a minimum buyback requirement. A similar increase is observed in CAR based on the four factor model (*CAR 4-factor*). The same pattern holds in case of the buy-and-hold abnormal returns.

3.1 Empirical Approach

3.1.1 Impact on market reaction to repurchase announcements

We examine the announcement period abnormal returns of the announcing firms for a 21-day event window around the event date (-10 to +10 days). We take a slightly longer window to accommodate illiquid and infrequently traded stocks. We calculate the the cumulative abnormal returns (CAR) in this period using the market model and the four factor model. Variable definitions are provided in Table 1. In order to examine the impact of the regulation on the announcement period CAR, we use the model below:

$$CAR_{i,t} = \beta_0 + \beta_1 \times Post_t + \Sigma_{n=1}^{N} \beta_n \times X_{n,i,t} + \delta_i + \epsilon_{i,t} \tag{12}$$

where $CAR_{i,t}$ stands for the announcement period CAR of the firm i in the event window around the announcement day t, $Post_t$ is a dummy variable that takes the value $= 1$ for the announcements in the minimum buyback regime and 0 otherwise. $X_{n,i,t}$ are N firm level controls. We employ book-to-market ratio and size, proxied by the firm's market capitalization, as controls, as they are known to impact stock returns. δ_i represents a dummy for the industry of the firm i, proxied by the two digit NIC code. We drop the firm level controls in the analysis with the *CAR 4-factor*, as they are already incorporated in the calculation of the abnormal returns.

3.1.2 Impact on long-run buy-and-hold returns and repurchase motive

We then examine the impact of the minimum buyback regulation on the 'buy-and-hold' abnormal returns (BHAR). We use a setup analogous to Equation 12 to examine the impact on BHAR 3-months, BHAR 6-months and BHAR 1-year, replacing the LHS with the BHAR measures. The variable definitions are provided in Table 1.

As the minimum buyback regime lowers the option value attached to OMRs, we investigate how motives for carrying out a repurchase change in the minimum buyback regime, compared to a no minimum buyback regime. We follow the approach of Dittmar (2000) and examine at an annual frequency, if the determinants of the amount spent on

buyback execution change in the minimum buyback regime. We use a set of explanatory variables as in Dittmar (2000). The variable definitions are provided in Table 1. We employ the following tobit model to examine the impact of the minimum buyback regime on the repurchase motives:

$$Prop.\ Bought\ back_{i,t} = \beta_0 + \Sigma_{n=1}^{N}\beta_n \times X_{n,i,t} + \Sigma_{k=1}^{N}\gamma_k \times X_{k,i,t} \times Post_t \tag{13}$$

where the dependent variable is the ratio of the amount spent on buyback as a proportion of the lagged total assets, for a firm i in the year t. We use the book-to-market ratio (BM), the cash-ratio($Cash\ ratio$), the cash flow ratio($Cashflow\ ratio$), dividend paid as a proportion of net profit($Payout$), firm size ($Log(assets)$), leverage ratio ($Leverage$), the ratio of ESOP reserves to the total assets of the firm ($Options\ ratio$) and the past one year raw return on the firm's stock ($Lagyr.\ rtn$) as explanatory variables. The variables are calculated as of the end of the finacial year prior to the buyback announcement. The variable definitions are provided in Table 1. In addition, we interact each of the N explanatory variables with the $Post_t$ dummy, which takes the value 1 for all buybacks from FY 2013-14. The coefficient of interest are, hence, γ_k, which capture the impact that each of the k explanatory variables has on the buyback amount spent in the minimum buyback regime.

3.1.3 Change in operating performance and imposition of minimum buyback

In order to examine the impact of the minimum buyback regime on the operating performance of an announcing firm, we focus on the quarterly return on assets (ROA) of the firm, as in Liu and Swanson (2016). Specifically, we investigate the impact by estimating the model below:

$$ROA_{i,q,t} = \beta_0 + \beta_1 \times Post_t + \beta_2 \times PostQtr_q + \beta_3 \times PostQtr_q \times Post_t + \beta_4 \times Log(Assets)_{i,t} + \delta_i + \epsilon_{i,t} \tag{14}$$

where $ROA_{i,q,t}$ is the return on assets for the quarter q of the firm i that approves a

buyback on date t. We employ the quarterly return on assets for all announcers for four quarters prior to the announcement and four quarters after the announcement (q from $t-4$ to $t+4$ with t in $q=0$). The variable definitions are provided in Table 1. We control for the size of the firm with *Log(Assets)*. The coefficient of interest is β_3, which is expected to be positive and significant as per our Hypothesis 2.

3.1.4 Impact on repurchase completion rates

We also investigate if the regulation is effective in improving the completion rates of buyback and consequently lowering the market timing ability of the firms that announce OMRs. As an initial step, we investigate if the proportion of shares actually bought back relative to the announced target, is greater in the period with a minimum buyback requirement. For the estimation, we employ the model below:

$$Completion_{i,t} = \beta_0 + \beta_1 \times Post_t + \delta_i + \epsilon_{i,t} \tag{15}$$

where, we expect β_1 to be positive and significant, due to the direct impact of the minimum buyback regulation.

Then, in order to examine the impact of the minimum buyback regime on the market timing ability of the firms, we follow De Cesari et al. (2012) and estimate two proxies for the market timing ability. The first proxy indicates the market timing ability within the allowed maximum buyback period (*Mkt. Timing(O)*). The second measure represents the market timing ability of firms within the months during which the firm bought back shares from the market (*Mkt. Timing(M)* as defined in Table 1). We expect a decline in the market timing ability of firms as per 3. The estimation is carried out with the following model:

$$Mkt.Timing(O/M)_{i,t} = \beta_0 + \beta_1 \times Post_t + \Sigma_{n=1}^{N} \beta_n \times X_{n,i,t} + \delta_i + \epsilon_{i,t} \tag{16}$$

where the coefficient of interest β_1 is expected to be positive and significant, as the market timing ability is expected to decline in the minimum buyback regime. $X_{n,i,t}$ are

control variables suggested in De Cesari et al. (2012), that may have an impact on the market timing ability of a buying back firm. Specifically, we control for, the promoter ownership (*Promoter Own*), institutional ownership (*Inst. Own*), illiquidity of the stock of the firm (*Illiq.*) and the firm size proxied by its market capitalization, (*Log(Mcap)*). The variable definitions are provided in Table 1.

