

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

Zhaojing Chen\*  
Renmin University of  
China

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

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

† 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.

## 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 pay 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 natural 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 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 find some evidence that 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 may have offset the disciplinary effect of short selling before and during the pilot program that relaxed the constraint of margin trading and short selling in 2010.

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 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, et al. (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, et al, 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, et al., 2011; Boehmer, et al., 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, et al., 2009), bond yields (Kecskés, et al., 2013), equity issuance and investment(Grullon, et al., 2014), insider trading (Masa, et al., 2014a), and earnings management( Fang, et al., 2014; Masa, et al., 2014b).

## **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, et al.(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, et al.(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**

Margin trading and short selling are strictly prohibited in the Chinese stock market before March 2010. 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 stipulate 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 requirements for qualified stocks. Taking the guidance of Citic Securities as an example, Panel B of Table 2 shows the requirements of qualified investors. Chang, et al (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 US. 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, et al., 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., 2014b) 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. (2014b) 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.<sup>1</sup>

Following Fang, et al.(2014) and Masa, et al., (2014b), we ask some natural questions: 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? In particular, securities lending and margin borrowing may simultaneously affect the earnings management in China. Does margin trading or short selling has a stronger effect on earnings management?

Given the previous literature, we suggest the following hypothesis:

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<sup>1</sup> 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, et al.,2014; Chang, et al., 2014; and Zhang, et al., 2014).

*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 enables investors and speculators to generate more profit from information that is available to the general public and hence create incentives for management to manipulate accounting reports based on their private information. In light of shareholder value creation needs, they can book a positive (negative) accrual in order to bring up (down) the net income when actual earnings are below (above) target in the hope of being able to reverse the accrual in a subsequent year when actual earnings are above (below) target. Therefore, 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, 2007 through December 31, 2013. The *PRE* period is defined from Jan 1, 2007 to Dec 31, 2009, while the *DURING* period is from Jan 1, 2011 to Dec 31, 2013. 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 200 pilot stocks in balanced sample, which are part of the margin trading and short selling pilot program. In unbalanced panel, there are 234, 233, and 664 available firms in 2011, 2012, and 2013, respectively. Among the 200 pilot stocks in the

balanced panel, 117 are listed on the Shanghai Stock Exchange (SSE) and 83 are listed on the Shenzhen Stock Exchange (SZSE).

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*), account receivables (*AR*), margin trading balance (*margin\_buy\_1*), net value of margin purchases (*margin\_buy\_1*), short sales balance (*short\_sell\_1*) and net value of short sales (*short\_sell\_2*) at yearly level for A-shares are obtained from Chinese Securities Market and Accounting Research (CSMAR).

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 2013; the control group consists of non-pilot firms that are not involved in this regulation for all years from 2011 to 2013. We also construct two variables to indicate time periods: *PRE* equals to one if a firm-year's fiscal end falls between January 1, 2007 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, 2013.

We proxy for earnings management using abnormal accruals, 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 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.<sup>2</sup>

In order to measure margin trading and short selling activities, we obtain the data of 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\_selling\_1*) implies the potential borrowing (lending) amount of the underlying stock at the year end. *Margin\_buy\_2* (*short\_selling\_2*) implies the realized borrowing (lending) amount of the underlying stock with one year. 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. 2007-2013). In the balanced sample, a firm is classified into the treatment group if its stock has margin trading

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<sup>2</sup> Following Kothari, et al (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.

activity during all three years from 2011 to 2013, while a firm is classified into the control group if its stock is not involved in margin trading activity at all during all three years from 2011 to 2013. In the unbalanced panel, the treatment group consists of firms participating in the program in each year from 2010 to 2013.

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.<sup>3</sup>

### 3.3 Sample statistics

The final sample includes 200 firms in the treat group and 698 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 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 firm discretionary accrual measure *DA1* for the balanced panel sample of the treatment and control groups measured from 2007 to 2013. The mean discretionary accrual of the treatment group in 2007 is 0.028, while this value drops to 0.003 in 2013. In the control group, the level of earnings management(discretionary accrual) are

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<sup>3</sup> 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(278 firms), and there are far more trading activities and firms participating in this program in 2013 (741 firms). Table 1 shows the timeline of pilot program.

below the treatment group in the whole sample period, where the average value of *DA1* is 0.002 in 2007, and -0.005 in 2013. For the *PRE* period from 2007 to 2009, the average of *DA1* of treatment, and control groups are 0.015, and 0.0001, respectively, while both groups observe the decrease of *DA1* in the *DURING* period with the mean value 0.000, and -0.013, 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 2007 to 2013. Figure 2 shows the separate trends in discretionary accrual of treatment group and control group.

