Earnings Management and Cross Listing: Evidence from a Natural Experiment in China

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Abstract: Our paper provides new evidence on earnings management of cross-listed firms by exploiting a natural experiment in China. Around 2000, regulators introduced stringent delisting requirements that firms with consecutive earnings losses for more than two years would be delisted from the mainland Chinese exchanges. No such delisting requirement was imposed in the Hong Kong exchange. We examine whether listed firms in Chinese market manage earnings to avoid delisting and whether mainland Chinese firms cross-listed in Hong Kong manage earnings the same way. Using a difference-in-difference methodology, we compare cross-listed and non-cross-listed firms' earnings management incentives before and after the policy change. We find that the new delisting threats induce rampant earnings management on mainland markets but cross listing in Hong Kong has a strong curbing effect on earnings management. The evidence suggests that bonding hypothesis of cross listing is at work in the Hong Kong exchange.

Key words: Earnings management, Cross listing, Delisting regulations, Bonding hypothesis

JEL classification: C14, G18, M41

1 Introduction

The bonding hypothesis has been proposed to explain why some firms cross list on foreign markets, where there are usually better investor protections (Coffee, 1999, 2002; Doidge, Karolyi and Stulz, 2004; Stulz, 1999). That is, firms want to distinguish themselves from peers at home, and signal their quality to investors by cross listing and bonding with a more mature market.[2] If bonding hypothesis is important, firms that choose to cross-list should adhere to better transparency and are less likely to manage earnings compared to firms that do not choose to cross-list.

Our paper provides new evidence on earnings management of cross-listed firms by exploiting a natural experiment in China. Around 2000, Chinese regulators introduced a set of new stringent delisting requirements. Under the new regulations, firms with continuous earnings losses for more than two years would be delisted from the mainland Chinese exchanges. Such policy tightening did not apply to Hong Kong markets. In this paper, we examine whether listed firms in the mainland market manage earnings to avoid small losses in response to delisting threats. We further ask whether mainland-based firms cross-listed in Hong Kong manage earnings the same way as those that do not cross list in Hong Kong. Using a difference-in-difference methodology, we compare cross-listed and non-cross-listed firms' earnings management incentives before and after the policy change.

Previous evidence on earnings management of cross-listed firms focus on the effects of cross-listing in the U.S. Lang, Raedy and Wilson (2006) use matched samples mainly based on growth in sales and found that cross-listed firms on U.S. markets do

[2] There is some evidence in the early literature that cross-listed firms demonstrate better market performances than their peers in home country (Doidge, Karolyi, and Stulz, 2004; Karolyi, 2006), which supports the bonding hypothesis.

manage earnings. Lang, Raedy and Yetman (2003) argue that firms cross-listed in the U.S. indeed manage earnings less compared to peers at home. However, they also find that firms cross-listed in non-U.S. markets do not reduce the level of earnings management.

We aim to add to these evidence. Our paper contributes to the literature in two dimensions. First, the policy change in 2000 provides an exogenous shock that increases firms' incentives to manage earnings. Instead of using a sample of firms that are matched to the cross-listed firms in other characteristics, we can compare the earnings management of the cross-listed firms before and after the policy change, while potential firm characteristics influencing earnings management incentives were largely held constant. Second, we study the bonding hypothesis in the context of capital markets outside the U.S. The Hong Kong Stock Exchange (HKSE) is currently the third largest stock exchange in Asia (after Tokyo and Shanghai) in terms of market capitalization, and the sixth in the world. Yet, there is little work on the effect of Chinese firms cross-listed in Hong Kong. Our paper provides new evidence that Hong Kong market has curbing effect on earnings management.

In our paper, we focus on earnings management in the particular measure of loss avoidance around zero profits, and we show that this behavior is largely due to delisting avoidance. We adopt a more elaborate definition of earnings management using the latest technique introduced in Bollen and Pool (2009), with which we provide strong evidence against sample selection concerns across firms with profits or losses. We find that new delisting threats induced rampant earnings management in mainland markets compared to before, but such pattern was absent in Hong Kong markets. Regarding potential endogeneity in cross listing decisions – the concern in

particular that cross-listed firms tend to be larger and larger firms have less incentive to manage earnings, we control for firm size and other covariates in difference-in-difference estimations, taking advantage of the exogenous delisting policy switch on the mainland only. We obtain consistent estimations across various specifications. We also study the heterogeneity of cross listing effects across firms connected to different levels of governments. Overall, this comparison exercise prompts us to suggest that the bonding hypothesis works for Chinese firms listing in Hong Kong markets.