3.1.5 Choice between tender offer and open market repurchases

Finally, we examine whether the minimum buyback regime had an impact on the determinants of the choice between OMRs and tender offers. We employ a binomial logit model similar to Vafeas (1997) as given below:

$$ModeOfBuyback_{i,t} = \beta_0 + \Sigma_{n=1}^{N} \gamma_n \times X_{n,i,t} + \delta_i \tag{17}$$

where $X_{n,i,t}$ are the potential determinants of the choice between the two repurchase methods, as in Vafeas (1997) and Oded (2011). $ModeOfBuyback_{i,t}$ takes a value of 1 for tender offers and 0 for OMRs. The estimation is carried out separately for buybacks in the two regimes in order to examine the change in determinants of the choice. First, the possible determinants that we consider are firm characteristics, viz., *Cashflow ratio* and *Cash ratio* which capture the amount of cash available to the firm for distribution, *Leverage* of the firm, ownership characteristics, by *Promoter own* and *Inst. own* and the size of the firm by *Log(Assets)*. Next, we consider the characterisitics of the stock of the firm such as *Pre CAR* and *Lagyr. d. rtn.*, which capture the stock return performance of the firm in the period before a buyback approval, *Tobinsq*, which is a proxy for the undervaluation of the stock of the firm and *Illliq.*, which captures the illiquidity of the firms stock. We also consider the size of the buyback, *Target to assets* and a dummy variable *Div. cut dum.* to capture if a firm has reduced the payout ratio in a particular year. The variable definitions are provided in Table 1.

In all our OLS estimations above, we cluster the standard errors at the firm and year levels in order to absorb any unobserved variation due to time and firm heterogeneity. We also report the results with and without industry controls to ensure robustness.

4 Findings and discussion

4.1 Impact on market reaction to buyback announcements

We show the impact of the regulation on the stock market reaction around the buyback announcement in Table 5. We employ two measures of abnormal market reaction, a measure of CAR based on the market model (*CAR market*) and another based on the four-factor model (*CAR 4-factor*). These measures are defined in Table 1. As the factor return estimates are available only till December 2019, the sample of OMR announcements employed for *CAR 4-factor* is only 259, three lower than the total sample of observations. Columns (1) to (3) show the results for *CAR market* and columns (4) and (5) show the results for *CAR 4-factor*. The table provides CAR estimates with and without additional controls.

In the period with the minimum buyback requirement, *CAR market* is about higher by about 6.7% (coefficient of *Post* in column (3)), which is significant at 1% level. The magnitude of the increase in CAR is economically significant as the increase is larger than the overall average *CAR market* of the sample of announcements (4.79%) and that in the no minimum buyback regime(3.96%) . Similar increase in abnormal stock returns is observed with the *CAR 4-factor*. In the post regulatory reform period, the CAR jumps by about 4.4% (coefficient of *Post* in column (5)). Among the control variables, the size of the firm has a negative and significant impact (coefficient of *Log(Mcap)*), which is consistent with small firm premium. In unreported results, we also find that the increase in CAR also holds for a 10-day window around the announcement date. For comparison, Manconi et al. (2019) report a 5-day CAR around the OMR announcement in the US to be 2.11%.

These findings suggest that the buyback announcements have been greeted more positively in the period with a threshold buyback requirement. The higher stock returns imply that the market attaches greater value to firms that announce a buyback in the post-regulatory reform period. Such as reaction is likely to be indicative of the higher signalling role of OMR announcements play when firms are mandated to buyback at

50% of the target amount. The finding supports Hypothesis 1, anchored on the greater separation between the good and bad firms with a mandatory repurchase execution.

As the optionality associated with OMRs are significantly lower after the amended repurchase regulation, a firm that announces an OMR is expected to place greater value to the signal it intends to send to the market. Therefore, it is likely with the announcement of the regulatory change, firms with greater underpricing announce OMRs relative to the prior period. This is possibly the reason why the market reaction to OMR announcements in the post-regulation period is significantly higher.

4.2 Impact of the regulation on market the timing of repurchase execution

It is expected that a regulation that insists on a minimum buyback could lead to a greater repurchase execution, as only self-selected announcers, who intend to buyback the minimum threshold are only likely to announce buybacks. As shown in Table 6, the completion rate in the post-regulatory reform period is significantly higher than that in the pre regulation period and the coefficient of *Post* in columns (1) and (2) of Table 6 is significantly positive. Compared to the average completion rate in our sample of of 60.9%, the increase in repurchase completion in the minimum buyback period is about 33%. As repurchase execution involves significant cash outflow for the announcers, the mandate imposes a cost on the buying back firm, and therefore it is likely to have lowered instance of false signaling. As repurchases in the post-regulatory reform period is likely to be driven by signalling motive to a greater extent, we examine if the ability of the firms to time the market also reduces in the post-regulatory reform period.

We follow De Cesari et al. (2012) in constructing a measure for market timing. We use *Mkt. timing(O)* and *Mkt. timing(M)* as the extent of market timing ability of a firm. The definitions are provided in Table 1. Ratio of the difference between the weighted average buyback price and the average daily closing price, scaled by the latter, in the maximum allowed time window for buyback execution. We use all open market buybacks that start before September 1, 2019 in order to avoid the pandemic crisis interfering with

our results, as the maximum window allowed for repurchase execution is six months. In our baseline model, we have 236 OMR announcements and the sample is reduced to 217 OMR announcements when we add controls, due to missing ownership data. We also employ a set of control variables similar to De Cesari et al. (2012).

We present the findings of the estimation of the market timing ability in Table 6 in columns (3)-(5). We find that the market timing has significantly declined during the post-regulatory reform period. For instance, as shown in columns (3)-(5), the coefficient of *Post* is positive, suggesting that the market timing ability is lower after the imposition of the minimum buyback period. Even with industry fixed effects the results hold, albeit with 10% level of significance (column (5)). However given the size of our sample, we think its meaningful to interpret that there is evidence that market timing ability of the buying back firm is greatly reduced due to the regulation. The coefficient of *Post* in column (5) imply that compared to the average $Mkt.Timing(O)$ of -10.8% in the sample, in the post-regulatory reform period, the market timing ability almost completely vanishes.

For comparison, De Cesari et al. (2012) report that in the first 19 months of announcing a buyback, the firms in the US buyback at a price roughly 3% lower than the naive benchmark of average daily closing price. Hence, the market timing ability is much higher in our data in the pre-regulatory reform period. Among the control variables, the coefficient of *Inst. own* is positive and significant, suggesting a lower market timing ability with a higher institutional ownership.