[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 three years from 2011 to 2013. We observe that the amount of margin trading (*margin\_buy\_1* is measured by the average ratio of remaining balance to market capitalization) increases from 0.52% in 2011 to 3.36% in 2013. The average ratio of net purchases to market capitalization (*margin\_buy\_2*) rises from 0.38% to 1.58% 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\_selling\_1*) is only 0.02%, on average, from 2011 to 2013. 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 2013. Since there are more firms involved in 2013, we find the ratio of margin trading balance(*margin\_buy\_1*) increases to 4.01% in 2013 and the ratio of short selling balance(*short\_selling\_1*) increases to 0.02% 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 also observed in Figure 3 and 4, which draws the time trend of margin trading and short selling measures in unbalanced panel from 2010 to 2013. In Figure 4.2, we show that the net sales of securities lending (*short\_selling\_2*) drops below zero in 2013, which means that investors pay back securities and become optimistic in this year.

[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 (200 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.<sup>4</sup> 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 display significantly higher returns on assets, higher leverage and larger size. The difference in book-to-market ratio is 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 2007 to 2009, i.e. three years before the pilot program. The results clearly indicate that these pilot firms are not randomly picked: they have higher profitability with 10.62% of *ROA* on average, while the stocks in control group only have 5.61% of *ROA*; they undertake significantly higher leverage than non-pilot stocks; 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 will control these characteristics in the later analysis.

[Insert Table 5 Here]

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<sup>4</sup> Unlike the short selling pilot program ordered by the SEC during 2005-2007, Fang, et al.(2014) demonstrate that U.S pilot stocks are arbitrarily chosen , and there are no significant difference in firm characteristics between treatment group and control group.

## 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 three-year periods before and during the pilot program. The mean values of *DA1* during the three-year period before the pilot program (year 2007 to 2009) are 0.015, and -.0001 for the treatment, and control group, respectively. The t-statistics of the difference in means is 2.74. During the three-year period of the pilot program (year 2011 to 2013), the mean values of *DA1* decrease to -0.0004, and -0.0131 for treatment, and control groups, respectively. The t-statistics of the difference in means is 3.31, and the Wilcoxon z-statistics for the difference in medians is 2.33, indicating that the level of earning management in the treatment group is still higher than the control group even though both groups have experienced the decline in *DA1*. We highlight the difference in difference (DiD) of *DA1* in the bottom row of Table 6. Comparing *PRE* and *DURING* period, the mean value of *DA1* in the treatment group decreases 0.015 on average, while for the control group, the mean of *DA1* declines 0.013. The t-statistics of testing difference in means is -0.33, and the Wilcoxon z-statistics of testing difference in medians is -0.72, 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 (2007-2009, 2011-2013) are retained and we estimate the following model:

$$DA1_{i,t} = \beta_0 + \beta_1 PILOT_i \times DURING_t + \beta_2 PILOT_i + \beta_3 DURING_t + Control_{i,t} + YearDummy_t + \varepsilon_{i,t} \quad (3)$$

The dependent variable is *DA1*, 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, 2013 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 -0.057 with t-statistics -3.58 when firm characteristics are controlled, indicating the decrease in DA1 compared to the PRE period. Without the control variables, the coefficient estimate of *PILOT* is positive and significant at the 1% level, but it becomes insignificant when firms characteristics are controlled, which shows the difference in *DA1* between pilot and non-pilot stocks are generated from firm features in these two groups. Most importantly, the coefficient of the interaction term  $PILOT_i \times DURING_i$  is not significant in both columns (with t-statistics -0.33 and -0.04). 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:

$$DA1_{i,t} = \beta_0 + \beta_1 \text{Margin\_buy\_}[1,2]_{i,t} + \beta_2 ROA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 BM_{i,t} + \beta_5 SIZE_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$DA1_{i,t} = \beta_0 + \beta_1 \text{Short\_sell\_}[1,2]_{i,t} + \beta_2 ROA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 BM_{i,t} + \beta_5 SIZE_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$DA1_{i,t} = \beta_0 + \beta_1 \text{Margin\_buy\_}[1,2]_{i,t} + \beta_2 \text{Short\_sell\_}[1,2]_{i,t} + \beta_3 ROA_{i,t} + \beta_4 LEV_{i,t} + \beta_5 BM_{i,t} + \beta_6 SIZE_{i,t} + \varepsilon_{i,t} \quad (6)$$

In Table 8, Panel A displays the Pearson correlations of nine variables from 2011-2013, including *DA1*, *ROA*, *LEV*, *BM*, *Margin\_buy\_1&2*, *Short\_sell\_1&2*. Since *Margin\_buy\_1(Short\_sell\_1)* and *Margin\_buy\_2(Short\_sell\_2)* share the high correlation of 0.798 (0.535), we will not include them in the same regression as explanatory variables. The r Fama-MacBeth regressions results are reported in Panel B of Table 8. The coefficients of *Margin\_buy\_1* and *Margin\_buy\_2* are significant at the 5% level whenever they are included in the regressions, indicating that margin purchase activities have the positive effect on *DA1* and increase the firms' level of earning manipulations. The short sales on firms' securities have the negative effect on *DA1*, 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 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 200 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.