The remainder of the paper is structured as follows. The next section reviews the relevant literature, followed by a brief introduction of the institutional background in Section 3. Section 4 provides an overview of our sample with some descriptive statistics. Section 5 reports some graphical evidence. Section 6 reports the differences-in-differences estimation results and discusses in depth the heterogeneity of the policy impacts. The last section concludes.

2 Literature Review

Recent cross listing literature suggests the bonding hypothesis as an important motive for firms to cross list on a foreign market (Coffee, 1999, 2002; Stulz, 1999). There is evidence for better market performance of cross-listed firms in U.S. markets compared to their peers from home country (e.g. Doidge, Karolyi and Stulz, 2004). But such better performance does not necessarily come at no cost. Karolyi (2006) points out that cross listing not only attracts more capital, but also brings about more stringent accounting requirements.

Other researchers note some fundamental heterogeneity between cross-listed firms

and their non-cross-listed peers, and bring up concerns about sample selection in cross listing decision. For instance, Coffee (2002) asks why there are a lot of firms that are eligible for cross listing but choose not to do so. He provides evidence that cross-listed firms differ in enjoying better growth prospects. Cross-listed firms are those who are confident about their future, hence are willing to sacrifice some of the private benefits of control to obtain equity finance. Market segmentation still exists as a result. Findings in Foerster and Karolyi (1999) and Bailey, Karolyi and Salva (2006) support this argument. Moreover, the literature comes up with some dissenting evidence against better market performances in the result of cross listing, thus raises the issue of earnings management even for cross-listed firms (e.g. Lang, Raedy and Wilson, 2006). But researchers also emphasize the uniqueness of U.S. markets in curbing earnings management of cross-listed firms (e.g. Lang, Randy and Yetman 2003).

Another branch of literature deals with the identification of earnings management, as it is quite difficult to come up with a perfect measure to capture such behavior but nothing else. Burgstahler and Dichev (1997) and Degeorge *et al.* (1999) are two seminal papers on earnings management. Burgstahler and Dichev (1999), for instance, assume that the latent true distribution of earnings either in level or in first difference should be continuous, so that the difference between the heights of two bars nearest to zero in a histogram is viewed as a measure for the level of earnings management. Dechow, Richardson and Tuna (2003) claim that the kink in earnings distribution not necessarily means earnings management. They propose alternative explanations: it is possible that managers take real actions to improve performance around zero; or there might be exchange listing preferences for profitable firms. Durtschi and Easton (2005) propose similar ideas and emphasize on the differences between characteristics of observations on two sides.

Nevertheless, most papers in the literature use similar statistical methodology in Burgstahler and Dichev (1999). Recently, in the context of hedge fund returns evaluation, Bollen and Pool (2009) extend the crude comparison of nearest two bars around zero to a more elaborate statistical method utilizing information of the whole distribution, and deal with the potential endogeneity problem in a more sophisticated manner.

Earnings management in the Chinese context has been studied before, with most emphasis on the importance of institutions and regulations. For example, Chen and Yuan (2004) and Yu, Du and Sun (2006) both establish the existence of earnings management around the three thresholds set by the regulators as requirements for rights issuance, namely 0, 6 and 10 per cent in ROE. To our best knowledge, there is little conclusive evidence about whether cross listing in a non-U.S. market has a curbing effect on earnings management. The Chinese institutional setup provides a unique opportunity to identify the real impact of cross listing on earnings management.

3 Institutional background

In this section, we introduce the institutional background on both mainland markets and Hong Kong markets, and explain why earnings management on the mainland side is often regulation induced, and such incentives are absent on Hong Kong markets. Therefore, a natural experiment setup is possible for comparison.

The stock exchanges in mainland China were established in 1990, mainly to privatize China's loss-making state-owned enterprises (SOEs). The Chinese Securities Regulatory Commission (CSRC) has been the main regulatory body since October

1992. Because of tight control in the capital market, the enthusiasm of local governments to get more funding for their own SOEs on the equity market was very high. 1110 out of 1224 listed companies at year-end 2002 were former SOEs administered by provincial governments (Green, 2003, p. 13). However, once those loss-making SOEs were listed, little effort was exerted to improve their performance. Instead of further reforming the stock market and allowing the market forces play its role, the CSRC tried to provide some direct incentives to the listed firms themselves by setting profit requirements first for rights issuance, and then for keeping the listing status.

There have been fairly exogenous variations in the CSRC's specific requirements for rights issuance (Yu, Du and Sun, 2006) and delisting policies, which facilitates our identification for earnings management.