Interestingly, the change in the within month market timing ability ($Mkt.Timing(M)$ in columns 6,7 and 8) is not significant and the coefficient is consistently negative. We interpret this result as a direct impact of the reduced number of months allowed for buyback execution (down from 1 year to 6 months) and the minimum buyback requirement. As fewer months are available to the firm for completing the buyback and in those months, the firm needs to buyback at least 50% of the announced amount, the overall market timing ability is lower. However, the within month market timing ability has no impact or perhaps an opposite impact of the regulation, owing to increased need for market timing within the active months.

The lower market timing ability suggest a reduction in the ability of the firm to harness the optionality of the OMR announcement to their advantage. Mandated by the regulation the OMR announcement turns more expensive for firms. Therefore it offers a greater separation between firms with high future prospects and others. This is results in higher initial market reaction as documented in the study.

4.3 Change in operating performance of the firms announcing buyback in the two regimes

The greater initial market reaction and lower market timing in repurchase execution by firms, point to the greater prevalence of signalling motive in the post-regulatory reform period. Therefore, we examine whether the repurchase announcers exhibit any significant improvement in their operating performance in the post-regulatory reform period. For this investigation, we examine the return on assets of the firms as the measure of the operating performance. The period covered is limited to four quarters prior to the announcement and four quarters after the announcement. As we exclude financial year 2020 from our analysis due to the COVID-19 pandemic, we ignore all the OMR announcements that occur after December 2018. We end up with 1983 firm-quarter observations, corresponding to 247 unique OMR announcements.

The results of the estimation are presented in Table 7. The coefficient $Post\ Qtr \times Post$ in columns (1) to (3), captures the impact of the regulation on the operating performance in the post-buyback period for announcements in the minimum buyback regime.

The coefficient of $Post\ Qtr \times Post$ is positive and significant (in column (3)). It is also economically significant as the operating performance improves by 0.59 % per quarter in the post-regulatory reform period. The improvement is about 12.5% higher than the mean ROA in the sample (4.7%). The results imply that the operating performance of the firms announcing buybacks under a mandated minimum amount, improves more than that of the firms announcing prior to the regulatory change. The results support our Hypothesis 2. The improvement in operating performance documented here is consistent with the higher validity of open market repurchases an information signal in the post-regulatory

reform period.

Altogether the results on higher initial market reaction, lower market timing and improvement in the operating performance suggest a greater signalling role for open market repurchases under the new regulatory regime. In the subsequent sections, we carry out a number additional analysis to further examine the strengthened signalling role of the open market repurchases.

4.4 Impact on the repurchase motives

As we observe that repurchase announcements in the post-regulatory reform period lead to greater abnormal returns and the market timing by firms is lower, it is likely that the repurchase motives could shift more towards signalling in the period. Specifically, with a Tobit model similar to (Dittmar, 2000) we examine if the regulatory change has made some of the motives more prominent. We use the actual amount of buyback obtained from the annual cash flow statements as the dependent variable. The sample employed comprise the entire set of listed firms in India. In our sample, which begins from the 1998-99 financial year end in in the 2019-20 financial year, we have total of 46,190 firm-year observations.

In the estimations, we do not distinguish between tender-offers and OMRs, as our data do not permit us to distinguish between the two types of buybacks. Therefore, if we observe a significant shift in the motives for buyback, it can only be interpreted at the aggregate level, which we admit as a limitation of the analysis. We show the results of our Tobit regression in Table 8.

Column (1) of the table presents the results without distinguishing the buybacks across the two periods. The variable definitions are given in Table 1. In line with the earlier findings (see, Dittmar, 2000), firms with higher cash balance and those with higher cash inflows spend more on buybacks, consistent with the cash distribution motive. Moreover, firms with a greater leverage spend less on buyback, consistent with leverage targeting motive. It is also found that firms with greater options outstanding buyback to nullify the dilutive effect of the exercise of the stock options. Notably, we observe is that buyback

levels are lower for firms with higher book-to-market ratio, indicating that undervaluation signalling is not a major motive of buybacks in India.

We interact the *Post* dummy with each of the explanatory variables to examine the impact of the regulation on the buyback motives. We do the interaction individually first with each explanatory variable (columns (2)-(9)) and then do a full interaction with all interactions placed in a single model (column (10). We do not comment on the magnitude of the coefficients as they are not directly comprehensible (see McDonald & Moffitt, 1980). As observed, the cash distribution motive has become stronger in the post-regulatory reform period as *Post* $\times$ *Cash ratio* is significant. More importantly, the coefficient for *Post* $\times$ *BM* is positive and significant at 10% level, indicating that in the minimum buyback regime, there is an incrementally influence of the motive to signal undervaluation. Dividend payers exhibit a higher likelihood to buyback stocks, indicating that signalling motive of buybacks has become more widespread. Leverage targeting seems a significant objective only in the minimum buyback regime. Based on the findings it can be argued that the signalling motive has a stronger influence on repurchase execution in the post-regulatory reform period.

4.5 Impact on long-term term buy-and-hold returns

We also examine if the long-term stock performance of the firms announcing OMRs in the post-regulatory reform period is lower relative to those announcing before the regulatory change. The buy-and-hold abnormal returns is estimated for a one-year window in the post-announcement phase. We restrict the analysis to a sample of 248 announcements till the December 31, 2018. The results of the estimation of BHAR are provided in Table 9.

We find mixed evidence in support of the hypothesis. Particularly, we find that the coefficient for *Post* in *BHAR-1 year* (column (9)) is not statistically significant, indicating that there is no significant difference between the long-term abnormal returns for firms announcing buybacks in the pre- and the post-regulatory reform period. However, *BHAR-3 month* (*BHAR-6 month*) is higher for announcers in the minimum buyback regime by

about 7.27% (13.19%), as in the coefficient of *Post* in column (3) (column (6)) of Table 9, compared to those in the no minimum buyback regime, which is inconsistent with our 4. It is likely that the greater abnormal return for the smaller time windows is on account of the delay in incorporation of the full information content of OMR announcement. The findings suggest that there is no significant impact of the regulation on the long-run market returns, though we hypothesized it be lower in the post-regulatory reform period.