After eliminating all firms that have missing data of discretionary accruals and firm characteristics, we obtain the unbalanced panel, consisting 234 firms in 2011, 233 firms in 2012, and 664 firms in 2013. The results of regressions in unbalanced panel are reported in Table 9. Panel A of Table 9 displays the Pearson correlations of nine variables from 2011-2013 in the unbalanced panel. In Panel B and C, we display regression estimates with all four control variables included in column (1)-(6). However, since *ROA*, *LEV* and *BM* are highly correlated, we report the results excluding *ROA* and *LEV* in column (7) to (12). In the first six columns of Panel B, we can obtain the same results as in the balanced panel: margin buying imposes the significantly positive effects on discretionary accruals while short sales have the negative impact. After excluding *ROA* and *LEV*, 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 (10) and (12) of Panel C, the coefficient of *Margin\_buy\_1* is 0.003 with t-statistic 2.58, and the coefficient of *Short\_sell\_1* is -0.266 with t-statistic -1.90; the coefficient of *Margin\_buy\_2* is 0.003 with t-statistic 2.47, and the coefficient of *Short\_sell\_1* is -0.451 with t-statistic -3.21. These results provide evidence that margin buying and security short sales impose offsetting impacts, and then generate no significant difference on firms' discretionary accruals between treatment group and control group before and during the pilot program.

[Insert Table 9 Here]



## 5. Discussion and Conclusion

Short selling and margin trading play an important role in capital markets for a variety of reasons: facilitating price discovery, 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.

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 had 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
<b>Dependent Variables</b>	
DA1	<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 <math>\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}</math>. The total accruals <math>TA_{i,t+1}</math> are defined as net income (NI) minus operating cash flow (CFO). <math>ASSET_{i,t}</math> is the total assets at the end of fiscal year t. <math>\Delta REV_{i,t+1}</math> is the change in the total sales revenue from the preceding fiscal year. <math>PPE_{i,t+1}</math> is the gross property, plant and equipment. The fitted normal accruals are calculated as <math>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}}</math> with the change in accounts receivables subtracted from the change in sales revenue. Firm-year specific discretionary accruals are calculated as <math>DA_{i,t+1} = \frac{TA_{i,t+1}}{ASSET_{i,t}} - NA_{i,t+1}</math>.</p>
<b>Experiment-related Variables</b>	
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, 2007 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, 2013 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, $Margin\_sell\_2(t) = Short\_sell\_1(t) - Short\_sell\_1(t-1)$ ;
<b>Firm Characteristics</b>	
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
$\Delta$ PPE	Cash paid to purchase and construct fixed assets, intangible assets and other long-term assets, from cash flow statement
AR	Total account receivables

### Table 1: The timeline of pilot program

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

This 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 the CSRC announces a change in the list of qualified stocks. We do not count ETF and we focus on five major revisions in the 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 margin-trading, 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 2007-2013**

This table reports summary statistics of the firm discretionary accrual measure for the balanced panel of the treatment and control groups from 2007 to 2013. Discretionary accrual measure DA1 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. 2007-2013). 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 2013, while the control group is constructed with all firms not participating in the program at all from 2011 to 2013.

Variable of interest	Treatment Group (PILOT=1)			Control Group (PILOT=0)		
	N	Mean	Median	N	Mean	Median
<b>DA1</b>						
2007	200	0.028	0.010	698	0.002	-0.004
2008	200	0.007	0.006	698	-0.003	-0.001
2009	200	0.009	0.004	698	0.001	0.008
2010	200	0.003	-0.011	698	-0.023	-0.026
2011	200	0.002	-0.010	698	-0.023	-0.019
2012	200	-0.006	-0.009	698	-0.011	-0.011
2013	200	0.003	0.007	698	-0.005	0.001
PRE(2007-2009)	600	0.015	0.008	2094	0.000	0.000
DURING(2011-2013)	600	0.000	-0.004	2094	-0.013	-0.011



**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 2013. *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. 2007-2013). 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 program for all three years from 2011 to 2013 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 program in each year from 2010 to 2013.

