

The Causal Effects of Margin Trading and Short Selling on Earnings Management: A Natural Experiment from China

Zhaojing Chen*
Purdue University

G. Nathan Dong†
Columbia University

Ming Gu‡
Renmin University of
China

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ABSTRACT

This paper estimates the joint effect of margin trading and short selling on earnings management following the deregulation pilot program in China that allows margin trading and short selling for a selected number of stocks in 2010. Using a quasi-experimental design we find that short selling provided an external governance mechanism to discipline management; however, margin trading could have provided incentives for accounting manipulation. Collectively, the incentive effect of margin trading offset the disciplinary effect of short selling to some extent.

Keywords: margin trading, short selling, earnings management, quasi-experiment

JEL Code: G14, G18, M41, M48

* Krannert School of Management, Purdue University. 403 W State Street, West Lafayette, IN 47907. E-mail: chen2034@purdue.edu.

† Dept. of Health, Policy & Management, Columbia University. 600 W 168th Street, New York, NY 10032. E-mail: gd2243@columbia.edu.

‡ Hanqing Advanced Institute of Economics and Finance, Renmin University of China, Beijing, 100872, China. E-mail: minggu@ruc.edu.cn.

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The Causal Effects of Margin Trading and Short Selling on Earnings Management: A Natural Experiment from China

ABSTRACT

This paper estimates the joint effect of margin trading and short selling on earnings management following the deregulation pilot program in China that allows margin trading and short selling for a selected number of stocks in 2010. Using a quasi-experimental design we find that short selling provided an external governance mechanism to discipline management; however, margin trading could have provided incentives for accounting manipulation. Collectively, the incentive effect of margin trading offset the disciplinary effect of short selling to some extent.

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“China’s capital markets have achieved significant progress in the past 20 plus years. In particular, new markets and businesses launched in recent years, including the Growth Enterprise Board, stock index futures, as well as margin trading and short selling, have played an important role in promoting the all-round social and economic development.”

*– Wang Qishan, Vice Premier of
The People’s Republic of China¹*

1. Introduction

The equity market benefits both investors and firms if the investment potential, risks and expected returns can be recognized through the pricing mechanism of an efficient market. The viability of an efficient market is critical. As a necessity to improve market efficiency and completeness, margin trading and short selling play an important role in the stability of capital markets and have far-reaching influences for capital markets and their participants around the world (Gregoriou 2011). Margin trading and short selling not only help improve price discovery, but also provides a means of increasing market volume and reducing liquidity risk (Woolridge and Dickison 1994), and most importantly, disciplining management in poorly performing companies (Massa, Zhang and Zhang 2014a).

However, the endogenous nature of the participation of investors and speculators in margin trading and short selling and the observable and unobservable firm characteristics such as financial performance and corporate governance has limited our understanding of the effect of margin trading and short selling on managerial opportunistic behavior including accounting manipulation. For instance, in equilibrium it is indeed difficult to distinguish if investors and speculators “select” certain firms to discipline, or firms “respond” to the disciplinary effect. Therefore, we should be careful not to jump into conclusion and to avoid generalization of results obtained from previous studies before separating the disciplinary effect of margin trading and short selling from the self-selection effect.

The ideal research design would be a blind randomized controlled experiment that assigns firms randomly to two different groups. The firms in the treatment group would be “forced” to experience margin trading and short selling that result in “possible” changes in managerial opportunistic behavior, and the control group would not. These firms would then be followed

¹ Excerpted from China Securities Regulatory Commission (2012).

through the period of experiment with a variety of parameters being measured to relate margin trading and short selling to earnings manipulation and fraud commitment. Unfortunately, the immeasurable complexity of planning, extensive costs of implementation, and the need for sophisticated coordination often make the experimental design an impossible alternative. Since this type of randomized experiment is not feasible, our solution to this evaluation problem is to use an exogenous event or a “shock” that caused sharp differential changes in margin trading and short selling across firms within a narrow time frame to identify the effect and hopefully to obtain a more validated result. The shock in this paper is the recent removal of short selling and margin trading bans on selected stocks in China. This unanticipated event enables us to study the causal effect of short selling and margin trading on the quality of firms’ financial reporting.

The stock market in China is one of the largest markets in the world. The market capitalization of Shanghai Stock Exchange and Shenzhen Stock Exchange combined is almost five trillion U.S. dollars, more than half as much as the GDP of that country in 2014. Still, when compared to its Western counterparts, it can hardly be considered free and efficient. Some banking and financing activities in China’s equity market are strictly regulated and short selling and margin trading were prohibited until recently. Using difference-in-difference (DiD) tests and regressions with detailed data of margin trading and short selling in China, we report evidence consistent with previous studies that short selling provides an external governance mechanism to discipline management; however, in addition to the disciplinary effect, we find that margin trading that often accompanies short selling provides incentives for accounting manipulation.

The paper makes an important contribution to the understanding of the joint effect of two stock market policies designed with the aim of promoting market efficiency, integrity and stability, namely the removal of short-selling and margin trading bans on selected stocks in China in 2010. Unfortunately, the finding reported in this paper suggest that the manipulative effect of margin trading may have offset the disciplinary effect of short selling, even after accounting for institutional ownership, trading turnover, illiquidity, trading turnover, analyst coverage, R&D expenditures, capital expenditures, and managers’ sensitivity to earnings management.

The remainder of the paper is organized as follows. Section 2 reviews the relevant prior research on short selling and margin trading and develops the hypotheses. Section 3 presents the sample data, measurement choice, and empirical method. Section 4 evaluates the results.

Section 5 adds additional control variables for firm characteristics as robustness checks. Section 6 discusses the main concerns and policy implications of these findings and concludes.

2. Related literature and hypothesis development

2.1 Short selling

Short-selling means the trading activity of selling a borrowed stock without owning it. Investors may generate a short selling position when they are extremely confident about the bad news of the underlying firm. Bris, Goetzmann and Zhu (2007) suggest that short-selling may not be easily practiced in some countries, because of country law, lack of stock lenders, high transaction cost, and up-tick trading rule. There is a large amount of studies related to short selling. For example, several studies demonstrate that short selling facilitates the flow of private information into stock prices and increases price efficiency (e.g., Miller 1977; Harrison and Kreps 1978; Chang, Cheng and Yu 2007; Boehmer and Wu 2013). Some recent studies exploit changes in short sale regulations to examine the economic implications of short selling, and show that the trading bans decrease the market quality (e.g., Autore, Billingsley and Kovacs 2011; Boehmer, Jones and Zhang 2013; Beber and Pagano 2013).

In July 2004, the Securities and Exchange Commission (SEC) adopted a new regulation governing short selling activities in the U.S. equity markets - Regulation SHO program. Regulation SHO allowed stocks in the pilot program exempted from short-sale price tests between May, 2005 and August, 2007. The growing studies employ SHO pilot program as a exogenous shock to examine the effect of short selling on several aspects, including order execution and market quality (Alexander and Peterson 2008), short-sale trades and short-sales volume (Diether, Lee and Werner 2009), bond yields (Kecskés, Mansi and Zhang 2013), equity issuance and investment (Grullon, Michenaud and Weston 2014), insider trading (Masa, Qian, Xu and Zhang 2014b), and earnings management (Fang, Huang and Karpoff 2014; Masa, et al 2014a).

2.2 Margin trading

Investors buy a stock if they have good news (are optimistic) about the underlying firm. If the

news is extremely positive and precise, investors may build up a leveraged long position by borrowing money (or stocks) from registered security companies (margin-trading) or from other resources. Traditional studies view the margin traders as potentially informative speculators who trade to produce excess volatility and destabilize the market. However, the empirical evidence about margin traders is mixed. For example, Seguin (1990) observes no higher volatility, improved liquidity, and increased price informativeness after margin trading is allowed for U.S. OTC stocks. Hardouvelis and Peristiani (1992) find that a higher margin requirement in Japan deters speculators and does not incur market instability. Lee and Yoo (1993) find no relationship between margin requirements and stock return volatility in Korea and Taiwan. Andrade, Chang and Seasholes (2008) apply the change in shares held in margin accounts in Taiwan Stock Exchange to proxy for noninformational trading imbalances, and show that order imbalances generate predictable reversals in stock returns. Hirose, Kato and Bremer (2009) show that retail investors dominate the margin trading in Japan, and their trades positively predict future returns.

2.3 Margin trading and short selling in China

In general, it is difficult to directly test the effects of margin trading and short selling on valuation and managerial behavior with data from the equity markets of developed countries because short selling has been allowed in these markets (Jain, Jain, McNish and McKenzie 2013) for a long time. In this paper, we use a unique data set from Chinese stock markets. Margin trading and short selling of stocks were strictly prohibited in the Chinese markets until recently. On March 31, 2010, the China Securities Regulatory Commission (CSRC) introduces the pilot program of margin trading and short selling to incorporate more information into stocks prices. Initially, 90 blue chip stocks are selected in the program in 2010. After several rounds of qualification standards loosening, there are a total of 900 stocks included in the pilot program in September 2014, accounting for more than one third of total listed stocks in China. Table 1 shows the timeline of pilot program. There are five major qualification list revisions between 2010 and 2014, and several minor revisions between major revisions. In each major revision, a

large amount of stocks are added to the pilot program. Once stocks fail to satisfy certain program requirements, they will be removed from the program list.

[Insert Table 1 Here]

To be qualified for the list, stocks have to satisfy certain size, liquidity, and volatility requirements. CSRC stipulates that only qualified investors can buy stocks on margin or sell stocks short, and the requirements differ across security companies. Panel A of Table 2 demonstrates the latest version margin requirements for qualified stocks. Taking the guidance of China Citic Securities as an example, Panel B of Table 2 shows the requirements of qualified investors. Chang, Luo and Ren (2014) compare several features of Chinese pilot program with other countries. For example, the transaction cost of margin trading and short selling is quite high in China, compared to U.S. Other Chinese features include the shortage of security lending supply, catering to retail investors, and strict up-tick rule.

[Insert Table 2 Here]

From March 2010 to August 2012, qualified investors can borrow money or stock only from security companies. Since the supply of security lending is quite limited in China, after August 27, 2012, qualified investors can borrow from other financial institutions such as banks and insurance companies through a centralized refinancing company. CSRC expects that the refinancing policy expand sources of securities to borrow, further relaxing short sale constraints.

2.4 Hypothesis development

Previous research indicates that top executives have incentives to distort their firms' reported financial performance to boost their compensation (e.g., Bergstresser and Philippon 2006; Burns and Kedia 2006; Efendi, Srivastava and Swanson 2007), gain through stock sales (Beneish and Vargus 2002), and acquire job security and corporate control (DeFond and Jiambalvo 1994; Sweeney 1994; DeFond and Park 1997). Recent two studies (Fang, et al. 2014; Masa, et al. 2014a)

examine the effect of short selling on earnings management, and find that short selling can constrain firms' incentives to manipulate or misrepresent earnings. For instance, Fang, et al. (2014) argue regulation SHO's pilot program represents an exogenously imposed reduction in the cost of short selling in the pilot stocks. The authors find that earnings management in the pilot firms decrease relative to earnings management in the non-pilot firms during the pilot program. Masa, et al. (2014a) employ the cross-country data, and document a similar result: a significantly negative relationship between lending supply and activism in the short selling market and earnings manipulation.

On March 31, 2010, CSRC permitted margin trading and short selling for the first time in the China stock market. The dual introduction of margin trading and short selling provide us a great opportunity to examine the effect of this reform on earnings management. Only stocks on the pilot list can be margin buy leverage long and sold short. The unique regulatory setting in China allows us to examine the separate effect of margin trading and short selling on earnings management.²

Following Fang, et al (2014) and Masa, et al (2014a), we ask the question: Will earnings management in the CSRC pilot firms decrease (or increase) relative to earnings management in the non-pilot firms during the CSRC pilot program? More importantly, we are interested in the phenomenon that securities lending and margin borrowing may simultaneously affect the earnings management in China. Given the previous literature, we suggest the following hypotheses:

H1: The short selling can discipline the earnings management. In other words, there is a negative relationship between short selling and earnings management.