5 Robustness of the results

In this section, we perform two falsification robustness test to see if it is indeed the regulation that causes the change in firm and market behaviour, observed in the previous sections. For this purpose, we examine if using a pseudo regulation date still generates the market reaction observations. Specifically, instead of using August 8, 2013 as the regulation date, we move it three years prior to August 8, 2010 and re-examine the results on CAR and BHAR. Although the choice of the pseudo introduction date is somewhat arbitrary, we repeat the tests with another pseudo introduction date, though we have not reported them. As an additional robustness test, we use a similar setup to examine the impact of the regulation on tender offer for buybacks. Since the regulatory change does not impact tender offers, we would not expect the observations related to the market reaction, to hold in tender offer for buybacks. We report the results in the subsequent subsections.

5.1 Falsification test with pseudo introduction date

In this subsection, we examine if using a pseudo introduction date produces the same market response results, as observed in the main sample. We expect the results to not exist in this falsification test. The results for CAR are presented in Table 10. As observed, the increase in both *CAR market* and *CAR 4-factor* is insignificant when a pseudo regulation date is used, as the coefficient of *Post* indicates. Similar test is repeated for BHAR and the results are reported in Table 11. As shown, *BHAR 3-months*

and *BHAR 6-months*, both of which had a significant and positive coefficient for *Post*, have insignificant and negative coefficients in the falsification test. In unreported results, we perform the same test with a different pseudo introduction date (August 8, 2007), and find similar results of no impact of a pseudo regulatory reform date.

5.2 Falsification test with tender offers

Next, we examine if the impact of the regulation specific to OMRs is present in tender offers for repurchases. If the repurchasing firm's signal became stronger for some other reason than the regulation after the regulation date, the impact is expected to be visible in tender offers too. We present the results for CAR first. We have 211 tender offers in the baseline sample, of which 46 are from the pre-regulation period and the rest are from the post regulation period. The sample size is larger in the *CAR 4-factor* sample (229), as we do not lose observations due to missing balance sheet data, with 49 observations in the pre-regulation period and the remaining in the post regulatory reform period. The results are presented in Table 12. The coefficient for *Post* is either negative and significant or is insignificant in all the specifications, as opposed to positive and significant in case of OMRs. Hence, tender offers for buyback do not generate an incrementally higher market response in the post reform period. This is indeed expected if the regulation *causes* the increased market reaction in case of OMRs, as the regulation does not impact tender offers.

Next, we examine if there is an impact of the regulation on BHAR, in case of tender offers. For the purpose, like in OMRs, we use only the tender offers announced till 31st of December 2018, as we need a year post the announcement for BHAR examination and we do not want the pandemic crisis of 2020 to impact our results. We hence have 173 tender offers in our sample, 46 of which are from the pre regulatory reform period and the rest from the post regulatory reform period. We show the results in Table 13. As shown, the coefficient of *Post* is insignificant for *BHAR 3-months*, *BHAR 6-months* and *BHAR 1-year*, which is inconsistent with the observation in the case of OMRs. Overall, we conclude that it is indeed the regulation which appears to be causing the observed

change in market reaction and firm behaviour, consistent with an increased signalling value of only OMR announcements.

6 Examination of the choice between tender and market buyback

Relative to the OMR the tender buyback is known to be a more costly form of signalling for firms. As mentioned earlier in the paper, the OMR leaves a valuable option with the firm to buyback shares, whereas tender offers *give* an option to the shareholders to tender their shares . However, the regulatory change which imposed a minimum buyback threshold along with contraction of the buyback completion period is likely to have accentuated the cost of the open market repurchases. Therefore, we expect that firms are likely to increasingly prefer to execute the buyback through tender offers relative to the pre-regulatory reform period. Furthermore, we expect the willingness to execute the buyback through tender offers, to be greater for firms which could be expected to have greater constraints on their market timing ability. Prior research (see De Cesari et al., 2012; Oded, 2011) on market timing has already established that firms with greater institutional holdings are likely to have lower ability to time the market. Similarly, it is reasonable to assume that firms with stocks ridden by relatively lower liquidity (see De Cesari et al., 2012) would be also face restricted market timing ability, particularly in the post-regulatory reform period.

We empirically examine how the likelihood of a tender announcement has been impacted in the post reform period, by modelling the choice of the firm to execute the buyback through tenders and OMRs. Specifically, we run a logit regression with the choice of the repurchase method as the dependent variable as in Vafeas (1997). Under the model dependent variable takes a value of 1 in case of tender repurchases and 0 if it is an OMR. The regressions are carried out separately for the pre-reform and the post-reform period. The explanatory variables included in the analysis represent a set factors which had been identified in the prior literature (see Jena et al., 2017; Vafeas, 1997). The

results are reported in Table 14.

We observe that the odds of a tender offer in both the pre-regulation and post regulation period significantly increase with an increase in *Target to assets*. For instance, for a 1% higher *Target to assets*, the log(odds) of a tender offer increase by 21.68 (24.89) in the pre(post)-regulation period (columns (2) and (4) respectively). The dependence of the odds of a tender offer on the amount bought back is likely, at least in part, driven by regulation. All buybacks that are more than 15% of the paid up capital of the company have to be carried out through tender offers [5]. Hence we also observe that the coefficient of *Target to assets* remains both statistically significant and qualitatively the same in both periods. Similarly, the promoters of a firm in India are allowed to tender their shares only if the buyback mechanism is fixed-price tender offer. We therefore observe that for 1% increase in *Promoters own* in pre(post)-regulation period, the log(odds) of a tender buyback increase by 0.06(0.07). Since the regulatory change does not impact these features of the original buyback regulation, the impact of the two factors is qualitatively and quantitatively the same in determining the choice between tender offers and OMRs.

The impact of illiquidity of a stock (*Illiq.*) on the choice of the buyback mechanism is significantly different between the two periods. While *Illiq.* does not impact the choice in the pre-regulatory reform period, in the post-reform period, the odds of a tender increase significantly if the stock is illiquid. For instance, a 0.01 increase in Amihud's illiquidity of a stock increases the log(odds) of a tender offer by 20.49, which is statistically significant. Illiquidity is conjectured to adversely impact the market timing ability of an OMR (see De Cesari et al., 2012; Oded, 2011). In the post-regulatory reform period, both the requirement to buyback a minimum of 50% of the announcement size and to complete the buyback in 6 months (down from 1 year) make the market timing ability critical in executing an OMR profitably, compared to the pre-reform period. Hence, more illiquid a stock is and more difficult market timing is in the minimum buyback regime, more likely it is that a firm opts for a tender offer mechanism, consistent with our hypothesis 5. With regards to institutional ownership (*Inst. own*), we find weak evidence that in the post

[5]The circular could be found at : https://www.sebi.gov.in/sebi$_data$/*attachdocs*/1375961931576.*pdf*

regulation period, firms with a higher institutional ownership prefer tender offers, owing to lower market timing ability. In the model without firm fixed effects (Column 3), the coefficient is positive and statistically significant at 10% level.