**Panel A. Summary Statistics of Trading Activities in 2011-2013 (Balanced Panel)**

Variable of interest	Treatment Group (PILOT=1)		
	N	Mean	Median
<i>Margin_Buy_1</i>			
2011	200	0.517	0.202
2012	200	1.772	1.416
2013	200	3.357	2.708
DURING(2011-2013)	600	1.882	1.230
<i>Margin_Buy_2</i>			
2011	200	0.381	0.184
2012	200	1.270	0.944
2013	200	1.580	1.087
DURING(2011-2013)	600	1.077	0.555
<i>Short_Sell_1</i>			
2011	200	0.009	0.005
2012	200	0.031	0.026
2013	200	0.025	0.018
DURING(2011-2013)	600	0.022	0.015
<i>Short_Sell_2</i>			
2011	200	0.011	0.006
2012	200	0.021	0.017
2013	200	-0.006	-0.002
DURING(2011-2013)	600	0.009	0.008

**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	0.514	0.221
2012	278	1.699	1.311
2013	741	4.009	3.333
DURING(2011-2013)	1297	2.765	1.926
<i>Margin_Buy_2</i>			
2010	95	0.472	0.412
2011	278	0.381	0.186
2012	278	1.224	0.885
2013	741	3.404	2.794
DURING(2011-2013)	1297	2.289	1.297
<i>Short_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
DURING(2011-2013)	1297	0.018	0.010
<i>Short_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
DURING(2011-2013)	1297	0.009	0.006

**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 2007-2009 (Panel B). The treatment group is designed by choosing all firms participating in the program for all three years from 2011 to 2013 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. 2007-2013). 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 2007 to 2009, where DURING equals to 1. DURING is a dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2011 and December 31, 2013, and zero otherwise.

**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	200	9.57	8.04	698	4.98	4.62	<b>7.94***</b>	<b>7.79***</b>
LEV	200	52.05	54.29	698	49.23	50.37	<b>1.97**</b>	1.47
BM	200	0.53	0.51	698	0.51	0.50	1.28	0.81
SIZE	200	12561.87	9475.10	698	2122.81	1726.00	<b>16.09***</b>	<b>20.27***</b>

**Panel B. Firm Characteristics of Treatment Group and Control Group from 2007 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	600	10.62	8.84	2094	5.61	5.16	<b>14.16***</b>	<b>14.21***</b>
LEV	600	50.85	51.58	2094	48.60	49.78	<b>2.77***</b>	<b>2.08**</b>
BM	600	0.59	0.58	2094	0.61	0.60	<b>-1.81*</b>	<b>-2.48***</b>
SIZE	600	10500.37	7064.94	2094	1765.25	1221.75	<b>22.81***</b>	<b>31.75***</b>

**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 three-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 three years from 2011 to 2013, while a firm is classified into the control group if its stock is not involved in margin trading activity at all during all three years from 2011 to 2013. *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). *PRE* is a dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2007 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, 2013 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. 2007-2013). \*\*\*, \*\* 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
<b><i>DA1</i></b>								
PRE(2007-2009)	600	0.015	0.008	2094	-0.000	0.000	<b>2.74***</b>	1.15
DURING(2011-2013)	600	-0.000	-0.004	2094	-0.013	-0.011	<b>3.31***</b>	<b>2.33***</b>
DURING-PRE	600	-0.015	-0.008	2094	-0.013	-0.011	-0.33	-0.72

## 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 three years from 2011 to 2013, while a firm is classified into the control group if its stock is not involved in margin trading activity at all during all three years from 2011 to 2013. *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). *PRE* is a dummy variable that equals to 1 if a firm's fiscal year end falls between January 1, 2007 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, 2013 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. 2007-2013). 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 2007-2013 (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:

$$DA1_{i,t} = \beta_0 + \beta_1 PILOT_i \times DURING_t + \beta_2 PILOT_i + \beta_3 DURING_t + \beta_4 Controls + \varepsilon_{i,t} .$$

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				
LEV	-0.258			
BM	-0.201	0.331		
SIZE	0.336	0.041	-0.086	

**Panel B. Multivariate Difference-in-difference Tests**

Dependent Variable	(1) DA1	(2) DA1
PILOT*DURING	-0.002	0.000
t-stat	(-0.33)	(-0.04)
PILOT	<b>0.015***</b>	-0.002
t-stat	(3.26)	(-0.35)
DURING	<b>-0.013***</b>	<b>-0.057***</b>
t-stat	(-4.28)	(-3.58)
ROA		<b>0.003***</b>
t-stat		(15.62)
LEV		0.000
t-stat		(-1.51)
BM		<b>0.056***</b>
t-stat		(8.25)
SIZE		0.000
t-stat		(0.23)
Adjusted R square	0.008	0.064

**Table 8. Tests for 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 three years from 2011 to 2013. *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. 2007-2013). 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 nine variables from 2011-2013. 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 in balanced panel. We test the effect of margin buying by estimating the following model in Column (1) and (4):

$$DA1_{i,t} = \beta_0 + \beta_1 Margin\_buy\_1[1,2]_{i,t} + \beta_2 ROA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 BM_{i,t} + \beta_5 SIZE_{i,t} + \varepsilon_{i,t}$$

We test the effect of short selling by estimating the following model in Column (2) and (5):

$$DA1_{i,t} = \beta_0 + \beta_1 Short\_sell\_1[1,2]_{i,t} + \beta_2 ROA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 BM_{i,t} + \beta_5 SIZE_{i,t} + \varepsilon_{i,t}$$

In Column (3) and (6), we include both margin buying and short selling measures in the same equation.