On the other hand, margin trading activities are closely related to security market speculation and reflected in the fluctuation of stock prices, and in fact, stockbrokers who profit from the volume of margin lending play an important role to exaggerate the effects of

² There is limited evidence on the effect of short sales and margin trading on earnings manipulation in emerging markets. Current studies in China related to CSRC reform mostly focus on the liquidity, volatility, and market efficiency after the trading ban are removed (e.g. Sharif, Anderson and Marshall 2014; Chang, et al. 2014; and Zhao, Li and Xiong 2014).

speculative trading on market stability (Thomas 1935). Bolton, Scheinkman and Xiong (2006) specifically model the stock market with a speculative component in the stock price and find a distortion in managerial incentives that potentially causes short-termism. The authors attribute this type of managerial short-term orientation to the speculative motive of firms' shareholders. An implication of their analysis is that the stock price-linked executive compensation will induce the CEO to exploit future investors if his goal is to ensure the maximization of the short-run value of his firm. To some extent, the evidence of Teoh, Welch and Wong (1998a) confirms the existence of this conflict between current and future shareholders by showing that some pre-IPO firms engage in earnings manipulation. The incentive of a firm's current shareholders (aka owners) before the IPO is to sell their firm at a higher price, and the fact that owners manipulate discretionary accruals to boost IPO prices supports the theory of speculative investment affecting managerial behavior that current shareholders often engage in short-term opportunistic strategies (e.g., earnings management). In the survey of Graham, Harvey and Rajgopal (2005), CFOs were asked to assess their decisions relating to financial reporting and the results show that financial executives are spurred by the speculative stock markets to behave in a short-termist fashion to boost short-term stock prices, for example, some of them were engaged in earnings manipulation and delaying profitable real investments. In light of these arguments and empirical findings, we can expect to find the opposite effect of margin buying on earnings management. Accordingly, we propose the second hypothesis:

H2: The margin trading can provide incentives for accounting manipulation and stimulate earnings management. In other words, there is a positive relationship between margin trading and earnings management.

3. Data, methodology and sample statistics

3.1 Data and measure

Our study covers the period from January 1, 2006 through December 31, 2014. The *PRE* period is defined from Jan 1, 2006 to Dec 31, 2009, while the *DURING* period is from Jan 1, 2011 to Dec 31, 2014. We drop the 3 months pre-period (January 1 to March 30, 2010) because the launch of

pilot program may have announcement effect and only 90 pilot stocks are initially included on February 12, 2010. In order to avoid the contaminating announcement, we take the PRE period to the end of 2009. Since the margin trading and short selling truncation data is limited from April, 2010 to December 2010, the year 2010 is excluded in our sample *DURING* period.

After removing all the stocks that do not meet the sample requirements of having all data available for firm characteristics and calculating discretionary accruals throughout the whole sample period, we obtain the final sample of 147 pilot stocks in balanced sample, which are part of the margin trading and short selling pilot program. In unbalanced panel, there are 278, 278, 741, and 916 available firms in 2011, 2012, 2013, and 2014, respectively.

We create an indicator variable *PILOT* to denote firms with pilot stocks (pilot firms). Specially, *PILOT* equals to one if a firm's stock is designated as a pilot stock under the margin trading and short-selling pilot program and zero otherwise. In the balanced sample, the treatment group is constituted by the pilot firms that participated in the program for all three years from 2011 to 2014; the control group consists of non-pilot firms that are not involved in this regulation for all years from 2011 to 2014. We also construct two variables to indicate time periods: *PRE* equals to one if a firm-year's fiscal end falls between January 1, 2006 and December 31, 2009 and zero otherwise; *DURING* equals to one if a firm-year's fiscal end falls between January 1, 2011 and December 31, 2014.

We use abnormal accruals to proxy for earnings management, defined as the difference between total accruals and the fitted normal accruals derived from a modified version of the Jones model (Jones 1991). Specifically, for each fiscal year and CSRC 11 industries (excluding utilities and financial firms in total CSRC 13 industries), we estimate the following cross-sectional model:

$$\frac{TA_{i,t+1}}{ASSET_{i,t}} = \beta_0 + \beta_1 \frac{1}{ASSET_{i,t}} + \beta_2 \frac{\Delta REV_{i,t+1}}{ASSET_{i,t}} + \beta_3 \frac{PPE_{i,t+1}}{ASSET_{i,t}} + \varepsilon_{i,t+1} \quad (1)$$

where *i* indexes firms and *t* indexes fiscal years. Total accruals $TA_{i,t+1}$ are estimated using the statement of cash flows approach and defined as net income (*NI*) minus operating cash flows

(CFO), $ASSET_{i,t}$ is the total assets at the end of fiscal year t , $\Delta REV_{i,t+1}$ is the change in sales revenue from fiscal year t to $t+1$, and $PPE_{i,t+1}$ is the gross value of property, plant and equipment at the end of fiscal year $t+1$. Next, we use the following model and the estimated coefficients from Equation (1) to compute the fitted normal accruals $NA_{i,t+1}$,

$$NA_{i,t+1} = \hat{\beta}_0 + \hat{\beta}_1 \frac{1}{ASSET_{i,t}} + \hat{\beta}_2 \frac{\Delta REV_{i,t+1} - \Delta AR_{i,t+1}}{ASSET_{i,t}} + \hat{\beta}_3 \frac{PPE_{i,t+1}}{ASSET_{i,t}} \quad (2)$$

Following prior studies, the change in accounts receivables is subtracted from the change in sales revenue as credit sales might also provide potential opportunity for accounting distortion. After obtaining the fitted normal accruals $NA_{i,t+1}$ from Equation (2), then we calculate firm-year discretionary accruals as $DA_{i,t+1} = TA_{i,t+1}/ASSET_{i,t} - NA_{i,t+1}$. Finally, our key variable of interest, industry-demeaned discretionary accruals $DA1$, is calculated as firm's discretionary accruals minus the average of the industry of the same fiscal year.³

In order to measure margin trading and short selling activities, we obtain the data of Renminbi(RMB) remaining balance of margin trading ($Margin_buy_1$), net purchases of margin trading ($Margin_buy_2$), RMB remaining balance of securities lending ($Short_sell_1$), net selling of securities lending ($Short_sell_2$) from Wind Financial Terminal (Wind). All four measures are standardized by the total market capitalization of the underlying stocks. Among these variables, $Margin_buy_1$ ($Short_sell_1$) implies the potential borrowing (lending) amount of the underlying stock at the year end. $Margin_buy_2$ ($Short_sell_2$) implies the realized borrowing (lending) amount of the underlying stock with one year. Data on return on assets (ROA), leverage (LEV), total market capitalization ($SIZE$), book-to-market ratio(BM), net income (NI), total assets ($ASSET$), operating cash flow (CFO), sales revenue (REV), gross property, plant and equipment (PPE), and account receivables (AR) at yearly level for A-shares are obtained from Chinese Securities Market and Accounting Research (CSMAR). Other control variables including R&D

³ Following Kothari, Leone and Wasley (2005), we construct another discretionary accrual measure to take into account the potential accounting distortion in credit sales in steps of the estimation procedure. The alternative discretionary accrual measure provides the similar results.

and capital expenditure, analyst coverage, institution ownership, turnover, illiquidity, and state-owned entity indicator are also obtained from CSMAR.

Appendix A provides the detailed descriptions of variables discussed above.

3.2 Methodology

The full sample requires a firm to have data available to calculate firm characteristics and discretionary accruals across the entire sample period used in empirical tests (i.e. 2006-2014). In the balanced sample, a firm is classified into the treatment group if its stock has margin trading activity during all four years from 2011 to 2014, while a firm is classified into the control group if its stock is not involved in margin trading activity at all during all four years from 2011 to 2014. In the unbalanced panel, the treatment group consists of firms participating in the program in each year from 2011 to 2014.

In order to examine the change of earnings management between treatment group and control group before and after the pilot program, we employ univariate difference-in-difference (DiD) test and multivariate DiD test. The full sample are divided into four groups: pilot stocks in *PRE* period, pilot stocks in *DURING* period, control stocks in *PRE* period, and control stocks in *DURING* period. Then we compare the difference in mean and median of discretionary accruals of treatment group and control group between the *PRE* period and *DURING* period. We apply pool regressions with fixed effect, and Fama-Macbeth regressions to test the separate effects of margin buying and short selling activities on firms' discretionary accruals in treatment groups of both balanced and unbalanced samples.⁴

3.3 Sample statistics

The final sample includes 147 firms in the treat group and 464 firms in the control group (balanced panel). Only the summary statistics of balanced sample are reported because firms participating in the margin trading and short selling program are different every year. For the

⁴ We provide the regression results of both balanced panel and unbalanced panel. The balanced panel shows relatively weak effect of margin trading and short selling on the firms' earnings management. The reason is that there are limited number of firms and amounts of trading in 2011 and 2012, and there are far more trading activities and firms participating in this program in 2013 and 2014. Table 1 shows the timeline of pilot program.

unbalanced panel, statistics of treatment and control groups in the *DURING* period can be reported, but not in the *PRE* period.

[Insert Table 3 Here]

Table 3 reports summary statistics of the industry adjusted firm discretionary accrual measure *DA* for the balanced panel sample of the treatment and control groups measured from 2006 to 2014. The average discretionary accrual of the treatment group is 0.004 in 2006, while this value drops to 0.002 in 2014. In the control group, the level of earnings management (discretionary accrual) are relatively lower than the treatment group in the whole sample period, where the average value of *DA* is 0.006 in 2006, and -0.013 in 2014. For the *PRE* period from 2006 to 2009, the average of *DA* of treatment, and control groups are 0.006, and 0.001, respectively, while both groups observe the decrease of *DA* in the *DURING* period with the mean value 0.003, and -0.010, respectively. As for the absolute change in value of discretionary accrual, there seems no significant difference between the two groups before and after the pilot program. Figure 1 draws the trend of the average firm discretionary accrual for the total sample from 2006 to 2014. Figure 2 shows the separate trends in discretionary accrual of treatment group and control group.⁵

[Insert Figure 1 and 2 Here]

Panel A of Table 4 reports the mean and median of margin trading and short selling measures in the treatment group of balanced panel, where the treatment group is designed by choosing all firms participating in the pilot program for all four years from 2011 to 2014. We observe that the amount of margin trading *Margin_buy_1*, measured by the average ratio of remaining balance to market capitalization, increases from 0.562% in 2011 to 5.432% in 2014. The average ratio of net purchases to market capitalization (*Margin_buy_2*) rises from 0.438% to

⁵ Our figure 1 and figure 2 show that the average firm discretionary accruals slightly decline from 2006 to 2014, which is different from other Chinese studies. For example, Xiao (2015) shows that earnings management increases after the Chinese government enforced the non-tradable share reform from 2007-2011. The main reason is that we consider the industry adjusted discretionary accruals for our main variable, but other studies do not deduct the industry effect.

3.013% in the same *DURING* period. There are far less short sales in the contemporaneous period, where the ratio of securities lending balance to market capitalization (*Short_sell_1*) is only 0.024%, on average, from 2011 to 2014. Panel B of Table 4 documents the mean and median of margin trading and short selling measures in the treatment group of unbalanced panel, where the treatment group consists of firms participating in the program in each year from 2010 to 2014. Since there are more firms involved in 2013 and 2014, we find the ratio of margin trading balance(*Margin_buy_1*) increases to 6.711% in 2014 and the ratio of short selling balance(*Short_sell_1*) decreases to 0.016% on average in the *DURING* period.

[Insert Table 4 Here]

As indicated above, margin trading is much more popular than short selling. Chang, et al (2014) suggest several reasons to understand this point, including the transaction cost, the limited supply short selling, the up-tick rule, and Chinese investors trading traditions. Similar pattern is observed in Figure 3 and 4, which draws the time trend of margin trading and short selling measures in unbalanced panel from 2010 to 2014.

[Insert Figure 3 and 4 Here]

3.4 Firm characteristics between treatment group and control group

In this subsection, we focus on the treatment group (147 stocks) in balanced panel. Due to the specific rules of selecting pilot stocks, the firms in the treatment group and control group display different characteristics.⁶ Table 5 reports summary statistics of firm characteristics for the balanced panel of the treatment and control groups. The variables include return on assets (*ROA*), leverage (*LEV*), book-to-market ratio (*BM*), and market capitalization (*SIZE*). As shown in Panel A of Table 5, we compare the pilot and non-pilot firms' characteristics in the fiscal year immediately before the announcement of the pilot program in 2009. We can see the pilot firms have significantly higher returns on assets, and larger size. The differences in book-to-market

⁶ Unlike the short selling pilot program ordered by the SEC during 2005-2007, Fang, et al.(2014) demonstrate that U.S pilot stocks are randomly chosen , and there are no significant difference in firm characteristics between treatment group and control group.

ratio and leverage ratio are not significant. Panel B of Table 5 displays the summary statistics of firm characteristics of treatment group and control group, and difference tests in mean and median from 2006 to 2009, i.e. four years before the pilot program. The results clearly indicate that these pilot firms are not randomly picked: they have higher profitability with 11.34% of *ROA* on average, while the stocks in control group only have 6.16% of *ROA*; they have lower book-to-market ratios and they are very large firms in the Chinese stock markets. Since the sample characteristics are significantly different from between treatment group and control group, we cannot compare the pilot firms with non-pilot firms using the *Size* and/or *BM* matching. Alternatively, we will control these characteristics in the regression analysis.