Delisting regulations first appeared in January 1998 in response to the emergence of poor-performing listed firms with consecutive losses, when the *Listing Rules* prescribed that firms with losses for two years in a row should be under special treatment (ST) and their interim reports be audited.[3] One and half years later in June 1999, *Regulations Concerning Suspension of Trading* required that all firms with losses for three consecutive years should be suspended from normal trading and their shares labeled as particular transfer (PT).[4] In February 2002, the CSRC further required that PT firms' stocks be terminated from trading on the market if they failed to avert losses during a grace period of 12 months. Therefore, 2000 seems to be an

[3] ST also means that the stocks are traded with a 5 per cent price change limit each day, versus 10 per cent for normal stocks.

[4] PT means that the shares can only be traded on Friday with a price ceiling of 5 per cent fluctuation on a single day, but no restriction on the downside.

important threshold year in terms of delisting regulations.[5] The earliest delisting occurred in mid 1999, and there were a few other companies delisted before 2002. There were altogether 60 companies delisted before the end of 2007.

The policy changes on rights issuance and delisting are summarized in Table 1, which divides the time span into four periods according to the regulation changes. The real threat of involuntary trading suspension only took effect after around 2000. This delay in implementation timing is used to identify the policy impact in the subsequent sections. As for the requirements for rights issuance, there had been various changes, but the threshold requirement of 0 per cent in ROE has always been applicable.

[Table 1 about here]

Since many listed firms are also cross-listed in the HKSE, where different policies for rights issuance and delisting apply, comparison across border yields interesting insights. The securities exchange in Hong Kong began formally in the late 19th century with the first establishment in 1891, and the HKSE has predominantly been the main exchange for Hong Kong, especially so in the 21st century after a series of mergers and acquisitions. The exchange is currently the sixth largest in the world, and "had 1,477 listed companies with a combined market capitalization of HK$ 16.985

[5] The CSRC also specified in November 1993 that listed firms were allowed to issue rights to existing shareholders if they had been profitable in the previous two years. In December 1994, the profit requirements for additional rights issuance were tightened to be at least three years' profits and a minimum three-year average ROE of 10 per cent. In January 1996, the threshold was further increased to a minimum ROE of 10 per cent in each of the previous three years. Due to overwhelming criticism that such rigid requirements were counterproductive and induced earnings management instead, in March 1999, the threshold was lowered to a minimum three-year average ROE of 10 per cent and a minimum ROE of 6 per cent in each of previous three years. And in March 2001, the standard was further lowered to an average ROE above 6 per cent in the past three years only. In a nutshell, the threshold requirement of 0 per cent ROE emerged in year-end 1993 and persisted afterwards. Other requirements for rights issuance peaked in about 1996-1999 and were relaxed a little after 1999.

trillion" ("Hong Kong Stock Exchange", 2012) as of 30 November 2011.

The first Chinese firm to cross list on the HKSE is the Tsingtao Brewery in July 1993. Just three months before that, the State Council in China issued its first regulation on overseas listing. (Sun, Wu and Tong, 2008) Apparently, the main motivation for the decision of "listing overseas" was to "raise capital" for restructured SOEs. Such cross listing decisions later were also highly regulated. Indeed, many cross-listed firms are SOEs, and no matter whether they got listed on the mainland or Hong Kong first, these firms had to obtain permission from the mainland government to get listed or issue extra shares in Hong Kong.

In HKSE, firms planning to have IPOs have to meet various conditions in terms of profit, market capitalization, revenue, or cash flow.[6] But there are no specific regulatory requirements that listed firms have to satisfy in order to avoid delisting – generally, a sufficient level of operations would warrant continued listing of firms' shares, which means that the delisting policies in Hong Kong are more lenient and market-orientated than in the mainland.[7] In fact, there have been few instances of involuntary delisting of Chinese firms listed on the HKSE, let alone cross-listed Chinese firms.[8] Most of the delisting decisions for mainland-based firms have been a result of mergers or acquisitions.[9] Hence, mainland-based cross-listed firms face little delisting threats at least in their Hong Kong listing.

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[6] http://www.hkex.com.hk/eng/rulesreg/listrules/mbrules/vol1_2.htm, Chapter 8, retrieved on April 20, 2012.
[7] http://www.hkex.com.hk/eng/listing/listhk/faq.htm, item 13, retrieved on April 20, 2012.
[8] Authors' search for relevant news and announcements on the official website of the HKSE, http://www.hkse.com.hk/.
[9] For instance, the hot pot restaurant Xiao Fei Yang delisted itself in February, 2012 after acquired by Baisheng Food and Beverages Co. Another example is Zhengzhou China Resources Gas Co. planned to delist in February, 2012 from the HKSE after China Resources Gas Group Ltd. increased its stake. However, these two firms were only listed in Hong Kong, but not in the mainland. Examples of delisted cross-listed firms are even rarer.