**Panel A. Correlation Matrix of Control Variables**

	DA1	ROA%	LEV%	BM%	SIZE	Margin_ buy_1	Short _sell_1	Margin _buy_2	Short _sell_2
ROA%	-0.043								
LEV%	0.064	<b>-0.512</b>							
BM%	0.022	<b>-0.554</b>	<b>0.567</b>						
SIZE	-0.051	<b>0.401</b>	-0.049	<b>-0.197</b>					
Margin_ buy_1	0.042	<b>-0.171</b>	0.013	0.004	-0.055				
Short_se ll_1	-0.053	0.053	-0.011	<b>-0.215</b>	<b>0.333</b>	<b>0.221</b>			
Margin_ buy_2	<b>0.070</b>	<b>-0.090</b>	-0.007	<b>-0.083</b>	-0.040	<b>0.798</b>	<b>0.140</b>		
Short_se ll_2	-0.031	<b>0.097</b>	<b>-0.077</b>	<b>-0.212</b>	<b>0.166</b>	<b>-0.201</b>	<b>0.535</b>	-0.044	

**Panel B. Fama-MacBeth Regression**

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	DA1	DA1	DA1	DA1	DA1	DA1
Margin_buy_1	<b>0.006**</b> (2.04)		<b>0.008**</b> (2.24)			
Margin_sell_1		-0.534 (-1.37)	-0.667 (-1.41)			
Margin_buy_2				<b>0.008***</b> (2.87)		<b>0.011**</b> (2.19)
Margin_sell_2					-0.381 (-0.99)	-0.538 (-1.10)
ROA	-0.001 (-0.29)	-0.001 (-0.34)	-0.001 (-0.30)	-0.001 (-0.35)	-0.001 (-0.35)	-0.001 (-0.39)
LEV	0.000 (1.55)	<b>0.000*</b> (1.67)	<b>0.000*</b> (1.71)	0.000 (1.20)	0.000 (1.69)	0.000 (1.38)
BM	-0.004 (-0.13)	-0.016 (-0.54)	-0.017 (-0.51)	-0.001 (-0.04)	-0.013 (-0.48)	-0.012 (-0.38)
SIZE	-0.004 (-0.98)	-0.002 (-0.77)	0.000 (-0.25)	-0.003 (-0.58)	-0.002 (-1.69)	0.000 (0.15)

**Panel C. Pool Regression with fixed effect**

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	DA1	DA1	DA1	DA1	DA1	DA1
Margin_buy_1	0.003 (1.46)		0.003 (1.53)			
Margin_sell_1		-0.137 (-0.74)	-0.162 (-0.87)			
Margin_buy_2				<b>0.005**</b> (2.00)		<b>0.004**</b> (1.99)
Margin_sell_2					-0.088 (-0.50)	-0.086 (-0.50)
ROA	0.000 (-0.03)	0.000 (-0.27)	0.000 (-0.10)	0.000 (-0.05)	0.000 (-0.24)	0.000 (-0.09)
LEV	0.000 (1.40)	0.000 (1.49)	0.000 (1.49)	0.000 (1.33)	0.000 (1.41)	0.000 (1.33)
BM	-0.008 (-0.42)	-0.016 (-0.82)	-0.012 (-0.64)	-0.005 (-0.29)	-0.013 (-0.72)	-0.007 (-0.37)
SIZE	-0.006 (-1.06)	-0.004 (-0.78)	-0.004 (-0.70)	-0.005 (-1.02)	-0.005 (-0.99)	-0.005 (-0.93)
Adjusted R square	0.012	0.010	0.014	0.016	0.009	0.016



**Table 9. Tests for the Effects of Margin Trading 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. *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. 2007-2013). 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 nine variables in unbalanced panel from 2011-2013. 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 in unbalanced panel. We test the effect of margin buying by estimating the following model in Column (1) and (4):

$DA1_{i,t} = \beta_0 + \beta_1 Margin\_buy\_1[1,2]_{i,t} + \beta_2 ROA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 BM_{i,t} + \beta_5 SIZE_{i,t} + \varepsilon_{i,t}$  We test the effect of short selling by estimating the following model in Column (2) and (5):

$$DA1_{i,t} = \beta_0 + \beta_1 Short\_sell\_1[1,2]_{i,t} + \beta_2 ROA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 BM_{i,t} + \beta_5 SIZE_{i,t} + \varepsilon_{i,t} .$$

In Column (3) and (6), we include both margin buying and short selling measures in the same equation.