[Insert Table 5 Here]

4. The effect of margin trading and short selling on discretionary accruals

4.1. Univariate difference-in-differences tests

Table 6 reports the results of univariate difference-in-difference test in the level of discretionary accruals for the balanced panel of the treatment and control groups for the four-year periods before and during the pilot program. The mean values of *DA* during the four-year period before the pilot program (year 2006 to 2009) are 0.006 and 0.001 for the treatment and control group, respectively. The t-statistics of the difference in means is 1.07. During the four-year period of the pilot program (year 2011 to 2014), the mean values of *DA* decrease to 0.003 and -0.010 for treatment and control groups, respectively. The t-statistics of the difference in means is 3.48, and the Wilcoxon z-statistics for the difference in medians is 2.79, indicating that the level of earning management in the treatment group is significantly higher than the control group even though both groups have experienced the decline in *DA*. We highlight the difference in difference (DiD) of *DA* in the last row of Table 6. Comparing *PRE* and *DURING* period, the mean value of *DA* in the treatment group decreases 0.003 on average, while for the control group, the mean of *DA* declines 0.011. The t-statistics of testing difference in means is 1.32, and the Wilcoxon z-statistics of testing difference in medians is 0.83, indicating that the variations in discretionary accruals of two groups in *PRE* and *DURING* period are not significantly different. This result suggests that

margin trading and short selling may have the joint effect on firms' earnings management. Their separate effect may be offset by each other.

[Insert Table 6 Here]

4.2 Multivariate difference-in-differences tests

In this section, we extend the DiD test by using multivariate regressions. All firm-year observations for both pilot and non-pilot firms for the sample period (2006-2009, 2011-2014) are retained and we estimate the following model:

$$DA_{i,t} = \beta_0 + \beta_1 PILOT_i \times DURING_t + \beta_2 PILOT_i + \beta_3 DURING_t + Control_{i,t} + \varepsilon_{i,t} \quad (3)$$

The dependent variable is *DA*, the industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. *PILOT* is a dummy variable that equals to 1 if a firm's stock is designated as pilot stock in the pilot program. *DURING* is a dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2011 and December 31, 2014 and zero otherwise. The year 2010 is omitted from these tests because the program and the identity of the pilot and non-pilot stocks are announced midway through 2010. The regression results estimating Equation (3) without control variables of firm characteristics are reported in the first column of Table 7. In the second column, the results for regressions with firm characteristics controlled and year dummies are displayed. The coefficient for *DURING* is -0.008 with t-statistics -2.57 when firm characteristics are controlled, indicating the decrease in *DA* compared to the PRE period. In the second column, the coefficient estimate of *PILOT* is negative and significant at the 5% level, suggesting that the earnings management of pilot firms is lower than that of non-pilot firms after controlling for firm characteristics. More importantly, the coefficient of the interaction term $PILOT_i \times DURING_t$ is insignificant in the first column, and marginally significant in the second columns. This result is in line with the univariate DiD test in Section 4.1.

[Insert Table 7 Here]

4.3 The separate effect of margin trading and short selling on discretionary accruals

The results in the previous subsections show that the execution of the pilot program does not manifest significant effect on decreasing or increasing the difference in earnings manipulations between treatment and control groups. In this section, we investigate whether margin trading and short selling provide offsetting separate effects on firms' discretionary accruals. We start with the balanced panel. We conduct Fama-MacBeth regressions for the following models:⁷

$$DA_{i,t} = \beta_0 + \beta_1 \text{Margin_buy_}[1,2]_{i,t} + \beta_2 \text{Short_sell_}[1,2]_{i,t} + \beta_3 ROA_{i,t} + \beta_4 LEV_{i,t} + \beta_5 BM_{i,t} + \beta_6 SIZE_{i,t} + \varepsilon_{i,t} \quad (4)$$

In Table 8, Panel A displays the Pearson correlations of discretionary accruals, margin trading and short selling variables, and other control variables from 2011-2014. Since *Margin_buy_1*(*Short_sell_1*) and *Margin_buy_2*(*Short_sell_2*) share the high correlation of 0.835 (0.451), we will not include them in the same regression as explanatory variables. The Fama-MacBeth regressions results are reported in Panel B of Table 8. The coefficients of *Margin_buy_1* and *Margin_buy_2* are significant whenever they are included in the regressions, indicating that margin purchase activities have the positive effect on *DA* and increase the firms' level of earning manipulations. The short sales on firms' securities have the negative effect on *DA*, although the coefficients of short selling are not significant. In addition to Fama-MacBeth regressions, we also conduct pool regressions with fixed effect and the same control variables as robustness check in Panel C of Table 8. The results of pooling regressions are similar to the Fama-MacBeth regression in Panel B.

[Insert Table 8 Here]

Overall, we find the significantly positive coefficients of margin purchase measures in regressions, supporting our hypothesis 2. The sign of short selling is negative, suggesting the negative effect of short sales on earning management. However, the coefficients of short sales

⁷ For the reverse causality concern, we also consider the one-year ahead earnings management as the dependent variables, and the regression results are qualitatively similar. The results are available upon request.

are insignificant in regressions, providing weak support for our hypothesis 1. We propose one possible reason of insignificance is that there are limited amount of security short selling activities when we conduct the regressions in balanced panel containing only 147 firms in the treatment group. As discussed in table 4, we show that margin buying is much more popular than short selling in China. Chang, et al (2014) suggest several reasons to understand this point, including the transaction cost, the limited supply short selling, the up-tick rule, and Chinese investors trading traditions.

In August 2012, CSRC impose a notable policy change concerning refinancing practices. Margin traders not only can borrow from their registered security companies, but also they can borrow from other financial institutions such as banks, mutual funds, and insurance companies through a centralized refinancing company. Intuitively, the refinancing policy expands sources of securities to borrow, further relaxing short sale constraints and contributing to the soaring volume of margin trading. Under this circumstance, we re-examine the Fama-MacBeth and pool regressions in unbalanced panel because we have more pilot firms in the years 2013 and 2014.

After eliminating all firms that have missing data of discretionary accruals and firm characteristics, we obtain the unbalanced panel, consisting 278, 278, 741, and 916 available firms in 2011, 2012, 2013, and 2014, respectively. The results of regressions in unbalanced panel are reported in Table 9. Panel A of Table 9 displays the Pearson correlations of selected variables from 2011-2014 in the unbalanced panel. In Panel B and C, we display regression estimates with all four control variables included in column (1)-(6). In Panel B, we obtain the same results as in the balanced panel: margin buying imposes the significantly positive effects on discretionary accruals. The coefficients of short selling become significantly negative, which is in line with our hypothesis 1 - short selling can discipline the earnings management. In the pooling regression with fixed effects of Panel C, we observe the significantly positive effect of margin trading and significantly negative effect of short selling on earnings management. For example, in column (6) of Panel C, the coefficient of *Margin_buy_2* is 0.002 with t-statistic 2.61, and the coefficient of *Short_sell_2* is -0.477 with t-statistic -3.82. The small difference in firms' discretionary accruals between the treatment group and the control group over time actually provides some evidence

that margin buying and security short sales on average have offsetting impacts on earnings management.

[Insert Table 9 Here]

5. Additional discussion

In the previous section, using a quasi-experimental design, we find that short selling have provided an external governance mechanism to discipline management; however, margin trading could have provided incentives for accounting manipulation. Although the results are favorable to our two hypotheses, we try to relive the concern of endogeneity from several robustness tests in this section.

5.1 Alternative proxies for short-selling potential

In this study, we find a significantly positive (negative) relationship between margin trading (short selling) and earnings manipulation. The insignificant results in DiD tests suggest that the incentive effect of margin trading may offset the disciplinary effect of short selling. Given the trading mechanism in the Chinese stock markets that only pilot stocks allow margin trading and short selling simultaneously, we have to admit that our results are jointly affect by both margin trading and short selling. Since we do not have the individual investor trading accounts, we are not sure whether margin traders and short sellers are the same investors or two types of investors in the Chinese market. Therefore, it is extremely difficult to fully disentangle the effect of margin trading from the effect of short selling on earnings management. For our best interest, we control other proxies for the short-selling potential, and examine whether the incentive effect of margin trading still holds.

Previous researchers argue that the cost of short selling is negatively related to a firm's level of institutional ownership because it is relatively easy to borrow shares from institutional owners to establish short positions (e.g., Chen, Hong and Stein 2002; Nagel 2005; Asquith, Pathak and Ritter 2005; Hirshleifer, Teoh and Yu 2011). Short selling in firms with low levels of institutional ownership, in contrast, can be difficult simply because of a scarcity of shares to borrow. Consistent with this argument, institutional ownership is positively related to short

selling in empirical tests (e.g., Karpoff and Lou, 2010). In addition, Edwards and Hanley (2010) find a high degree of correlation between short selling and trading volume. Chordia, Roll and Subrahmanyam (2008) indicate that liquidity stimulates arbitrage activity, which enhances the market efficiency. Hong, Lim and Stein (2000) show that stocks with lower analyst coverage are associated with more slowly information dissemination. Therefore, we employ institutional ownership, turnover ratio, illiquidity, and analyst coverage as proxies for short-selling potential. Specifically, we construct institutional ownership as the total shareholding percentage owned by institutions in firms' annual reports, annual turnover as the cumulative turnover rate with one year, the annual illiquidity measure following Amihud (2002), and analyst coverage as the number of EPS forecasting agencies in firms' annual reports.

The robustness test begins by estimating Eq (4), controlling alternative proxies for short-selling potential, and results are reported in Table 10. In Panel A of Table 10, we investigate whether the effect of margin trading and short selling on pilot firms' discretionary accruals is related to the level of institutional ownership in the firm. For both balanced panel and unbalanced panel, the positive effect of margin trading and negative effect of short selling still remain significant, when institutional ownership are controlled. For the remaining three panels of Table 10, the offsetting effect of margin trading and short selling still remains, when turnover, illiquidity, and analyst coverage are included separately.

5.2 Controlling for Investment

Grullon, et al (2014) show that financially constrained pilot firms significantly reduced their investment during the Regulation SHO's pilot program. So it is possible that the pilot firms' tendency to decrease their earnings management during the pilot program reflects changes in the difference between the pilot and non-pilot firms' investment and/or equity issuance around the pilot program. This concern is particularly pertinent when discretionary accruals are used to measure earnings management, because prior research shows that a firm's accruals correlate with its growth (e.g., Fairfield, Whisenant and Yohn 2003; Zhang 2007; Wu, Zhang and Zhang 2010) and its incentives to issue equity (e.g., Teoh, Welch, and Wong, 1998a, 1998b).

We investigate this concern by controlling investment in our regression analysis. Following the methodology in Fang, et al (2014), this robustness test begins by estimating Eq (4), controlling for R&D expenditures (R&D) and capital expenditures (CAPEX), both scaled by lagged total assets. R&D is selling expenses and management fee at the end of year t scaled by total assets by the end of year t-1. CAPEX is cash paid to purchase and construct fixed assets, intangible assets and other long-term assets scaled by total asset by the end of year t-1. INVESTMENT is the sum of R&D and CAPEX. In Column (1) and (3), we include R&D and CAPEX separately in Panel A of Table 11, and the sum of R&D and CAPEX, denoted as INVESTMENT in Panel B of Table 11. The coefficients on the estimators of *Margin_buy_1* and *Margin_buy_2* are still significantly positive, barely affected by the inclusion of these controls. The coefficients on R&D, CAPEX and INVESTMENT are insignificant. Margin trading and short selling still show offsetting effects on earnings management, to some extent.

5.3 Controlling for managers sensitivity to earnings manipulation

One motivation for managers to manipulate earnings is to increase their personal benefits such as wealth, reputation, and tenure. In other words, managers may have different incentives to manipulate earnings through discretionary accruals. To examine this conjecture in this subsection, we partition the sample of pilot and non-pilot firms into two subsamples based on this unique Chinese firm clarification, state-owned entities vs. non-state-owned entities. We define state-owned entities include central entities, local country-owned entities, universities and working unions, and non-state-owned entities are those of which controllers are private enterprises, collective enterprises or foreign corporations. The results re-estimating Eq. (4) using the two subsamples are reported in Table 12. For balanced panel in Panel A and unbalanced panel in Panel B, the positive coefficients of margin trading and negative coefficients of short selling remain significant for most specifications, suggesting that our results are robust managers sensitivity to earnings manipulation.

6. Conclusion

Short selling and margin trading play an important role in capital markets for a variety of reasons: facilitating price discovery (by integrating more information into securities prices), mitigating bubble formation, increasing market liquidity, and providing hedging benefits. The recent studies on the disciplinary role of short selling and its effect on opportunistic managerial behavior including accounting manipulation and fraud are interesting; however the results can be confounded by the fact that the participation of investors and speculators in short selling and the firm characteristics such as financial performance and corporate governance are endogenous in nature. Therefore, we need to identify an exogenous event or a “shock” that caused sharp differential changes in short selling across firms within a narrow time frame to estimate the causal effect. In addition, given its hedge demanding nature and the borrowing and leverage that it accompanies, the effect of short selling should be studied along with the effect of margin trading.