There might also be other potential reasons for mainland-based cross-listed firms to avoid managing earnings. Hong Kong Exchange sometimes issues public reprimand on firms' accounting practices. Hong Kong Security and Futures commission has authority to launch investigation. There are also threats of class action lawsuits by shareholders. Furthermore, a firm cross-listed in Hong Kong gets more scrutiny by financial press and institutional investors in Hong Kong.

In this paper, we would like to focus on earnings management induced by delisting regulatory threats, and entertain the hypothesis that firms cross-listed in the HKSE tend to have a lower level of earnings management with other things equal, i.e. with a less probability of ROE falling in the region [0, 1%], because they face less pressure of being delisted.

4 Sample and Graphical Evidence

Our data come from the China Stock Market and Accounting Research Database (CSMAR), and our original sample covers information from quarterly accounting announcements of all the firms listed in the mainland stock exchanges from end of 1990 to end of 2009. Moreover, we have relevant information on IPOs, firms' corporate structure, and parallel accounting reports for firms cross-listed in the HKSE as well. Our sample has a longer time span than those often used in the literature, which provides us with an opportunity of exploring a rich history of policy variations.

The ROE measure is defined as earnings divided by book equity. We restricted our sample to observations with equity inside the 1 and 99 per cent percentiles. Extreme values of equity could lead to very small ROE, causing the distribution to falsely

cluster to the right of 0 per cent and bias upward our measure for earnings management at that point. We obtained a sample of 1657 firms and 51256 firm-quarter observations. Table 2 provides some descriptive statistics for the main variables of interest. For instance, the mean value for ROE is positive, yet below the threshold of 6 per cent.[10] The proportion of firms cross-listed in the HKSE in the end of 2008 is 3.88 per cent.

[Table 2 about here]

Next we provide some graphical evidence to illustrate the main results of our paper. We will first describe the major steps of the empirical methods in Bollen and Pool (2009), and apply it to our context.[11]

4.1 Methodology and measurement

We want to construct a *t*-statistic for the difference between empirical and expected densities in the latent distribution of ROE around certain threshold values, such as 0 per cent. It is helpful to use as much information as possible of the whole distribution for this test statistic – call it "difference statistic." Thus, three components are needed, the empirical and expected densities respectively, and the point-wise standard error. The former two come from histogram density estimate and kernel density estimate for the ROE distribution, sharing a same choice for bin width and bandwidth, while the last component comes from the point-wise bootstrap standard error. We lay out corresponding procedures as follows.

[10] The inconsistency in the observation numbers in Table 2 is merely due to missing values in some variables. Without any missing value, the number should be 51256.
[11] Only necessary steps are stated here for clarity purpose. Readers who are interested are referred to Bollen and Pool (2009) for more details.

First of all, the histogram of ROE provides an overall look of the empirical distribution and whether the actual probability distribution function (PDF) has significant discontinuities. The bin width, *b*, is the most important parameter. It determines the shape of the distribution, thus influences the level of discontinuities at certain values. In practice, the following rule of thumb for optimal bin width is proposed by Silverman (1986):

$$b = \alpha \cdot 1.364 \min(\sigma, \frac{Q}{1.340}) n^{-\frac{1}{5}} \quad (1)$$

where σ is the empirical distribution's standard deviation, *Q* is its interquartile range, *n* is the number of observations, and α is a scalar that depends on the type of underlying distribution assumed. As in Bollen and Pool (2009), we set $\alpha = 0.776$, corresponding to a normal distribution.[12]

Secondly, we assume smoothness for the true distribution, except for any discontinuities in the density function. By kernel density estimation, we could obtain the expected number of observations in each bin of the histogram. This is feasible because we use a Gaussian kernel[13] for computational convenience, thus the optimal choice of the bandwidth for the kernel coincides with that of the bin width for the histograms.[14] The estimator at point *t* becomes:

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[12] As noted by Bollen and Pool (2009), "[t]his definition and the MSE criterion above show that choosing the optimal bin width is somewhat of a circular reference in that it requires knowing the underlying distribution we aim to estimate. However, Devroye (1997) shows through simulation that the above rule is robust." (p. 14) It should be emphasized that in the next step of kernel density estimation, similar assumption is *not* needed.

[13] Silverman (1986) demonstrates through simulations that the choice of kernel is not very important, while the choice of the bandwidth matters a lot more for the resulting shape of the estimate.