**Panel A. Correlation Matrix of Control Variables**

	DA1	ROA%	LEV%	BM%	SIZE	Margin _buy_1	Margin _sell_1	Margin _buy_2	Margin _sell_2
DA1	1.000								
ROA%	<b>-0.148</b>	1.000							
LEV%	<b>0.058</b>	<b>-0.444</b>	1.000						
BM%	0.031	<b>-0.431</b>	<b>0.547</b>	1.000					
SIZE	<b>-0.061</b>	<b>0.366</b>	-0.004	-0.033	1.000				
Margin_buy_1	0.045	<b>-0.180</b>	<b>-0.126</b>	<b>-0.132</b>	<b>-0.300</b>	1.000			
Margin_sell_1	<b>-0.070</b>	<b>0.081</b>	<b>0.055</b>	-0.049	<b>0.370</b>	-0.004	1.000		
Margin_buy_2	0.042	<b>-0.136</b>	<b>-0.157</b>	<b>-0.205</b>	<b>-0.344</b>	<b>0.932</b>	<b>-0.102</b>	1.000	
Margin_sell_2	<b>-0.075</b>	<b>0.082</b>	-0.036	<b>-0.123</b>	<b>0.133</b>	-0.074	<b>0.586</b>	0.006	1.000

**Panel B. Fama-MacBeth Regression**

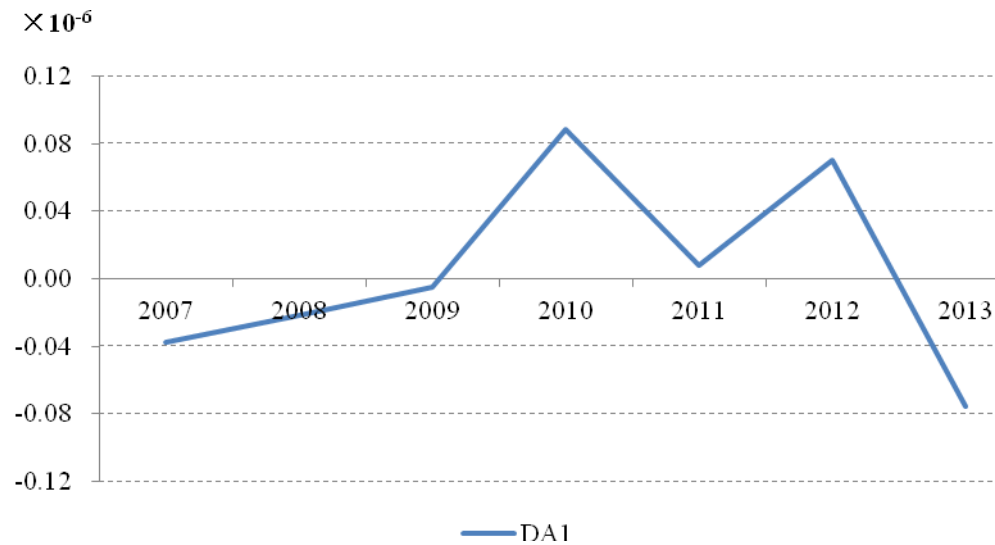
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1
Margin_buy_1	<b>0.006**</b> (2.37)		<b>0.008***</b> (2.72)				<b>0.006***</b> (2.98)		<b>0.008***</b> (3.32)			
Margin_sell_1		-0.601 (-1.41)	-0.719 (-1.51)					-0.593 (-1.58)	<b>-0.705*</b> (-1.70)			
Margin_buy_2				<b>0.008**</b> (2.55)		<b>0.011**</b> (2.31)				<b>0.008***</b> (2.93)		<b>0.011***</b> (2.64)
Margin_sell_2					-0.580 (-1.46)	-0.724 (-1.57)					<b>-0.597*</b> (-1.74)	<b>-0.734*</b> (-1.85)
ROA	-0.001 (-0.31)	-0.001 (-0.34)	0.000 (-0.29)	-0.001 (-0.42)	-0.001 (-0.36)	-0.001 (-0.41)						
LEV	0.000 (-0.18)	0.000 (0.09)	0.000 (0.40)	0.000 (-0.37)	0.000 (0.04)	0.000 (0.17)						
BM	0.014 (0.54)	0.004 (0.16)	0.003 (0.11)	0.015 (0.57)	0.002 (0.07)	0.002 (0.06)	<b>0.011***</b> (3.82)	0.003 (1.12)	0.004 (0.68)	<b>0.014***</b> (3.43)	0.001 (0.35)	0.005 (0.59)
SIZE	-0.003 (-0.94)	-0.002 (-0.58)	0.000 (0.11)	-0.001 (-0.39)	-0.003 (-1.55)	0.001 (0.43)	-0.004 (-0.75)	-0.003 (-1.01)	0.000 (-0.03)	-0.003 (-0.43)	-0.004 (-1.12)	0.000 (-0.05)