Our findings suggest that increases in the cost of OMRs has increased the likelihood that the firms take the tender-offer route in executing their repurchase program. The increase in the likelihood is particularly strong for firms, which are likely to have a disproportionately lower market timing value from OMRs. Taken together, the greater short-run and long-run abnormal stock returns of the announcers of OMRs and the greater propensity to adopt the tender buyback in the post-reform period, suggest imposition of buyback threshold has strengthened the signalling role of open market repurchases.

7 Conclusion

The paper investigates the impact of a key regulatory change in the execution of open market repurchases in India. The regulatory change laid down a minimum mandatory buyback amount of 50% of the target amount and at the same time significantly shortened the time window within which buyback needs to be completed. As an outcome of the regulation the completion window was shortened to 6 months from 12 months, earlier. We examine the impact of the regulatory change by extending the theoretical framework of Oded (2005), by assuming a minimum buyback amount. Based on the model we predict a rise in the validity of open market repurchases as a signalling mechanism, in the the post-regulatory reform period as the regulatory reform is also likely to lead to a more stringent threshold for the announcers.

Our empirical analysis is able to find support for the theoretical predictions. First, we find that the short-run abnormal returns associated with the open market repurchases significantly increase in the post-reform period, relative to the prior period. Second, we document a significant increase in the operating performance of firms in the post-announcement period, implying a stronger signalling role of open market repurchases. Third, we observe that market timing ability of firms through diligent execution of the

buyback has significantly declined in the period following the regulatory change. The decline in the market timing ability corroborates the elevated role of OMRs as a signalling device. Lastly, by examining the choice between tender repurchases and OMRs we document that firms that are relatively more constrained in their market timing ability have a greater likelihood of shifting to tender repurchases in the post-reform period.

The results documented in the paper point to a positive impact of the regulatory change on the shareholder wealth for firms announcing open market buybacks.

8 Extensions and future work

We are currently extending the paper in several ways. First, we are expanding the theoretical model on the separation between good and bad types of firms for a range of the repurchase price, P_1, where their separation may not be as distinct. Second, we are also extending the model to incorporate the impact of the shortened time window for the buyback completion. Finally, we plan to model the choice between tender buybacks and open market repurchases as the regulatory change has apparently made the latter more expensive for firms to undertake a buyback. The extension is intended investigate how the choice between open market repurchases and tender offers would vary at the margin in the pre- and the post-regulatory reform periods. In this extension, we plan to build on the preliminary results related to the change in the influence of various factors on the choice of the buyback method, between the two periods (presented in Table 14).

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methods. *Journal of Accounting, Auditing & Finance*, *12*(2), 101–124.

Table 1: **Variable definitions and data sources**

Variable	Definition and construction	Data source
Buyback characteristics:		
Prop bought back	Ratio of the amount bought back in a year to the total assets of the firm as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Target to assets	The amount sought to be bought back scaled by the total assets of the firm as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess & SEBI website
Target to mcap	The amount targeted to be bought back in scaled by the market capitalization of the firm as at the end of the previous financial year.	CMIE Prowess & SEBI website
Post	A dummy variable which takes a value of 1 for all the repurchases which are approved after August 8, 2013, and 0 otherwise. The date corresponds to the introduction of the the minimum 50% minimum buyback regulation.	NA
Post Qtr	Dummy variable which takes value 1 for an observation which lies within 4-quarters post the approval of an OMR, and 0 otherwise.	CMIE Prowess
Completion	Execution of the buyback as a percentage of target announced.	SEBI website
Mkt. Timing(O)	Ratio of the difference between the weighted average buyback price and the average daily closing price, scaled by the latter, in the maximum allowed time window for buyback execution.	CMIE Prowess & SEBI website
Mkt. Timing(M)	Ratio of the difference between the weighted average buyback price and the average daily market close price, scaled by the latter, within the months that the firm actually bought back at least one share.	CMIE Prowess & SEBI website
Buyback announcement return characteristics:		
CAR market	Cumulative abnormal return of the firm in the 21-day window around the date of approval of the repurchase, estimated based on the market model. The market model estimates are based on 3-years monthly returns prior to the announcement.	CMIE Prowess
CAR 4-factor	Cumulative abnormal return of the firm in the 21-day window around the date of approval of the repurchase, estimated with the the four factor model. The four factor model has Fama-French and momentum factors. The four factor model estimates are based on 3-years monthly returns prior to the announcement.	CMIE Prowess & IIMA data library.

Continued on next page

Table 1 – *Continued from previous page*

Variables	Definition and construction	Data source
BHAR 3-months	Buy-and-hold abnormal returns of the firm in a 90-day window from the date of approval of the repurchase, estimated against the returns of the market over the same period. The market return is proxied by NIFTY returns.	CMIE Prowess
BHAR 6-months	Analogous to the definition of *BHAR 3-months* with 180 days window.	CMIE Prowess
BHAR 1-year	Analogous to the definition of *BHAR 3-months* with 365 days window.	CMIE Prowess
Firm characteristics:		
log(Mcap)	Natural logarithm of the market capitalization of a firm on the last day of the financial year prior to the repurchase announcement (INR Crores).	CMIE Prowess
log(Assets)	Natural logarithm of the book value of the assets as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Cash ratio	Ratio of the cash, bank balance and marketable securities of the firm to the total assets of the firm as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Cashflow ratio	Ratio of the net cash flow from operations, financing activities and investments of the firm to the total assets of the firm as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Leverage	Ratio of the long-term and short-term borrowings of the firm to the total assets of the firm as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Option ratio	Ratio of the ESOP reserve reported by a firm to the total assets as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Promoters own	Promoters ownership in a firm as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Inst. own	Non-promoter institutional ownership in a firm as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Payout	Dividend payout ratio of the firm in the financial year prior to the repurchase announcement.	CMIE Prowess
Div cut dum.	A dummy variable equal to 1 if the payout ratio is reduced in the year of announcement of buyback compared to the previous year by a firm, and 0 otherwise.	CMIE Prowess