In this paper, we identify the exogenous policy shock using the recent removal of short selling and margin trading bans on selected stocks in China. This unanticipated event enables us to study the causal effect of short selling and margin trading on the quality of firms’ financial reporting. Using a quasi-experimental design we find that short selling provided an external governance mechanism to discipline management; however, margin trading could have provided incentives for accounting manipulation. Collectively, the incentive effect of margin trading offset the disciplinary effect of short selling. The positive (negative) effect of margin trading (short selling) on earnings management remains significant after conducting several robustness tests.

Indeed, although the regulatory change that relaxes the restriction of margin trading and short selling did not boost or decrease the earnings management of the pilot program securities, our evidence suggests that the disciplining effects of short selling were likely offset by the effects of margin buying. From a public policy perspective, it is up to the regulators to make a value judgment based on the evidence presented in the current research whether to include more firms and investors to participate in margin trading and short selling. At least the year 2012 CSRC refinancing practice is on the right track.

When interpreting the evidence presented in this paper, however, it is important to bear in

mind that our results could be a country specific phenomenon because of unique historical, cultural, and behavioral factors associated with the stock market in China. Given the fact that China is the fastest growing economy in the world and its stock market is heavily regulated by CSRC (China Securities Regulatory Commission), it is not difficult to imagine that the regulatory agency may have hand-picked the firms with best financial performance and corporate governance for the deregulation pilot program in 2010. Nevertheless, we believe the contribution of this paper to be complementary to present work that mainly studies the cross-sectional correlations.

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Appendix A – Variable Definition

Variable Name	Definition
Dependent Variables	
DA	<p>Industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. We use the CSRC industry classification and exclude utilities and financial firms. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). The modified Jones model is specified as $\frac{TA_{i,t+1}}{ASSET_{i,t}} = \beta_0 + \beta_1 \frac{1}{ASSET_{i,t}} + \beta_2 \frac{\Delta REV_{i,t+1}}{ASSET_{i,t}} + \beta_3 \frac{PPE_{i,t+1}}{ASSET_{i,t}} + \varepsilon_{i,t+1}$. The total accruals $TA_{i,t+1}$ are defined as net income (NI) minus operating cash flow (CFO). $ASSET_{i,t}$ is the total assets at the end of fiscal year t. $\Delta REV_{i,t+1}$ is the change in the total sales revenue from the preceding fiscal year. $PPE_{i,t+1}$ is the gross property, plant and equipment. The fitted normal accruals are calculated as $NA_{i,t+1} = \hat{\beta}_0 + \hat{\beta}_1 \frac{1}{ASSET_{i,t}} + \hat{\beta}_2 \frac{\Delta REV_{i,t+1} - \Delta AR_{i,t+1}}{ASSET_{i,t}} + \hat{\beta}_3 \frac{PPE_{i,t+1}}{ASSET_{i,t}}$ with the change in accounts receivables subtracted from the change in sales revenue. Firm-year specific discretionary accruals are calculated as $DA_{i,t+1} = \frac{TA_{i,t+1}}{ASSET_{i,t}} - NA_{i,t+1}$.</p>
Experiment-related Variables	
PILOT	A dummy variable that equals to 1 if a firm's stock is designated as pilot stock in the margin trading program.
PRE	A dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2006 and December 31, 2009 and zero otherwise.
DURING	A dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2011 and December 31, 2014 and zero otherwise.
Margin_buy_1	The total remaining balance of a firm's margin buying at the end of fiscal year t, standardized by total market capitalization in percentage.
Margin_buy_2	The net RMB value change in percentage of a firm's margin buying at the end of fiscal year t, $Margin_buy_2(t) = Margin_buy_1(t) - Margin_buy_1(t-1)$;
Short_sell_1	The total remaining balance of a firm's short selling at the end of fiscal year t, standardized by total market capitalization in percentage.
Short_sell_2	The net RMB value change in percentage of a firm's short selling at the end of fiscal year t, $Margin_sell_2(t) = Short_sell_1(t) - Short_sell_1(t-1)$;
Firm Characteristics	
ASSET	Book value of total assets
BM	Book value of total assets scaled by market capitalization in fiscal year end
ROA	Return-on-assets ratio in percentage
LEV	Total debt scaled by total assets of the previous fiscal year end in percentage
SIZE	Firm's market capitalization (in million RMB) of the previous fiscal year end. In regressions, the independent variable is the natural logarithm of SIZE.
NI	Net income, from income statement
CFO	Operating cash flow of the previous fiscal year end, from cash flow statement

REV	Total sales revenue, from income statement
AR	Total account receivables
Δ PPE	Cash paid to purchase and construct fixed assets, intangible assets and other long-term assets, from cash flow statement
R&D	Selling expenses and management fee at the end of year t scaled by total assets by the end of year t-1
CAPEX	Cash paid to purchase and construct fixed assets, intangible assets and other long-term assets scaled by total asset by the end of year t-1
INVESTMENT	Sum of R&D and CAPEX
Analyst Coverage	The number of EPS forecasting agencies in firms' annual reports
Institutional Ownership	Total shareholding percentage owned by institutions in firms' annual reports
Turnover	Σ [trading volume per trading day / shares outstanding]*100% in year t
	Amihud illiquidity measure for stock i in year t is
Amihud illiquidity	$\ln(\text{Amihud}_{i,t}) = \ln\left(\frac{1}{N_{i,t}} \sum_{d=1}^{N_{i,t}} \frac{ R_{id} }{Vol_{id}} \times 10^9\right)$, where R_{id} is the return of stock i on day d in year t, Vol_{id} is the respective volume in Chinese Yuan, and $N_{i,t}$ is the number of trading days of stock i in year t. The arbitrary scaling by 10^9 simply generates a convenient magnitude of illiquidity measure.
Dummy for SOE	SOE stands for state-owned entities, of which the controllers include central entities, local country-owned entities, universities and working unions. Non-state-owned entities are those of which controllers are private enterprises, collective enterprises or foreign corporations. Dummy for SOE for firm i equals to 1 if firm i is state-owned, otherwise it equals to 0.

Table 1: The timeline of CSRC pilot program

(Source: <http://www.sse.com.cn/disclosure/magin/> and <http://www.szse.cn/main/disclosure/rzrqxx/ywgg/>)

The table summarizes changes in the qualification list from the initial implementation of pilot program (February 12, 2010) to the latest major revision (September 22, 2014) in China. Effective date refers to the date on which a designated stock can perform margin trading and/or short selling. Announcement date refers to the date on which China Securities Regulatory Commission (CSRC) announces a change in the list of qualified stocks. We do not count ETF in the revisions table.

Effective day	Announcement day	firms added	firms deleted	firms on list
2010/3/31	2010/2/12	90	0	90
<i>between 2010/03 and 2011/11</i>		6	6	90
2011/12/5	2011/11/25	189	1	278
2013/1/31	2013/1/25	222	0	500
<i>between 2013/01 and 2013/09</i>		0	6	494
2013/9/16	2013/9/6	206	0	700
<i>between 2013/09 and 2014/09</i>		0	5	695
2014/9/22	2014/9/12	205	0	900

Table 2: CSRC regulates the requirements for qualified stocks and investors

Panel A: Margin trading and short selling requirements for qualified stocks

(Source: <http://www.sse.com.cn/aboutus/innovation/margin/>)

CSRC regulation specifies the requirements for qualified stocks in the pilot program:
1. Qualified stocks have been traded on an exchange for more than three months.
2. To be eligible for margin trading, qualified stocks should have more than 100 million tradable shares outstanding (or more than 500 million RMB market value); To be eligible for short-selling, qualified stocks should have more than 200 tradable million shares outstanding (or more than 800 million RMB market value).
3. Qualified stocks should have no less than 4000 individual shareholders
4. In any given day during the past three months, the average daily turnover should be no lower than 15% of market index turnover (or the average daily trading value should be no lower than 50 million RMB), and the average daily return should not deviate more than 4% from the market return, and the return volatility should not reach 5 times of the market index volatility.
5. Qualified stocks have completed non-tradable shares reform, so that all shares are tradable.
6. Qualified stocks are not investigated currently by CSRC, i.e., the firm is not under a merger, buyout, reorganization, or investigation of possible illegal activities.

Panel B: Margin trading and short selling requirements for qualified investors

(Source: <http://etrade.cs.ecitic.com/webtrade/rzrq/rzrqNew/tips.jsp>)

Citic Securities specifies the requirements for qualified investors who can buy stocks on margin or short sell stocks.
1. Qualified investor should have a trading history longer than 18 months with security company (reduced to 6 months after December 2011), with capital of no less than RMB 500,000.
2. Qualified investor should demonstrate the basic investment knowledge by passing a professional knowledge exam and a risk aversion test.
3. Qualified investors should have a good trading record, low bankruptcy risk, and not being a corporate insider, etc.

Table 3: Discretionary Accruals of Treatment Group and Control Group in 2006-2014

This table reports summary statistics of the industry adjusted firm discretionary accrual measure for the balanced panel of the treatment and control groups from 2006 to 2014. Discretionary accrual measure DA is calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). All variables are winsorized at 1% and 99% levels. The treatment group is designed by choosing all firms participating in the program for all three years from 2011 to 2014, while the control group is constructed with all firms not participating in the program at all from 2011 to 2014.

Variable of interest	Treatment Group (PILOT=1)			Control Group (PILOT=0)		
	N	Mean	Median	N	Mean	Median
DA						
2006	147	0.004	0.002	464	0.006	0.004
2007	147	0.014	0.009	464	-0.002	-0.006
2008	147	0.012	0.009	464	-0.006	-0.001
2009	147	-0.005	-0.004	464	0.005	0.007
2010	147	0.005	-0.012	464	-0.021	-0.027
2011	147	0.003	-0.010	464	-0.020	-0.018
2012	147	-0.004	-0.008	464	-0.008	-0.007
2013	147	0.014	0.015	464	0.000	0.005
2014	147	0.002	-0.004	464	-0.013	-0.012
PRE(2006-2009)	588	0.006	0.005	1856	0.001	0.000
DURING(2011-2014)	588	0.003	-0.002	1856	-0.010	-0.008

Table 4: Margin Trading and short selling during the Pilot Program

This table reports summary statistics of the firm margin trading and short selling activities for the balanced and unbalanced panels of the treatment group from 2011 to 2014. *Margin_Buy_1* is the total remaining balance of a firm's margin buying at the end of fiscal year *t*, standardized by total market capitalization; *Margin_Buy_2* is the net RMB value change of a firm's margin buying at the end of fiscal year *t*, $\text{Margin_buy_2}(t) = \text{Margin_buy_1}(t) - \text{Margin_buy_1}(t-1)$; *Short_Sell_1* is the total remaining balance of a firm's short selling at the end of fiscal year *t*, standardized by total market capitalization; *Short_Sell_2* is the net RMB value change of a firm's short selling at the end of fiscal year *t*, $\text{Short_sell_2}(t) = \text{Short_sell_1}(t) - \text{Short_sell_1}(t-1)$. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). All variables are winsorized at 1% and 99% levels.

Panel A displays the mean and median of the margin trading and short selling measures in the treatment group of balanced panel, where the treatment group is designed by choosing all firms participating in the pilot program for all three years from 2011 to 2014 out of the total sample.

Panel B displays the mean and median of the margin trading measures in the treatment group of unbalanced panel, where the treatment group consists of firms participating in the pilot program in each year from 2010 to 2014.