**Panel C. Pool Regression with fixed effect**

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1	DA1
Margin_buy_1	<b>0.002*</b> (1.85)		<b>0.002**</b> (2.04)				<b>0.003**</b> (2.42)		<b>0.003***</b> (2.58)			
Margin_sell_1		<b>-0.268*</b> (-1.92)	<b>-0.295**</b> (-2.11)					<b>-0.234*</b> (-1.67)	<b>-0.266*</b> (-1.90)			
Margin_buy_2				0.002 (1.58)		<b>0.002**</b> (2.04)				<b>0.002**</b> (2.03)		<b>0.003**</b> (2.47)
Margin_sell_2					<b>-0.413***</b> (-2.99)	<b>-0.454***</b> (-3.26)					<b>-0.402***</b> (-2.88)	<b>-0.451***</b> (-3.21)
ROA	<b>-0.002***</b> (-4.31)	<b>-0.002***</b> (-4.68)	<b>-0.002***</b> (-4.31)	<b>-0.002***</b> (-4.43)	<b>-0.002***</b> (-4.68)	<b>-0.002***</b> (-4.41)						
LEV	0.000 (0.33)	0.000 (0.32)	0.000 (0.56)	0.000 (0.26)	0.000 (0.22)	0.000 (0.40)						
BM	-0.018 (-1.51)	<b>-0.022*</b> (-1.84)	<b>-0.020*</b> (-1.72)	-0.016 (-1.39)	<b>-0.025**</b> (-2.15)	<b>-0.022*</b> (-1.88)	0.007 (0.73)	0.004 (0.46)	0.006 (0.63)	0.009 (0.90)	0.000 (-0.01)	0.003 (0.35)
SIZE	-0.002 (-0.42)	0.000 (0.07)	0.001 (0.36)	-0.001 (-0.31)	-0.002 (-0.55)	0.000 (-0.12)	<b>-0.007**</b> (-2.07)	<b>-0.007*</b> (-1.77)	-0.005 (-1.21)	<b>-0.007*</b> (-1.95)	<b>-0.009**</b> (-2.48)	<b>-0.006*</b> (-1.74)
Adjusted R-square	0.027	0.027	0.030	0.026	0.031	0.034	0.009	0.007	0.012	0.008	0.011	0.016

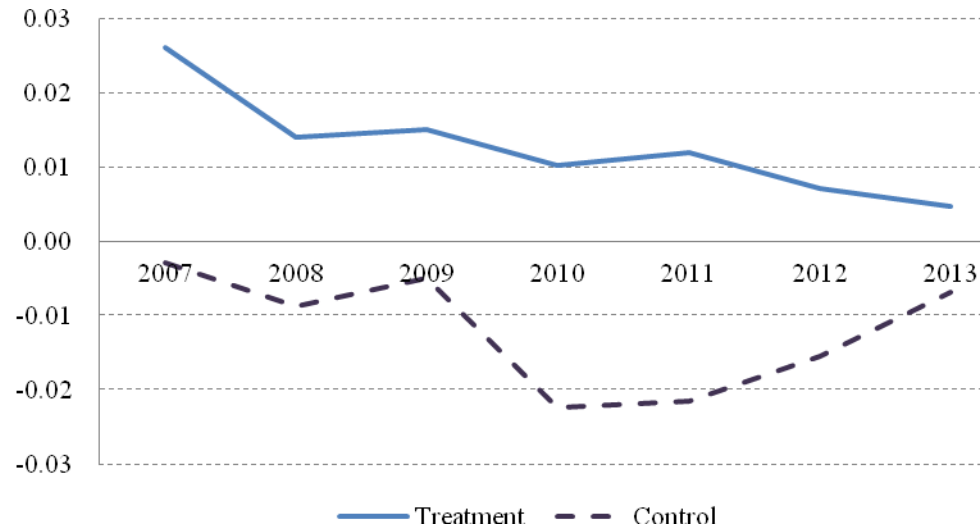
### Figure 1. Discretionary Accruals from 2007 to 2013

This figure reports the firm discretionary accrual measure for the total sample of the treatment and control groups from 2007 to 2013. Discretionary accrual measure *DA1* 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. 2007-2013). All variables are winsorized at 1% and 99% levels.



### Figure 2. Discretionary Accruals for Pilot vs. Non-Pilot Firms from 2007 to 2013

This figure reports the firm discretionary accrual measure for the total sample of the treatment and control groups from 2007 to 2013. The treatment group is designed by choosing all firms participating in the program for all three years from 2011 to 2013, while the control group is constructed with all firms not participating in the program at all from 2011 to 2013. Discretionary accrual measure  $DA1$  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. 2007-2013). All variables are winsorized at 1% and 99% levels.



### Figure 3. Margin Buying Activities of Pilot Firms from 2010 to 2013

This figure reports the trend of the firm's margin buying activities for the unbalanced panel of the treatment group from 2010 to 2013. *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 2013. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2007-2013). All variables are winsorized at 1% and 99% levels.

Figure 3.1 Trend of margin buying balance from 2010 to 2013

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).