Continued on next page

Table 1 – *Continued from previous page*

Variables	Definition and construction	Data source
ROA	Return on assets on a quarterly basis, defined as the EBITDA scaled by the total assets of the firm as at the end of the financial year prior to the repurchase announcement	CMIE Prowess
Tobinsq	Ratio of the sum of the book value of debt and market value of equity to the total assets of the firm as at the end of the financial year prior to the repurchase announcement.	CMIE Prowess
Stock characteristics:		
Illiq.	Average of the Amihud's illiquidity ratio (Amihud, 2002), estimated over a period of 1- year prior the repurchase approval date until 10 days before the approval date.	CMIE Prowess
Lagyr. rtn.	The stock return of the firm in the financial year prior to the repurchase announcement.	CMIE Prowess
Lagyr. d. rtn.	The cumulative daily returns of the stock for a 3 year period prior to the approval of a buyback.	CMIE Prowess
Pre CAR	The cumulative abnormal daily return of the stock for the 6 months prior to the approval of a buyback, based on the market model. The market model is estimated with 3-year monthly returns of the stock prior to the approval.	CMIE Prowess & SEBI website

Table 2: Summary Statistics: Firm and buyback characteristics(OMR only)

	All Firms			No minimum buyback			Minimum buyback		
Variable	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Buyback characteristics									
Target(%)	10.20	7.35	10.80	11.33	7.84	11.80	6.33	5.96	4.49
ROA(preqtr)(%)	5.09	3.88	6.31	5.37	3.95	6.69	3.79	3.53	3.85
ROA(postqtr)(%)	4.46	3.55	4.42	4.61	3.63	4.73	3.74	3.33	2.40
Completion(%)	60.96	68.13	35.95	54.91	58.62	36.28	77.12	92.24	29.70
Mkt. Timing(O)(%)	-10.91	-1.56	30.23	-12.98	-2.63	32.73	-4.34	0.09	19.17
Firm characteristics									
log(mcap)	6.15	6.34	2.06	5.89	6.03	2.07	7.03	6.91	1.78
BM(%)	15.51	5.34	28.86	18.44	7.14	32.07	5.41	3.28	5.71
log(bookvalue)	3.26	3.22	1.14	3.21	3.18	1.12	3.44	3.34	1.20
Promoters Own(%)	48.29	48.40	13.95	48.36	48.40	13.83	48.04	48.50	14.44
Inst. Own(%)	16.77	15.48	14.05	16.10	15.09	13.54	18.88	18.11	15.53
Illiq.($\times$ 100)	3.49	1.75	4.98	4.07	1.92	5.48	1.66	0.93	1.98

Note: The definitions of the variables are provided in Table 1. *ROA(preqtr)* denotes the average ROA in the 4 quarters before the announcement of the buyback. *ROA(Postqtr)* denotes the average ROA in the 4 quarters after the announcement of the buyback.

Table 3: Summary Statistics of market reaction variables

	No minimum buyback			Minimum buyback			Change	
Var	Mean	Median	SD	Mean	Median	SD	$\Delta Mean$	tstat
CAR market	3.96	1.68	13.92	7.65	7.75	11.39	3.69	2.08
CAR 4-factor	4.22	2.78	13.44	8.07	7.17	11.11	3.85	2.19
BHAR 3-months	-1.76	-2.73	18.97	3.76	0.01	23.25	5.51	1.48
BHAR 6-months	-0.34	-3.92	31.98	9.19	2.46	38.68	9.53	1.54
BHAR 1-year	3.33	-3.10	35.90	12.33	1.79	43.87	9.00	0.09

Note: The definitions of the variables are provided in Table 1. All variables in percentage. SD denotes the standard deviation.

Table 4: Summary Statistics of Firm and Buyback characteristics

Panel A: Choice between tender offers and OMRs									
	All Firms			No minimum buyback			Minimum buyback		
Var	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Cashflow ratio(%)	0.64	0.14	4.49	1.03	0.39	5.28	0.28	0.00	3.60
Cash ratio(%)	6.12	1.35	9.58	2.87	0.07	6.95	9.07	3.63	10.65
Target to assets(%)	8.09	6.15	5.46	6.74	5.49	4.31	9.32	7.06	6.09
Pre CAR(%)	-2.03	-3.02	23.99	-1.11	-1.91	25.69	-2.88	-4.05	22.35
Lagyr. d. rtn.(%)	-17.61	6.66	81.15	3.43	30.79	79.92	-36.79	-20.30	77.59
Tobinsq(%)	243.22	201.71	132.93	210.19	168.55	114.86	273.34	226.38	141.12
Promoters Own(%)	54.60	55.41	14.17	49.36	49.33	12.57	59.37	61.68	13.88
Illiq. (×100)	4.17	1.49	6.22	5.07	1.94	6.61	3.35	1.10	5.73
Inst. Own(%)	16.09	16.14	12.90	17.02	17.11	13.08	15.25	15.24	12.71
Leverage(%)	5.73	0.00	10.30	2.99	0.00	8.41	8.24	1.66	11.21
Log(Assets)	6.90	6.80	1.72	6.41	6.44	1.50	7.35	7.29	1.79
Panel B: Variables related to buyback motive									
Prop. Bought back(%)	0.22	0.00	2.32	7.37	2.56	11.37	7.25	2.93	10.84
Log(Mcap)	4.32	4.04	2.48	5.17	5.02	2.14	6.85	7.01	2.46
Log(Assets)	7.55	7.42	2.13	8.26	8.23	1.82	9.38	9.24	2.03
Cash ratio(%)	3.26	0.49	7.61	1.60	0.11	4.75	7.39	2.85	10.62
Cashflow ratio(%)	0.38	0.01	4.78	1.15	0.24	6.14	0.39	0.05	4.75
Payout(%)	13.82	0.00	21.50	15.43	10.43	19.52	20.21	11.18	25.18
Leverage(%)	11.47	0.00	20.09	4.70	0.00	13.54	16.62	9.41	19.26
Option ratio(%)	0.01	0.00	0.08	0.02	0.00	0.10	0.07	0.00	0.18
Lagyr. rtn(%)	0.16	-0.48	75.88	8.81	6.24	83.83	5.30	-1.03	54.91

Note: The definitions of the variables are provided in Table 1.