Panel A. Summary Statistics of Trading Activities in 2011-2014 (Balanced Panel)

Variable of interest	Treatment Group (PILOT=1)		
	N	Mean	Median
<i>Margin_Buy_1</i>			
2011	147	0.562	0.201
2012	147	1.841	1.479
2013	147	3.379	2.597
2014	147	5.432	4.782
DURING(2011-2014)	588	2.804	1.921
<i>Margin_Buy_2</i>			
2011	147	0.438	0.187
2012	147	1.292	0.967
2013	147	1.537	1.099
2014	147	3.013	2.598
DURING(2011-2014)	588	1.570	0.940
<i>Margin_Sell_1</i>			
2011	147	0.010	0.006
2012	147	0.032	0.028
2013	147	0.026	0.019
2014	147	0.028	0.022
DURING(2011-2014)	588	0.024	0.018
<i>Margin_Sell_2</i>			
2011	147	0.011	0.007
2012	147	0.022	0.018
2013	147	-0.005	-0.001
2014	147	0.001	0.002
DURING(2011-2014)	588	0.007	0.006

Panel B. Summary Statistics of Trading Activities in 2010-2013(Unbalanced Panel)

Variable of interest	Treatment Group (PILOT=1)		
	N	Mean	Median
<i>Margin_Buy_1</i>			
2010	95	0.472	0.412
2011	278	0.519	0.221
2012	278	1.714	1.311
2013	741	4.042	3.333
2014	916	6.711	6.110
DURING(2011-2014)	2213	4.412	3.401
<i>Margin_Buy_2</i>			
2010	95	0.472	0.412
2011	278	0.389	0.186
2012	278	1.225	0.885
2013	741	3.435	2.794
2014	916	4.428	3.913
DURING(2011-2014)	2213	3.186	2.365
<i>Margin_Sell_1</i>			
2010	95	0.000	0.000
2011	278	0.009	0.005
2012	278	0.033	0.026
2013	741	0.015	0.008
2014	916	0.014	0.007
DURING(2011-2014)	2213	0.016	0.008
<i>Margin_Sell_2</i>			
2010	95	0.000	0.000
2011	278	0.010	0.005
2012	278	0.023	0.018
2013	741	0.003	0.003
2014	916	0.002	0.002
DURING(2011-2014)	2213	0.006	0.003

Table 5. Firm Characteristics of Treatment Group and Control Group (Balanced Panel)

This table reports summary statistics of firm characteristics for the balanced panel of the treatment and control groups in 2009 (Panel A) and in 2006-2009 (Panel B). The treatment group is designed by choosing all firms participating in the program for all four years from 2011 to 2014 out of the total sample. ROA is Return-on-assets ratio in percentage; LEV is total debt scaled by total assets of the previous fiscal year end in percentage; BM is book value of total assets scaled by market capitalization in fiscal year end; SIZE is firm's market capitalization in millions of RMB of the previous fiscal year end. We use Wilcoxon Rank Test to test for the difference in median and report Wilcoxon z-statistics. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). All variables are winsorized at 1% and 99% levels. ***, **, * indicated significance at the 1%, 5% and 10% levels using two-tailed tests.

Panel A shows the summary statistics of firm characteristics of treatment group and control group, and difference tests in mean and median in 2009, the year immediately before the margin trading program.

Panel B displays the summary statistics of firm characteristics of treatment group and control group, and difference tests in mean and median from 2006 to 2009.

Panel A. Firm Characteristics of Treatment Group and Control Group in 2009

Variable	Treatment Group (PILOT=1)			Control Group (PILOT=0)			Test for differences	
	N	Mean	Median	N	Mean	Median	t-stat	Wilcoxon z-stat
ROA%	147	10.60	8.95	464	5.52	4.91	7.32***	6.80***
LEV%	147	50.45	51.52	464	49.18	50.29	0.77	0.42
BM	147	0.50	0.49	464	0.52	0.50	-1.19	-1.66*
SIZE	147	12476.94	9836.66	464	2383.51	1964.31	14.15***	17.00***

Panel B. Firm Characteristics of Treatment Group and Control Group from 2006 to 2009

Variable	Treatment Group (PILOT=1)			Control Group (PILOT=0)			Test for differences	
	N	Mean	Median	N	Mean	Median	t-stat	Wilcoxon z-stat
ROA%	588	11.34	9.36	1856	6.16	5.55	14.82***	15.09***
LEV%	588	49.57	50.38	1856	48.66	50.21	1.13	0.27
BM	588	0.53	0.50	1856	0.61	0.58	-6.84***	-7.70***
SIZE	588	10736.81	7143.57	1856	2091.74	1446.21	20.16***	29.89***

Table 6. Difference Tests of Discretionary Accruals before and during the Pilot Program

This table reports summary statistics of the level of discretionary accruals for the balanced panel sample of the treatment and control groups for the four-year periods before and during the margin trading program, and the difference in the mean and median. A firm is classified into the treatment group if its stock has margin trading activity during all four years from 2011 to 2014, while a firm is classified into the control group if its stock is not involved in margin trading activity at all during all four years from 2011 to 2014. *DA* is the industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). *PRE* is a dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2006 and December 31, 2009 and zero otherwise. *DURING* is a dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2011 and December 31, 2014 and zero otherwise. We use Wilcoxon Rank Test to test for the difference in median and report Wilcoxon z-statistics. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). ***, ** and * indicated significance at the 1%, 5% and 10% levels using two-tailed tests.

Variable of interest	Treatment Group (PILOT=1)			Control Group (PILOT=0)			Test for differences	
	N	Mean	Median	N	Mean	Median	t-stat	Wilcoxon z-stat
<i>DA</i>								
PRE(2007-2009)	588	0.006	0.005	1856	0.001	0.000	1.07	0.18
DURING(2011-2013)	588	0.003	-0.002	1856	-0.010	-0.008	3.48***	2.79***
DURING-PRE	588	-0.003	0.000	1856	-0.011	-0.007	1.32	0.83

Table 7. Multivariate Difference-in-difference Tests

This table reports the results of multivariate difference-in-difference tests. A firm is classified into the treatment group if its stock has margin trading activity during all four years from 2011 to 2014, while a firm is classified into the control group if its stock is not involved in margin trading activity at all during all four years from 2011 to 2014. *DA* is the industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). *PRE* is a dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2006 and December 31, 2009 and zero otherwise. *DURING* is a dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2011 and December 31, 2014 and zero otherwise. *ROA* is Return-on-assets ratio; *LEV* is total debt scaled by total assets of the previous fiscal year end; *BM* is book value of total assets scaled by market capitalization; *SIZE* is firm's market capitalization in millions of RMB of the previous fiscal year end. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). All variables are winsorized at 1% and 99% levels. ***, ** and * indicated significance at the 1%, 5% and 10% levels using two-tailed tests.

Panel A displays the Pearson correlations of the four control variables from 2006-2014 (Excluding year 2010). The correlation coefficients are marked bold if they are significant at the 10% level.

Panel B reports the regression results that estimate difference in pilot and non-pilot firms' discretionary accruals for the period before and during the program, using the balanced panel.

We estimate the model:

$$DA_{i,t} = \beta_0 + \beta_1 PILOT_i \times DURING_t + \beta_2 PILOT_i + \beta_3 DURING_t + \beta_4 Controls + \varepsilon_{i,t}.$$

Standard errors are clustered at the year and firm levels in all specifications. Coefficient estimates with significance are shown in bold and their t-statistics are displayed in parentheses.

Panel A. Correlation Matrix of Control Variables

	ROA	LEV	BM	SIZE
ROA	1.000			
LEV	-0.283	1.000		
BM	-0.226	0.236	1.000	
SIZE	0.339	0.005	-0.230	1.000

Panel B. Multivariate Difference-in-difference Tests

Dependent Variable	(1)	(2)
	DA	DA
PILOT*DURING	0.008	0.011*
t-stat	(1.36)	(1.79)
PILOT	0.005	-0.011**
t-stat	(1.24)	(-2.24)
DURING	-0.011***	-0.008***
t-stat	(-3.69)	(-2.57)
ROA		0.003***
t-stat		(12.91)
LEV		0.000*
t-stat		(-1.84)
BM		0.024***
t-stat		(4.47)
SIZE		0.002
t-stat		(1.22)
R square	0.004	0.046

Table 8. The Effects of Margin Trading and Short Selling on Discretionary Accruals (Balanced Panel)

This table reports the results of Fama-MacBeth regressions and pooling regressions, using data of the treatment group. A firm is classified into the treatment group if its stock has margin trading activity during all four years from 2011 to 2014. *DA1* is the industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). *ROA* is Return-on-assets ratio; *LEV* is total debt scaled by total assets of the previous fiscal year end; *BM* is book value of total assets scaled by market capitalization in fiscal year end; *SIZE* is firm's market capitalization in millions of RMB of the previous fiscal year end. *Margin_Buy_1* is the total remaining balance of a firm's margin buying at the end of fiscal year *t*, standardized by total market capitalization; *Margin_Buy_2* is the net RMB value change of a firm's margin buying at the end of fiscal year *t*, $Margin_buy_2(t) = Margin_buy_1(t) - Margin_buy_1(t-1)$; *Short_Sell_1* is the total remaining balance of a firm's short selling at the end of fiscal year *t*, standardized by total market capitalization; *Short_Sell_2* is the net RMB value change of a firm's short selling at the end of fiscal year *t*, $Margin_sell_2(t) = Margin_sell_1(t) - Margin_sell_1(t-1)$. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2011-2014). All variables are winsorized at 1% and 99% levels. Standard errors are clustered at the year and firm levels in all specifications. Coefficient estimates with significance are shown in bold and their t-statistics are displayed in parentheses. ***, ** and * indicated significance at the 1%, 5% and 10% levels using two-tailed tests.

Panel A displays the Pearson correlations of selected variables from 2011-2014. The correlation coefficients are marked bold if they are significant at the 10% level.

Panel B and C study the effects of margin trading and short selling on firm discretionary accruals using Fama-Macbeth regressions and pooling regressions with fixed effect. We test the effect of margin buying by estimating the following model:

$$DA_{i,t} = \beta_0 + \beta_1 Margin_buy_1[1,2]_{i,t} + \beta_2 Short_sell_1[1,2]_{i,t} + \beta_3 ROA_{i,t} + \beta_4 LEV_{i,t} + \beta_5 BM_{i,t} + \beta_6 SIZE_{i,t} + \varepsilon_{i,t}$$

Panel A. Correlation Matrix of Control Variables

	ROA%	LEV%	BM%	SIZE	Margin_buy_1	Short_sell_1	Margin_buy_2	Short_sell_2
ROA%	1.000							
LEV%	-0.509	1.000						
BM%	-0.385	0.452	1.000					
SIZE	0.213	0.007	-0.283	1.000				
Margin_buy_1	-0.167	-0.038	-0.265	0.191	1.000			
Short_sell_1	0.118	-0.070	-0.212	0.335	0.179	1.000		
Margin_buy_2	-0.104	-0.039	-0.266	0.149	0.835	0.114	1.000	
Short_sell_2	0.101	-0.046	-0.077	0.032	-0.215	0.451	-0.111	1.000

Panel B. Fama-MacBeth Regression

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.005*** (2.69)		0.007** (2.54)			
Short_sell_1		-0.472 (-1.61)	-0.591* (-1.68)			
Margin_buy_2				0.008*** (3.50)		0.010** (2.43)
Short_sell_2					-0.252 (-0.84)	-0.355 (-0.90)
ROA	0.010 (0.08)	0.004 (0.04)	0.011 (0.08)	0.001 (0.01)	0.000 (0.00)	-0.007 (-0.06)
LEV	-0.005 (-0.16)	-0.002 (-0.07)	0.002 (0.06)	-0.008 (-0.28)	-0.004 (-0.14)	-0.003 (-0.10)
BM	0.009 (0.49)	-0.003 (-0.15)	-0.002 (-0.07)	0.012 (0.63)	0.000 (-0.02)	0.003 (0.13)
SIZE	-0.001 (-0.19)	0.001 (0.30)	0.003 (0.75)	0.000 (0.02)	-0.001 (-0.31)	0.003 (0.71)

Panel C. Pool Regression with fixed effect

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.003** (2.30)		0.003** (2.37)			
Short_sell_1		-0.073 (-0.48)	-0.117 (-0.77)			
Margin_buy_2				0.005*** (3.19)		0.005*** (3.19)
Short_sell_2					-0.120 (-0.77)	-0.118 (-0.76)
ROA	0.053 (0.89)	0.044 (0.73)	0.054 (0.89)	0.049 (0.81)	0.042 (0.70)	0.047 (0.78)
LEV	-0.015 (-0.74)	-0.015 (-0.76)	-0.014 (-0.73)	-0.016 (-0.84)	-0.015 (-0.78)	-0.017 (-0.85)
BM	0.024 (1.63)	0.017 (1.16)	0.022 (1.48)	0.026* (1.79)	0.018 (1.19)	0.025* (1.71)
SIZE	-0.002 (-0.40)	-0.003 (-0.54)	-0.001 (-0.11)	-0.001 (-0.32)	-0.003 (-0.62)	-0.001 (-0.21)
R square	0.013	0.006	0.014	0.019	0.006	0.020

Table 9. The Effects of Margin Trading and Short Selling on Discretionary Accruals (Unbalanced Panel)

This table reports the results of Fama-MacBeth regressions and pooling regressions, using data of the treatment group in unbalanced panel. A firm is classified into the treatment group of the year if its stock has margin trading activity during the year. *DAI* is the industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). *ROA* is Return-on-assets ratio; *LEV* is total debt scaled by total assets of the previous fiscal year end; *BM* is book value of total assets scaled by market capitalization in fiscal year end; *SIZE* is firm's market capitalization in millions of RMB of the previous fiscal year end. *Margin_Buy_1* is the total remaining balance of a firm's margin buying at the end of fiscal year *t*, standardized by total market capitalization; *Margin_Buy_2* is the net RMB value change of a firm's margin buying at the end of fiscal year *t*, $Margin_buy_2(t) = Margin_buy_1(t) - Margin_buy_1(t-1)$; *Short_Sell_1* is the total remaining balance of a firm's short selling at the end of fiscal year *t*, standardized by total market capitalization; *Short_Sell_2* is the net RMB value change of a firm's short selling at the end of fiscal year *t*, $Margin_sell_2(t) = Margin_sell_1(t) - Margin_sell_1(t-1)$. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2011-2014). All variables are winsorized at 1% and 99% levels. Standard errors are clustered at the year and firm levels in all specifications. Coefficient estimates with significance are shown in bold and their t-statistics are displayed in parentheses. ***, ** and * indicated significance at the 1%, 5% and 10% levels using two-tailed tests.