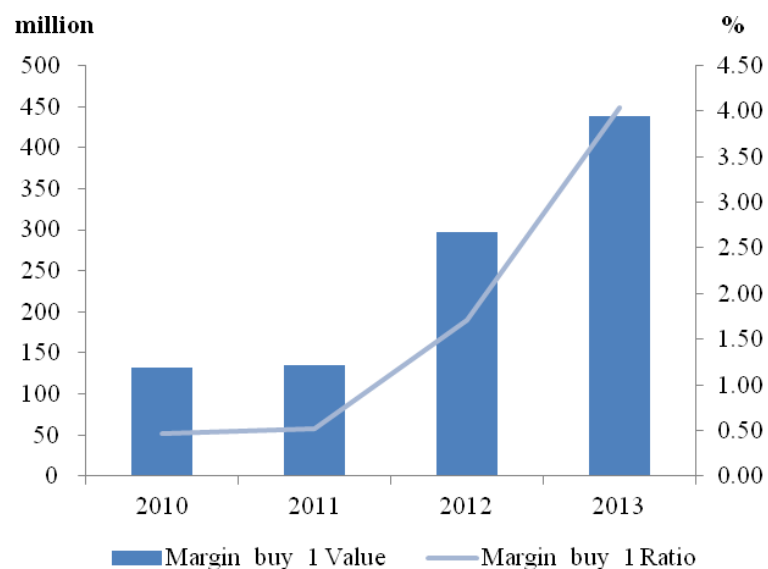
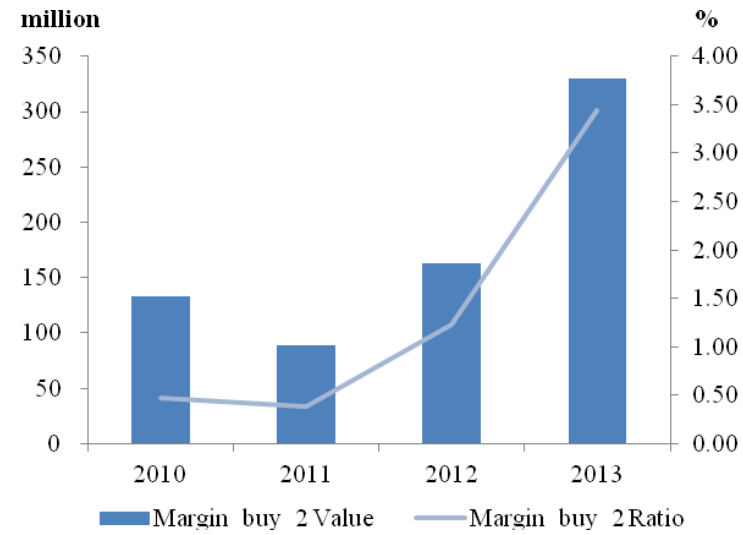


Figure 3.2 Trend of net change in margin buying from 2010 to 2013

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 2013

This figure reports the trend of the firm's short sales for the unbalanced panels of the treatment group from 2010 to 2013. *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 2013. The sample requires a firm to have available data to calculate firm characteristics and discretionary accruals in the entire sample period (i.e. 2007-2013). All variables are winsorized at 1% and 99% levels.

Figure 4.1 Trend of short selling balance from 2010 to 2013

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).

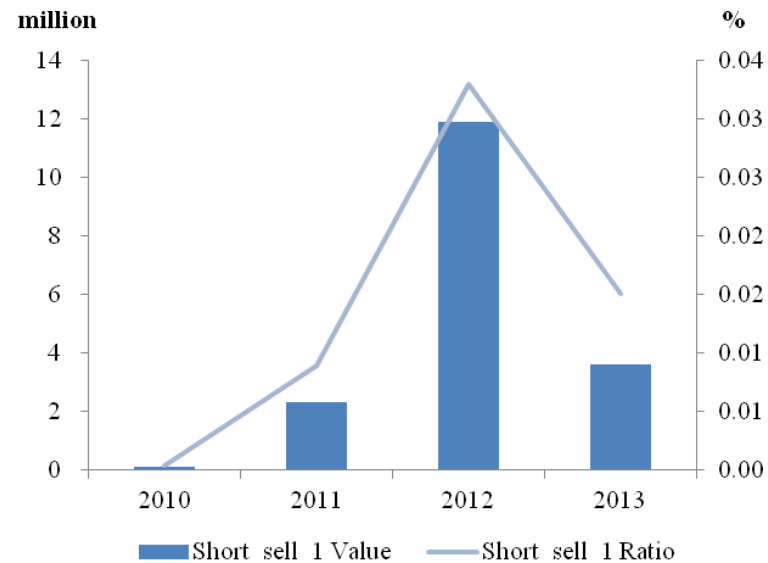




Figure 4.2 Trend of net change in short selling from 2010 to 2013

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).