Table 5: Impact on market reaction to buyback announcements

Var	CAR market			CAR 4-factor	
	(1)	(2)	(3)	(4)	(5)
Post	3.69**	6.05***	6.71***	3.85*	4.41**
	(1.8)	(1.8)	(1.6)	(2.2)	(1.8)
BM		2.17	-0.22		
		(6.9)	(7.9)		
Log(Mcap)		-1.82***	-2.22***		
		(0.5)	(0.5)		
Constant	3.96***	14.30***	16.88***	4.23***	4.02***
	(1)	(3.4)	(3.7)	(0.9)	(0.8)
Industry fixed effects	No	No	Yes	No	Yes
N	262	262	254	259	251
Adj. R^2	0.94	9.30	8.40	1.10	2.10

Note: The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6: Impact of the regulation on market the timing

Var	Completion		Market timing					
			Mkt. timing (O)			Mkt. timing (M)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	22.21525***	20.69450**	0.08838	0.15107*	0.10850*	-0.06397	-0.16526	-0.1548
	(6.828)	(7.304)	(0.071)	(0.075)	(0.058)	(0.175)	(0.159)	(0.133)
Promoters Own				-0.00032	-0.00182		-0.00448	-0.00639**
				(0.001)	(0.001)		(0.003)	(0.003)
Log(Mcap)				-0.05222***	-0.03892*		0.10600***	0.11915***
				(0.013)	(0.022)		(0.025)	(0.026)
Inst. Own				0.00533**	0.00449*		-0.00663*	-0.00872**
				(0.002)	(0.002)		(0.004)	(0.004)
Illiq.				0.32757	0.34634		-0.31732	-0.14523
				(0.498)	(0.629)		(0.685)	(0.538)
Constant	54.90743***	55.66425***	-0.13506**	0.09986	0.11119	-0.26898***	-0.55870	-0.52107***
	(4.608)	(4.610)	(0.053)	(0.143)	(0.178)	(0.053)	(0.155)	(0.134)
Industry fixed effects	No	Yes	No	No	Yes	No	No	Yes
N	268	263	236	217	211	1137	1137	1137
Adj. R^2	0.07248	0.05822	0.01035	0.06905	0.09561	0.00466	0.12755	0.25648

Note: The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7: Change in operating performance

Var	(1)	(2)	(3)
Post Qtr	-0.76***	-0.74***	-0.65***
	(0.2)	(0.2)	(0.2)
Post	-1.58***	-2.19***	-1.48***
	(0.5)	(0.5)	(0.4)
Post Qtr × *Post*	0.71**	0.67**	0.59**
	(0.3)	(0.3)	(0.3)
Log(Asset)			-0.00621*
			(0.3)
Constant	5.37***	5.47***	10.66***
	(0.5)	(0.4)	(3.2)
Industry fixed effects	No	Yes	Yes
N	1983	1983	1983
Adj, R^2	0.98	10.19	12.47

Note: Dependent variable is ROA. The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8: Impact on the repurchase motives

Var	Overall	Individual interaction								Full interaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
BM	-0.184***	-0.194***	-0.190***	-0.187***	-0.198***	-0.193***	-0.182***	-0.188***	-0.188***	-0.235***
	(0.0265)	(0.0312)	(0.0269)	(0.0268)	(0.0273)	(0.0272)	(0.0266)	(0.0268)	(0.0268)	(0.0451)
Cash ratio	0.781***	0.958***	0.205	0.999***	0.894***	1.015***	0.786***	0.960***	0.960***	-0.098
	(0.2309)	(0.2428)	(0.4765)	(0.2449)	(0.2446)	(0.2446)	(0.2497)	(0.2429)	(0.243)	(0.4415)
Cashflow ratio	0.733**	0.663*	0.658*	0.896**	0.678*	0.670*	0.710*	0.666*	0.668*	0.993**
	(0.3692)	(0.3697)	(0.3697)	(0.4257)	(0.3699)	(0.3692)	(0.3701)	(0.3696)	(0.3696)	(0.4399)
Payout	-0.002*	-0.002*	-0.002*	-0.002*	-0.005***	-0.002*	-0.002*	-0.002*	-0.002*	-0.005***
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0012)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0013)
Log(Assets)	0.125***	0.128***	0.129***	0.128***	0.126***	0.112***	0.127***	0.128***	0.128***	0.108***
	(0.01)	(0.0101)	(0.0101)	(0.0101)	(0.0101)	(0.0126)	(0.0101)	(0.0101)	(0.0101)	(0.0134)
Leverage	-0.826***	-0.717***	-0.660***	-0.713***	-0.667***	-0.711***	-0.253	-0.709***	-0.712***	-0.200
	(0.1152)	(0.1247)	(0.1265)	(0.1241)	(0.1242)	(0.1245)	(0.1809)	(0.1244)	(0.1242)	(0.1822)
Options ratio	86.998***	92.087***	92.099***	91.821***	87.687***	89.423***	88.737***	82.213***	91.805***	87.594***
	(16.3879)	(16.5661)	(16.5478)	(16.5471)	(16.5747)	(16.6156)	(16.5468)	(27.6828)	(16.5532)	(25.9643)
Lagyr. rtn.	0.058**	0.060**	0.058**	0.060**	0.059**	0.059**	0.064**	0.059**	0.058*	0.049
	(0.0262)	(0.0262)	(0.0262)	(0.0262)	(0.0262)	(0.0262)	(0.0263)	(0.0262)	(0.0301)	(0.0307)
Post		-0.113**	-0.148***	-0.103**	-0.240***	-0.435***	-0.012	-0.110**	-0.106**	-0.596***
		(0.0483)	(0.0508)	(0.0456)	(0.0544)	(0.1629)	(0.0534)	(0.0468)	(0.0457)	(0.186)
Post x BM		0.022								0.118*
		(0.0521)								(0.0677)
Post x Cash ratio			1.064*							1.301**
			(0.5595)							(0.559)
Post x Cashflow ratio				-0.890						-1.167
				(0.8326)						(1.0509)
Post x Payout					0.008***					0.007***
					(0.0017)					(0.0018)
Post x Log(Assets)						0.038**				0.044**
						(0.0182)				(0.0186)
Post x Leverage							-0.806***			-0.773***
							(0.2479)			(0.2636)
Post x Options ratio								14.859		-5.464
								(34.1301)		(32.3595)
Post x Lagyr. rtn.									0.006	0.042
									(0.0583)	(0.0613)
Constant	-3.787***	-3.789***	-3.783***	-3.794***	-3.712***	-3.661***	-3.800***	-3.789***	-3.792***	-3.553***
	(0.1224)	(0.1229)	(0.1227)	(0.1228)	(0.1226)	(0.1355)	(0.1227)	(0.1229)	(0.1228)	(0.2922)
										0
var(e.propboughtback)	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0037)
N	46190	46190	46190	46190	46190	46190	46190	46190	46190	46190

Note: Dependent variable is Prop bought back.The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 9: Impact on long-term term buy-and-hold returns