Panel A displays the Pearson correlations of selected variables from 2011-2014. The correlation coefficients are marked bold if they are significant at the 10% level.

Panel B and C study the effects of margin trading and short selling on firm discretionary accruals using Fama-Macbeth regressions and pooling regressions with fixed effect. We test the effect of margin buying by estimating the following model:

$$DA_{i,t} = \beta_0 + \beta_1 Margin_buy_1 + \beta_2 Short_sell_1 + \beta_3 ROA_{i,t} + \beta_4 LEV_{i,t} + \beta_5 BM_{i,t} + \beta_6 SIZE_{i,t} + \varepsilon_{i,t}$$

Panel A. Correlation Matrix of Control Variables

	ROA%	LEV%	BM%	SIZE	Margin_buy_1	Short_sell_1	Margin_buy_2	Short_sell_2
ROA%	1.000							
LEV%	-0.421	1.000						
BM%	-0.254	0.405	1.000					
SIZE	0.242	0.010	-0.171	1.000				
Margin_buy_1	-0.184	-0.158	-0.364	-0.063	1.000			
Short_sell_1	0.108	0.060	0.064	0.308	-0.092	1.000		
Margin_buy_2	-0.140	-0.165	-0.322	-0.157	0.852	-0.172	1.000	
Short_sell_2	0.071	0.006	0.054	-0.008	-0.164	0.499	-0.076	1.000

Panel B. Fama-MacBeth Regression

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.005** (2.10)		0.006** (2.28)			
Short_sell_1		-0.483 (-1.44)	-0.579 (-1.54)			
Margin_buy_2				0.006** (2.39)		0.009** (2.11)
Short_sell_2					-0.575* (-1.93)	-0.683* (-1.97)
ROA	0.052 (0.33)	0.047 (0.30)	0.056 (0.35)	0.041 (0.27)	0.045 (0.29)	0.043 (0.28)
LEV	-0.003 (-0.38)	-0.001 (-0.07)	0.004 (0.27)	-0.005 (-0.50)	-0.002 (-0.11)	0.001 (0.08)
BM	0.014 (0.73)	0.006 (0.33)	0.006 (0.28)	0.015 (0.76)	0.005 (0.25)	0.006 (0.25)
SIZE	-0.003 (-1.35)	-0.002 (-1.03)	0.000 (-0.24)	-0.002 (-0.64)	-0.003** (-2.32)	0.000 (-0.12)

Panel C. Pool Regression with fixed effect

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.001 (1.20)		0.001 (1.40)			
Short_sell_1		-0.184 (-1.59)	-0.203* (-1.75)			
Margin_buy_2				0.002** (2.28)		0.002*** (2.61)
Short_sell_2					-0.448*** (-3.60)	-0.477*** (-3.82)
ROA	0.030 (0.80)	0.024 (0.66)	0.031 (0.84)	0.032 (0.86)	0.024 (0.65)	0.033 (0.90)
LEV	-0.008 (-0.73)	-0.009 (-0.81)	-0.007 (-0.62)	-0.007 (-0.66)	-0.009 (-0.85)	-0.006 (-0.58)
BM	0.008 (0.88)	0.006 (0.71)	0.007 (0.82)	0.009 (1.06)	0.003 (0.39)	0.006 (0.69)
SIZE	-0.003 (-1.20)	-0.003 (-0.87)	-0.001 (-0.42)	-0.003 (-0.93)	-0.004 (-1.42)	-0.002 (-0.66)
R square	0.005	0.006	0.007	0.007	0.011	0.015

Table 10. Robustness Tests: alternative proxies for short-selling potential

This table reports the robustness test results of Fama-MacBeth regressions, using data of the treatment group in both balanced and unbalanced panel and controlling for short-selling potential. A firm is classified into the treatment group of the year if its stock has margin trading activity during the year. DA is the industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). BM is book value of total assets scaled by market capitalization in fiscal year end; SIZE is firm's market capitalization in millions of RMB of the previous fiscal year end. Margin_Buy_1 is the total remaining balance of a firm's margin buying at the end of fiscal year t, standardized by total market capitalization; Margin_Buy_2 is the net RMB value change of a firm's margin buying at the end of fiscal year t, $\text{Margin_buy_2}(t) = \text{Margin_buy_1}(t) - \text{Margin_buy_1}(t-1)$; Short_Sell_1 is the total remaining balance of a firm's short selling at the end of fiscal year t, standardized by total market capitalization; Short_Sell_2 is the net RMB value change of a firm's short selling at the end of fiscal year t, $\text{Margin_sell_2}(t) = \text{Margin_sell_1}(t) - \text{Margin_sell_1}(t-1)$. We employ institutional ownership, turnover, illiquidity, and analyst coverage as proxies for short-selling potential. Institutional Ownership is the total shareholding percentage owned by institutions in firms' annual reports. Annual Turnover is cumulative turnover rate with one year. The annual illiquidity measure is following Amihud (2002). Analyst Coverage is the number of EPS forecasting agencies in firms' annual reports. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2011-2014). All variables are winsorized at 1% and 99% levels. Standard errors are clustered at the year and firm levels in all specifications. Coefficient estimates with significance are shown in bold and their t-statistics are displayed in parentheses. ***, ** and * indicated significance at the 1%, 5% and 10% levels using two-tailed tests.

Panel A. Institutional Ownership

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Balanced Panel						Unbalanced Panel					
	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.006** (2.06)		0.007** (2.53)				0.005 (1.58)		0.007** (2.12)			
Short_sell_1		-0.522* (-1.69)	-0.584* (-1.64)					-0.515 (-1.47)	-0.570 (-1.50)			
Margin_buy_2				0.007*** (4.43)		0.010*** (3.06)				0.005** (2.11)		0.008** (2.38)
Short_sell_2					-0.288 (-0.89)	-0.348 (-0.87)					-0.610** (-1.96)	-0.673* (-1.92)
ROA	0.008 (0.06)	0.008 (0.07)	0.008 (0.06)	-0.002 (-0.02)	0.002 (0.01)	-0.011 (-0.09)	0.050 (0.32)	0.056 (0.36)	0.054 (0.35)	0.040 (0.26)	0.054 (0.35)	0.041 (0.27)
LEV	-0.005 (-0.18)	0.000 (-0.01)	0.001 (0.03)	-0.008 (-0.27)	-0.002 (-0.06)	-0.004 (-0.11)	-0.004 (-0.39)	0.002 (0.15)	0.003 (0.18)	-0.006 (-0.47)	0.002 (0.12)	0.001 (0.04)
BM	0.011 (0.53)	-0.003 (-0.15)	0.000 (0.00)	0.012 (0.62)	-0.001 (-0.04)	0.003 (0.14)	0.014 (0.72)	0.005 (0.25)	0.007 (0.30)	0.015 (0.73)	0.004 (0.17)	0.006 (0.24)
SIZE	0.000 (-0.06)	0.003 (0.83)	0.004 (0.97)	0.000 (0.10)	0.001 (0.39)	0.003 (0.87)	-0.002 (-1.29)	-0.001 (-0.44)	0.000 (0.21)	-0.001 (-0.50)	-0.002 (-1.21)	0.000 (0.28)
Instit Ownership	0.005 (0.31)	-0.025** (-2.04)	0.004 (0.28)	0.003 (0.25)	-0.023* (-1.81)	0.004 (0.40)	0.004 (0.28)	-0.019** (-2.24)	0.004 (0.28)	-0.001 (-0.09)	-0.019** (-2.18)	0.000 (0.00)

Panel B. Turnover

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Balanced Panel						Unbalanced Panel					
	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.002 (0.83)		0.003 (1.17)				0.002 (1.61)		0.004* (1.65)			
Short_sell_1		-0.569* (-1.81)	-0.638* (-1.73)					-0.577* (-1.67)	-0.628 (-1.61)			
Margin_buy_2				0.004* (1.83)		0.007* (1.70)				0.004* (1.85)		0.006* (1.67)
Short_sell_2					-0.344 (-1.05)	-0.410 (-1.01)					-0.686** (-2.41)	-0.740** (-2.15)
ROA	0.026 (0.23)	0.028 (0.24)	0.024 (0.20)	0.018 (0.17)	0.023 (0.20)	0.008 (0.07)	0.053 (0.34)	0.055 (0.35)	0.056 (0.35)	0.048 (0.31)	0.053 (0.34)	0.047 (0.30)
LEV	-0.007 (-0.27)	-0.005 (-0.15)	0.000 (0.00)	-0.009 (-0.32)	-0.007 (-0.22)	-0.003 (-0.10)	-0.006 (-0.47)	0.000 (-0.01)	0.002 (0.15)	-0.006 (-0.50)	-0.001 (-0.07)	0.001 (0.06)
BM	0.021 (1.27)	0.010 (0.45)	0.009 (0.43)	0.021 (1.18)	0.012 (0.64)	0.010 (0.51)	0.021 (0.99)	0.014 (0.60)	0.012 (0.50)	0.021 (0.96)	0.013 (0.54)	0.010 (0.42)
SIZE	-0.001 (-0.19)	0.003 (1.77)	0.004 (1.16)	0.000 (-0.02)	0.002 (0.91)	0.003 (1.05)	-0.002 (-0.98)	0.001 (0.68)	0.001 (0.72)	-0.001 (-0.58)	0.000 (-0.02)	0.001 (0.85)
Turnover	0.006** (2.27)	0.006*** (3.86)	0.006** (2.34)	0.005** (2.10)	0.006*** (3.90)	0.005** (2.18)	0.004** (2.41)	0.005** (2.20)	0.004** (2.49)	0.004** (2.22)	0.005** (2.26)	0.004** (2.37)

Panel C. Amihud Illiquidity

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Balanced Panel						Unbalanced Panel					
	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.005*** (3.18)		0.007*** (2.70)				0.004** (2.07)		0.005** (2.19)			
Short_sell_1		-0.459 (-1.58)	-0.577 (-1.61)					-0.490 (-1.52)	-0.570 (-1.56)			
Margin_buy_2				0.007*** (3.45)		0.010*** (2.34)				0.005** (2.41)		0.008** (2.06)
Short_sell_2					-0.267 (-0.91)	-0.367 (-0.93)					-0.580** (-2.03)	-0.678** (-2.01)
ROA	0.016 (0.12)	0.003 (0.02)	0.016 (0.12)	0.004 (0.04)	0.000 (0.00)	-0.003 (-0.02)	0.046 (0.29)	0.042 (0.27)	0.050 (0.32)	0.038 (0.24)	0.040 (0.25)	0.040 (0.26)
LEV	-0.007 (-0.24)	-0.003 (-0.11)	-0.001 (-0.03)	-0.010 (-0.33)	-0.006 (-0.20)	-0.006 (-0.18)	-0.004 (-0.38)	0.000 (-0.03)	0.003 (0.23)	-0.005 (-0.47)	-0.001 (-0.08)	0.001 (0.08)
BM	0.010 (0.47)	-0.001 (-0.03)	-0.001 (-0.04)	0.012 (0.61)	0.002 (0.08)	0.003 (0.13)	0.016 (0.75)	0.010 (0.44)	0.008 (0.36)	0.017 (0.78)	0.008 (0.36)	0.008 (0.31)
SIZE	-0.004 (-0.31)	-0.008 (-0.77)	0.002 (0.15)	-0.005 (-0.49)	-0.008 (-0.83)	0.000 (0.03)	-0.014*** (-2.62)	-0.016* (-1.89)	-0.011** (-1.98)	-0.013*** (-2.57)	-0.017** (-2.13)	-0.010** (-2.19)
Amihud	-0.001 (-0.06)	-0.007 (-0.89)	0.001 (0.12)	-0.003 (-0.34)	-0.006 (-0.73)	0.000 (0.02)	-0.011** (-2.53)	-0.015** (-2.40)	-0.010** (-2.46)	-0.011** (-2.45)	-0.014** (-2.18)	-0.009** (-1.96)

Panel D. Analyst Coverage

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Balanced Panel						Unbalanced Panel					
	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.004** (2.52)		0.006*** (2.83)				0.004* (1.74)		0.006** (2.28)			
Short_sell_1		-0.430 (-1.60)	-0.548* (-1.75)					-0.431 (-1.41)	-0.528 (-1.57)			
Margin_buy_2				0.007*** (4.45)		0.009*** (2.73)				0.005** (2.23)		0.008** (2.25)
Short_sell_2					-0.223 (-0.79)	-0.312 (-0.86)					-0.538* (-1.95)	-0.643** (-2.04)
ROA	0.028 (0.21)	0.030 (0.21)	0.021 (0.15)	0.016 (0.13)	0.033 (0.24)	0.008 (0.06)	0.073 (0.44)	0.073 (0.44)	0.070 (0.43)	0.063 (0.39)	0.074 (0.45)	0.062 (0.38)
LEV	-0.003 (-0.11)	0.000 (0.01)	0.002 (0.07)	-0.006 (-0.21)	-0.001 (-0.05)	-0.002 (-0.07)	-0.003 (-0.28)	0.000 (-0.03)	0.004 (0.26)	-0.004 (-0.40)	-0.001 (-0.05)	0.001 (0.09)
BM	0.011 (0.56)	-0.002 (-0.09)	0.000 (0.01)	0.013 (0.68)	0.001 (0.06)	0.005 (0.22)	0.016 (0.82)	0.008 (0.44)	0.008 (0.39)	0.017 (0.85)	0.007 (0.36)	0.008 (0.34)
SIZE	0.002 (0.60)	0.005** (2.22)	0.005 (1.55)	0.003 (0.78)	0.004 (1.55)	0.005 (1.51)	0.000 (0.09)	0.001 (0.55)	0.002 (1.29)	0.002 (1.59)	0.001 (0.23)	0.002 (1.63)
Analyst Coverage	0.000 (-1.01)	-0.001* (-1.69)	0.000 (-0.75)	0.000 (-0.95)	-0.001** (-2.26)	0.000 (-1.21)	-0.001 (-1.09)	-0.001* (-1.80)	0.000 (-0.96)	-0.001 (-1.28)	-0.001** (-2.04)	-0.001 (-1.44)

Table 11. Robustness Tests: controlling for R&D expenditure, CAPEX, and investment

This table reports the robustness test results of Fama-MacBeth regressions, using data of the treatment group in both balanced and unbalanced panel and controlling for R&D expenditure, CAPEX, and investment. A firm is classified into the treatment group of the year if its stock has margin trading activity during the year. DA is the industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). BM is book value of total assets scaled by market capitalization in fiscal year end; SIZE is firm's market capitalization in millions of RMB of the previous fiscal year end. Margin_Buy_1 is the total remaining balance of a firm's margin buying at the end of fiscal year t, standardized by total market capitalization; Margin_Buy_2 is the net RMB value change of a firm's margin buying at the end of fiscal year t, $\text{Margin_buy_2}(t) = \text{Margin_buy_1}(t) - \text{Margin_buy_1}(t-1)$; Short_Sell_1 is the total remaining balance of a firm's short selling at the end of fiscal year t, standardized by total market capitalization; Short_Sell_2 is the net RMB value change of a firm's short selling at the end of fiscal year t, $\text{Margin_sell_2}(t) = \text{Margin_sell_1}(t) - \text{Margin_sell_1}(t-1)$. R&D is selling expenses and management fee at the end of year t scaled by total assets by the end of year t-1. CAPEX is cash paid to purchase and construct fixed assets, intangible assets and other long-term assets scaled by total asset by the end of year t-1. INVESTMENT is the sum of R&D and CAPEX. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2011-2014). All variables are winsorized at 1% and 99% levels. Standard errors are clustered at the year and firm levels in all specifications. Coefficient estimates with significance are shown in bold and their t-statistics are displayed in parentheses. ***, ** and * indicated significance at the 1%, 5% and 10% levels using two-tailed tests.

Panel A. Controlling for R&D Expenditure and CAPEX Separately

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Balanced Panel						Unbalanced Panel					
	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.005*** (3.34)		0.007*** (2.72)				0.005** (2.14)		0.006** (2.22)			
Margin_sell_1		-0.476 (-1.60)	-0.602* (-1.65)					-0.486 (-1.42)	-0.585 (-1.51)			
Margin_buy_2				0.008*** (3.89)		0.010** (2.48)				0.006** (2.31)		0.009** (2.02)
Margin_sell_2					-0.329 (-1.10)	-0.434 (-1.09)					-0.591** (-1.96)	-0.704** (-1.98)
ROA	0.024 (0.19)	0.016 (0.12)	0.024 (0.18)	0.014 (0.12)	0.011 (0.08)	0.004 (0.03)	0.064 (0.39)	0.060 (0.36)	0.067 (0.41)	0.053 (0.33)	0.058 (0.35)	0.054 (0.33)
LEV	-0.004 (-0.14)	-0.001 (-0.04)	0.002 (0.07)	-0.008 (-0.25)	-0.003 (-0.10)	-0.003 (-0.07)	-0.004 (-0.40)	-0.001 (-0.06)	0.003 (0.22)	-0.006 (-0.53)	-0.001 (-0.09)	0.001 (0.06)
BM	0.010 (0.43)	-0.003 (-0.13)	-0.001 (-0.02)	0.012 (0.53)	-0.002 (-0.07)	0.002 (0.08)	0.011 (0.55)	0.003 (0.17)	0.003 (0.13)	0.012 (0.60)	0.002 (0.09)	0.003 (0.11)
SIZE	-0.001 (-0.28)	0.001 (0.67)	0.003 (0.88)	0.000 (-0.06)	-0.001 (-0.35)	0.002 (0.66)	-0.003 (-1.42)	-0.002 (-0.92)	0.000 (0.07)	-0.001 (-0.54)	-0.003 (-1.83)	0.000 (0.25)
R&D	-0.020 (-1.26)	-0.020 (-1.28)	-0.016 (-1.28)	-0.020 (-1.27)	-0.022 (-1.28)	-0.020 (-1.28)	-0.030 (-1.21)	-0.030 (-1.21)	-0.030 (-1.20)	-0.029 (-1.20)	-0.030 (-1.22)	-0.028 (-1.21)
CAPEX	-0.064 (-1.11)	-0.061 (-1.13)	-0.067 (-1.13)	-0.059 (-1.12)	-0.058 (-1.11)	-0.058 (-1.11)	-0.019 (-1.09)	-0.020 (-1.09)	-0.020 (-1.11)	-0.020 (-1.09)	-0.020 (-1.07)	-0.021 (-1.09)

Panel B. Controlling for Investment

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Balanced Panel						Unbalanced Panel					
	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.005***		0.007***				0.005**		0.007**			
	3.16		2.56				2.19		2.20			
Margin_sell_1		-0.451	-0.584					-0.480	-0.584			
		-1.55	-1.59					-1.45	-1.52			
Margin_buy_2				0.008***		0.011**				0.007**		0.009**
				3.51		2.38				2.30		2.00
Margin_sell_2					-0.291	-0.408					-0.583**	-0.701**
					-1.01	-1.03					-2.00	-2.00
ROA	0.028	0.018	0.026	0.017	0.014	0.006	0.064	0.059	0.067	0.053	0.058	0.054
	0.22	0.14	0.20	0.14	0.10	0.05	0.39	0.36	0.41	0.32	0.35	0.33
LEV	-0.007	-0.004	0.000	-0.010	-0.006	-0.005	-0.006	-0.003	0.001	-0.008	-0.004	-0.001
	-0.23	-0.12	0.01	-0.33	-0.20	-0.16	-0.61	-0.23	0.11	-0.73	-0.28	-0.07
BM	0.008	-0.004	-0.003	0.011	-0.002	0.001	0.012	0.004	0.003	0.013	0.003	0.003
	0.39	-0.19	-0.11	0.52	-0.11	0.04	0.58	0.21	0.15	0.62	0.13	0.13
SIZE	-0.002	0.000	0.002	-0.001	-0.001	0.002	-0.003	-0.002	0.000	-0.002	-0.003	0.000
	-0.35	0.21	0.64	-0.11	-0.59	0.50	-1.36	-1.23	-0.15	-0.59	-2.76	0.04
Investment	-0.040	-0.038	-0.039	-0.037	-0.038	-0.037	-0.026	-0.026	-0.026	-0.025	-0.026	-0.025
	-1.14	-1.15	-1.14	-1.14	-1.14	-1.14	-1.15	-1.15	-1.15	-1.15	-1.14	-1.14

Table 12. Robustness Tests: controlling for state-owned or non-state-owned Entities

This table reports the robustness test results of Fama-MacBeth regressions, using data of the treatment group in both balanced and unbalanced panel and controlling for whether firms are state-owned or non-state-owned. A firm is classified into the treatment group of the year if its stock has margin trading activity during the year. DA is the industry-demeaned discretionary accruals, calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). BM is book value of total assets scaled by market capitalization in fiscal year end; SIZE is firm's market capitalization in millions of RMB of the previous fiscal year end. Margin_Buy_1 is the total remaining balance of a firm's margin buying at the end of fiscal year t, standardized by total market capitalization; Margin_Buy_2 is the net RMB value change of a firm's margin buying at the end of fiscal year t, $\text{Margin_buy_2}(t) = \text{Margin_buy_1}(t) - \text{Margin_buy_1}(t-1)$; Short_Sell_1 is the total remaining balance of a firm's short selling at the end of fiscal year t, standardized by total market capitalization; Short_Sell_2 is the net RMB value change of a firm's short selling at the end of fiscal year t, $\text{Margin_sell_2}(t) = \text{Margin_sell_1}(t) - \text{Margin_sell_1}(t-1)$. Dummy for State-owned entities include central entities, local country-owned entities, universities and working unions. Non-state-owned entities are those of which controllers are private enterprises, collective enterprises or foreign corporations. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2011-2014). All variables are winsorized at 1% and 99% levels. Standard errors are clustered at the year and firm levels in all specifications. Coefficient estimates with significance are shown in bold and their t-statistics are displayed in parentheses. ***, ** and * indicated significance at the 1%, 5% and 10% levels using two-tailed tests.

Panel A. Balanced Panel

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	State-Owned Entity						Non-State-Owned Entity					
	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.005** (2.41)		0.005** (2.14)				0.005**** (2.93)		0.007** (2.54)			
Short_sell_1		-0.605**** (-2.90)	-0.620**** (-2.80)					-0.420 (-1.19)	-0.574 (-1.35)			
Margin_buy_2				0.009 (1.49)		0.010 (1.42)				0.007**** (5.05)		0.009**** (3.37)
Short_sell_2					-0.468**** (-4.78)	-0.547**** (-3.04)					-0.242 (-0.64)	-0.319 (-0.71)
ROA	-0.036 (-0.15)	-0.053 (-0.21)	-0.045 (-0.18)	-0.022 (-0.09)	-0.064 (-0.25)	-0.039 (-0.16)	0.057 (0.83)	0.053 (0.76)	0.056 (0.79)	0.049 (0.86)	0.047 (0.67)	0.039 (0.61)
LEV	-0.035 (-0.73)	-0.021 (-0.43)	-0.024 (-0.48)	-0.033 (-0.71)	-0.029 (-0.67)	-0.028 (-0.64)	0.002 (0.06)	0.001 (0.04)	0.008 (0.23)	-0.002 (-0.09)	-0.002 (-0.07)	0.000 (0.01)
BM	0.025 (0.54)	0.011 (0.19)	0.011 (0.19)	0.028 (0.58)	0.018 (0.38)	0.017 (0.36)	0.012 (0.85)	0.000 (-0.01)	0.002 (0.13)	0.015 (1.14)	0.001 (0.08)	0.007 (0.39)
SIZE	-0.011 (-0.65)	-0.005 (-0.33)	-0.003 (-0.18)	-0.014 (-0.80)	-0.009 (-0.69)	-0.009 (-0.61)	0.000 (0.01)	0.000 (-0.04)	0.003 (0.99)	0.002 (0.51)	-0.001 (-0.45)	0.003 (1.12)

Panel B. Unbalanced Panel

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	State-Owned Entity						Non-State-Owned Entity					
	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA
Margin_buy_1	0.007*** (3.43)		0.007*** (3.34)				0.004 (1.60)		0.005** (2.12)			
Short_sell_1		-0.633*** (-3.33)	-0.616** * (-2.61)					-0.387 (-1.22)	-0.478 (-1.41)			
Margin_buy_2				0.011* (1.88)		0.012* (1.75)				0.004 (1.33)		0.006** (2.32)
Short_sell_2					-0.480* (-1.93)	-0.599* (-1.87)					-0.548* (-1.81)	-0.618** (-2.05)
ROA	0.103 (0.64)	0.088 (0.49)	0.112 (0.67)	0.103 (0.62)	0.077 (0.45)	0.100 (0.60)	0.062 (0.40)	0.058 (0.38)	0.062 (0.40)	0.050 (0.33)	0.057 (0.37)	0.050 (0.33)
LEV	-0.055* (-1.86)	-0.048** (-2.09)	-0.047* (-1.76)	-0.057** (-2.08)	-0.049** (-2.01)	-0.048* (-1.90)	0.006 (0.60)	0.006 (0.39)	0.011 (0.77)	0.003 (0.26)	0.005 (0.35)	0.007 (0.44)
BM	0.061** (2.43)	0.055** (2.55)	0.054** (2.54)	0.067*** (2.72)	0.053** (2.47)	0.054*** (2.61)	0.010 (0.47)	0.003 (0.16)	0.003 (0.15)	0.011 (0.50)	0.002 (0.09)	0.004 (0.17)
SIZE	-0.014 (-1.07)	-0.008 (-0.89)	-0.007 (-0.62)	-0.015 (-1.11)	-0.011 (-1.56)	-0.009 (-0.99)	-0.002 (-1.33)	-0.002 (-0.72)	0.000 (0.00)	0.000 (0.16)	-0.003 (-1.21)	0.001 (0.91)

Figure 1. Discretionary Accruals from 2006 to 2014

This figure reports the firm discretionary accrual measure for the total sample from 2006 to 2014. Discretionary accrual measure *DA* is calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). All variables are winsorized at 1% and 99% levels.