Var	BHAR 3-months			BHAR 6-months			BHAR 1-year		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	5.51	6.37*	7.27**	9.54	12.48*	13.19**	0.88	5.55	8.58
	(4.8)	(3.6)	(3.4)	(8.4)	(6.4)	(5.5)	(12.4)	(9.4)	(8.7)
Log(Mcap)			-2.07**			-3.89***			-6.11***
			(0.8)			(1)			(1.8)
BM			-10.59			-27.52***			-28.47**
			(8.1)			(7)			(11.6)
Constant	-1.76	-1.90	45.72**	-0.35	-0.99	89.81***	6.54	6.62	146.62***
	(1.1)	(1.3)	(19.1)	(3.3)	(2.8)	(23.9)	(6.2)	(5.2)	(40.7)
Industry fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	248	240	240	248	240	240	248	240	240
Adj R^2	0.74	3.18	4.87	0.81	2.97	6.53	-0.40	-1.60	0.57

Note: The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 10: Falsification Test-CAR (Pseudo introduction date)

Var	CAR market			CAR 4-factor	
	(1)	(2)	(3)	(4)	(5)
Post	0.92	2.96	3.64*	1.65	2.20
	(1.7)	(2)	(2)	(1.8)	(1.9)
BM		2.26	-0.02		
		(6.9)	(8)		
Log(Mcap)		-1.71***	-2.07***		
		(0.5)	(0.5)		
Constant	4.36***	13.53***	15.70***	4.28***	3.93***
	(1.3)	(3.4)	(3.8)	(0.9)	(1.2)
Industry fixed effects	No	No	Yes	No	Yes
N	262	262	254	259	251
Adj. R^2	-0.27	7.10	6.00	0.00	0.80

Note: The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 11: Falsification Test - BHAR (Pseudo introduction date)

Var	BHAR 3-months			BHAR 6-months			BHAR 1-year		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	1.32	1.79	2.19	-2.18	-0.95	-1.81	-11.85	-8.24	-7.22
	(2.5)	(2.8)	(3.2)	(5.9)	(5.2)	(5)	(9.6)	(8.3)	(7.5)
Log(Mcap)			-1.88**			-3.20***			-5.31***
			(0.9)			(0.8)			(1.5)
BM			-10.71			-29.00***			-30.76**
			(8.3)			(7)			(12)
Constant	-1.34	-1.59	41.78*	2.36	1.55	77.71***	12.01*	11.14*	133.57***
	(1.6)	(1.8)	(20)	(4)	(3.5)	(19.6)	(6.2)	(6)	(35)
Industry fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	248	240	240	248	240	240	248	240	240
Adj R^2	-0.30	1.88	3.28	-0.30	0.95	4.43	0.88	-1.16	0.62

Note: The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 12: Falsification Test - CAR (Tender Offers)

Var	CAR market			CAR 4-factor	
	(1)	(2)	(3)	(4)	(5)
Post	-5.08**	1.19	1.09	-4.52***	-4.92**
	(2.1)	(2.1)	(2.2)	(1.4)	(2)
BM		9.04	13.52		
		(6.1)	(8.6)		
Log(Mcap)		-1.99***	-1.77***		
		(0.4)	(0.5)		
Constant	11.16***	19.90***	17.66***	7.15***	7.38***
	(1.9)	(3.3)	(4.3)	(1.3)	(1.8)
Industry fixed effects	No	No	Yes	No	Yes
N	211	211	201	229	219
Adj R^2	3.10	24.50	23.40	3.70	9.70

Note: The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 13: Falsification Test - BHAR (Tender Offers)

Var	BHAR 3-months			BHAR 6-months			BHAR 1-year		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	-7.92*	-9.18**	-2.55	-8.01	-15.03*	-4.09	-51.09	-41.81	-4.08
	(4)	(4)	(5.2)	(7.4)	(7.3)	(8.3)	(30.3)	(29.8)	(15.6)
Log(Mcap)			-1.74			-1.02			-2.62
			(1.1)			(1.3)			(4.2)
BM			8.53			41.42*			155.77
			(19.1)			(23)			(125.6)
Constant	5.58*	6.53**	41.55	3.41	8.19*	19.26	47.63	41.04	57.07
	(3.2)	(2.5)	(26.4)	(5.7)	(4.7)	(33)	(29.3)	(28.6)	(98.3)
Industry fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	173	165	165	173	165	165	173	165	165
Adj R^2	2.98	4.85	9.56	0.84	7.62	15.06	5.92	9.18	20.20

Note: The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 14: Examination of the choice between tender and market buyback

Var	No minimum buyback		Minimum buyback	
	(1)	(2)	(3)	(4)
Cashflow ratio	1.43	2.55	-8.57	-5.42
	(3.655)	(5.011)	(6.982)	(9.248)
Cash ratio	-0.58	5.8	0.35	0.59
	(4.555)	(5.681)	(1.687)	(4.031)
Target to assets	15.89***	21.68**	17.72***	24.89***
	(4.338)	(9.596)	(4.207)	(7.901)
Pre CAR	1.06	1.2	1.24*	3.12***
	(0.771)	(1.078)	(0.64)	(0.941)
Lagyer. d. rtn.	-0.24	-0.28	0.4*	0.71**
	(0.223)	(0.468)	(0.236)	(0.348)
Tobinsq	-0.58*	-0.6*	-0.09	0.28
	(0.335)	(0.324)	(0.126)	(0.281)
Promoters Own	0.07**	0.06*	0.09***	0.07**
	(0.027)	(0.032)	(0.015)	(0.033)
Div cut dum.	0.06	0.08	-0.53	-0.4
	(0.475)	(0.501)	(0.406)	(0.54)
Illiq.	3.03	-1.21	5.61**	20.49***
	(5.04)	(7.129)	(2.685)	(7.482)
Inst. Own	0.04	0.03	0.04*	-0.01
	(0.036)	(0.039)	(0.02)	(0.047)
Leverage	-3.01	-3.54	0.72	2.75
	(1.953)	(3.469)	(1.842)	(2.556)
Log(Assets)		-0.1		0.64
		(0.318)		(0.447)
Constant	-5.84**	-5.05	-5.9***	-13.03***
	(2.344)	(3.631)	(1.049)	(4.137)
Industry fixed effects	No	Yes	No	Yes
N	204	204	228	228

Note: Dependent variable is a dummy which takes 1 if the buyback type is tender and 0 if it is OMR. The definitions of the variables are provided in Table 1. All coefficients are in percentage. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.