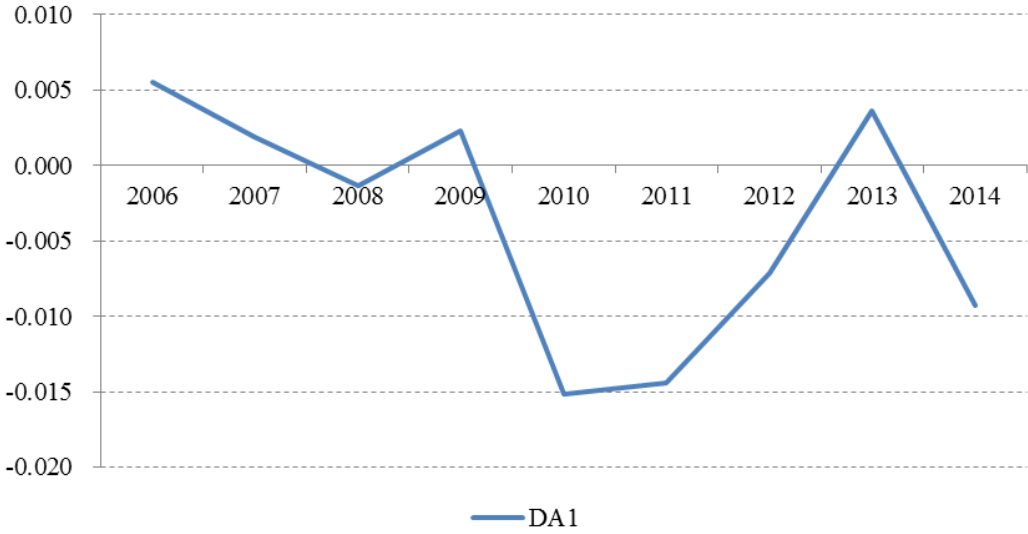


Figure 2. Discretionary Accruals for Pilot vs. Non-Pilot Firms from 2006 to 2014

This figure reports the firm discretionary accrual measure for the treatment and control groups from 2006 to 2014. The treatment group is designed by choosing all firms participating in the program for all four years from 2011 to 2014, while the control group is constructed with all firms not participating in the program at all from 2011 to 2014. Discretionary accrual measure DA is calculated as a firm's discretionary accruals minus the average of the industry of the same year. A firm's discretionary accruals are defined as the difference between its total accruals and the fitted normal accruals derived from a modified Jones model (Jones, 1991). The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). All variables are winsorized at 1% and 99% levels.

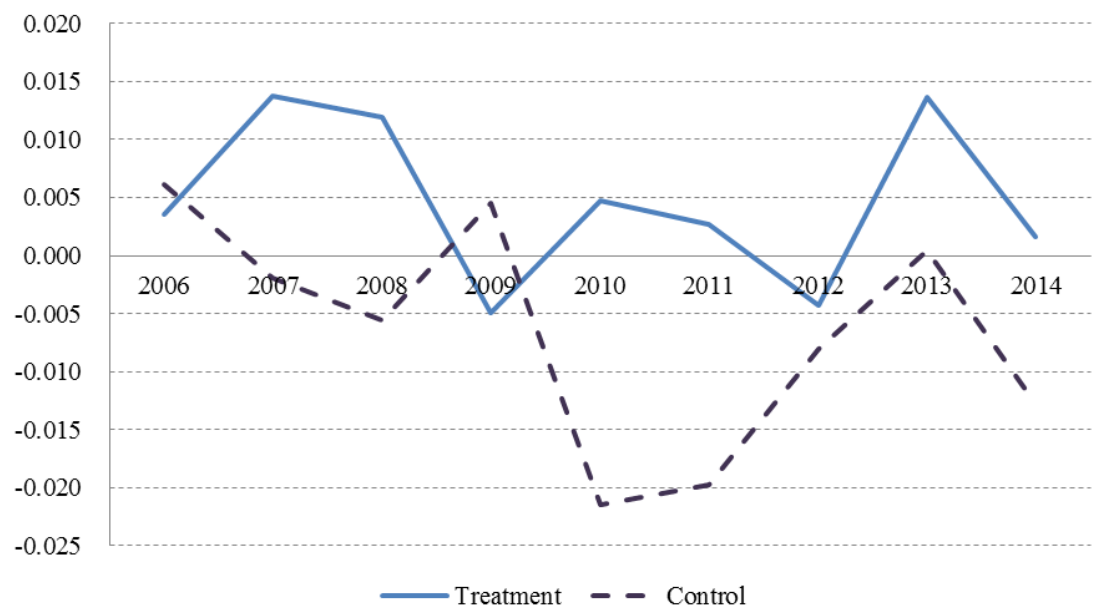


Figure 3. Margin Buying Activities of Pilot Firms from 2010 to 2014

This figure reports the trend of the firm's margin buying activities for the unbalanced panel of the treatment group from 2010 to 2014. *Margin_Buy_1* is the total remaining balance of a firm's margin buying at the end of fiscal year *t*, standardized by total market capitalization; *Margin_Buy_2* is the net RMB value change of a firm's margin buying at the end of fiscal year *t*, $Margin_buy_2(t) = Margin_buy_1(t) - Margin_buy_1(t-1)$; The treatment group in unbalanced panel consists of firms participating in the program in each year from 2010 to 2014. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). All variables are winsorized at 1% and 99% levels.

Figure 3.1 Trend of margin buying balance from 2010 to 2014

The bars show the trend of absolute value in million RMB of the total remaining balance of a firm's margin buying at the end of fiscal year *t*. The lines display the trend of *Margin_buy_1* (standardized by total market capitalization).

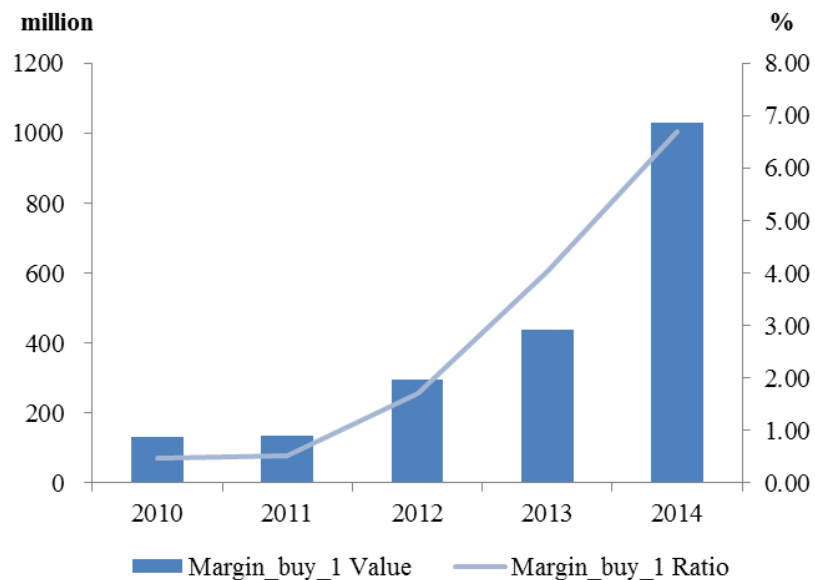


Figure 3.2 Trend of net change in margin buying from 2010 to 2014

The bars show the trend of absolute value in million RMB net change of a firm's margin buying at the end of fiscal year t. The lines display the trend of *Margin_buy_2* (standardized by total market capitalization).

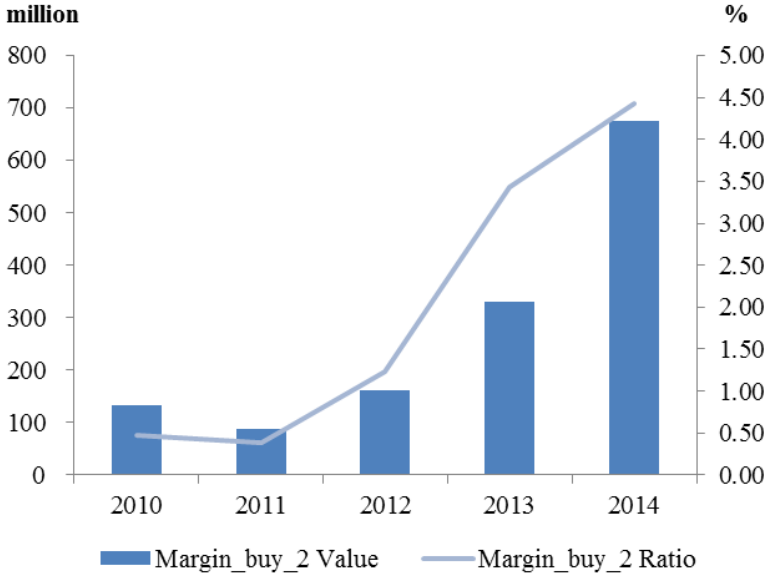


Figure 4. Short Selling Activities of Pilot Firms from 2010 to 2014

This figure reports the trend of the firm's short sales for the unbalanced panels of the treatment group from 2010 to 2014. *Short_Sell_1* is the total remaining balance of a firm's short selling at the end of fiscal year *t*, standardized by total market capitalization; *Short__Sell_2* is the net RMB value change of a firm's margin short selling at the end of fiscal year *t*, $Short_sell_2(t) = Short_sell_1(t) - Short_sell_1(t-1)$. The treatment group in unbalanced panel consists of firms participating in the program in each year from 2010 to 2014. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2006-2014). All variables are winsorized at 1% and 99% levels.

Figure 4.1 Trend of short selling balance from 2010 to 2014

The bars show the trend of absolute value in million RMB of the total remaining balance of a firm's short selling at the end of fiscal year *t*. The lines display the trend of *Short_sell_1* (standardized by total market capitalization).

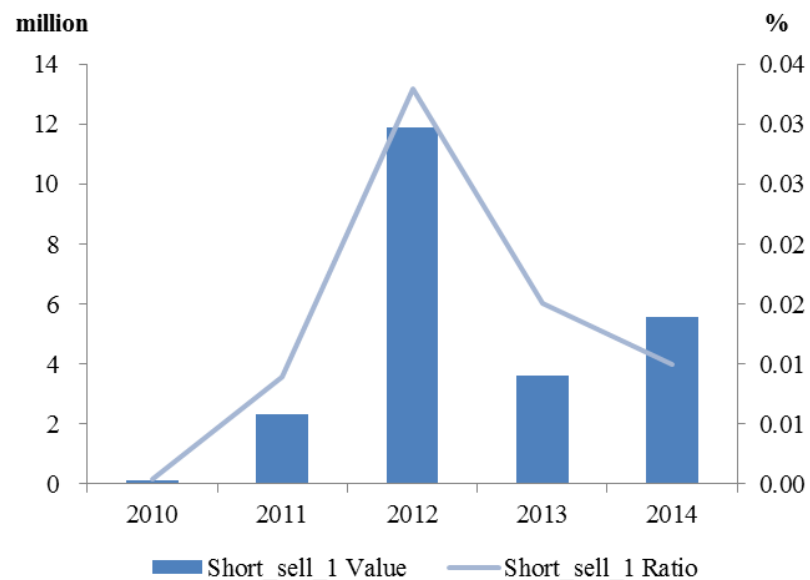


Figure 4.2 Trend of net change in short selling from 2010 to 2014

The bars show the trend of absolute value in million RMB net change of a firm's short selling at the end of fiscal year t. The lines display the trend of Short_sell_2 (standardized by total market capitalization).