[14] In fact, a histogram can be viewed as a kernel density estimator with a uniform kernel.

$$\hat{f}(t;h) = \frac{1}{nh}\sum_{i=1}^{n}\phi\left(\frac{x_i - t}{h}\right) \qquad (2)$$

where *h* is the bandwidth of the kernel, *n* is the number of observations, *x* represents the data, and ϕ is the probability density function of a standard normal distribution.

Finally, we estimate sampling variation in the histogram by generating random samples from the fitted kernel density, using the algorithm summarized in Hörmann and Leydold (2000). The algorithm bootstraps from the original sample with replacement and adds noise to the re-sampled data. In particular, it composes of the following steps to generate a sample of size *n* from a kernel density:

1. draw *n* independent random integers, denoted by $I_1, \ldots, I_n$, that are uniformly distributed on $\{1, 2, \ldots, n\}$;
2. generate *n* independent random variates, $W_1, \ldots, W_n$, that are distributed $k(\cdot)$, where *k* is the relevant kernel density;
3. the i^{th} element of the simulated sample from the kernel density is created as follows: $y_i = x(I_i) + b \cdot W_i$, where $x(I_i)$ is the I_i^{th} element of the original sample and *b* is the bandwidth of the kernel density estimation.[15]

The above procedure is repeated 999 times[16] in order to obtain enough draws for a large test power close to 1. The bootstrapped samples are then ordered respectively and point-wise standard errors can be directly calculated across samples at certain

[15] There is also a variance-corrected algorithm, which insures that the variance of the simulated sample equals the variance of the original data. Readers are referred to step 3 in Hörmann and Leydold (2000).

[16] As suggested in Davidson and MacKinnon (2004, chapter 4.6, pp. 155-166), the number of bootstrap draws, *B*, should be such in order to make $\alpha \cdot (B+1)$ to be an integer, where α is the desired confidence level for subsequent tests, i.e. the test size. In our case, the test size is 0.01, therefore *B* should be such values as 99, 999, etc.

values. The difference statistic would then be defined as:

$$d(t) = \frac{p(t) - \hat{f}(t;b)}{s(t)} \tag{3}$$

where $p(t)$ is the observed density from the histogram estimate, and $s(t)$ is the point-wise bootstrap standard error, and $d(t)$ stands for the difference statistic.

Figure 1 demonstrates a histogram estimate together with kernel density estimate and 99 per cent confidence intervals, for the ROE distribution of the entire sample. The range of the horizontal axis is restricted for a clearer demonstration. There is a big jump around 0, suggesting potential earnings management at this threshold value. Nevertheless, one cannot see formally how abnormal this jump is. Equation (3) allows us to transform information in this figure into the difference statistic in Figure 2, which is easier to interpret. The difference statistic is calculated at the center value of each bin in the histogram, for the mere sake of illustration. The two horizontal dashed lines are specified at values ±2.575, i.e. critical values for 99 per cent confidence intervals for a standard normal distribution. Appropriate reading of difference statistic outside these two lines at a certain level of ROE then translates into statistical significance at 1 per cent confidence level for the statistic.

[Figure 1 about here]

Figure 1 shows that there are all obvious jumps at thresholds 0, 6, and 10 per cent in ROE – the upper ends of the histogram bars lie outside the corresponding 99 per cent confidence intervals. The jump around 0 per cent is particularly sharp. Therefore, the difference statistics lies outside the 99 per cent confidence intervals in Figure 2 at these threshold values of ROE. The difference statistic plots can be read as showing

statistical significance, while the original histograms suggest economic significance of the jump. Due to the relative convenience in reading of difference statistic plots, we would mainly rely on them instead of histograms with kernel density estimates in the following analysis.

[Figure 2 about here]

4.2 Delisting avoidance as the main motive

The jump around 0 per cent is obvious in Figures 1 and 2. We provide some evidence below that such a jump is mainly due to earnings management in listed mainland firms to avoid delisting, in response to regulatory threats. As mentioned in the literature review, there are other potential reasons for density of ROE to display a kink around zero. These include the rights issuance requirements of certain ROE thresholds, or simply to avoid loss in order to please investors. We provide evidence against these alternative hypotheses. Historical variations in regulatory policies are first explored for this purpose.

Figure 3 summarizes the four periods with the difference statistic plots corresponding to the regulatory changes in Table 1. One could easily demonstrate that the changes in the test statistic correspond well with the variations in ROE requirements.[17] For instance, after 2000, the statistical significance at the 10 per cent threshold largely disappears, as the standard in ROE was lowered to 6 per cent. This lends support to the reliability of our direct measure of earnings management.

[Figure 3 about here]

[17] Since the vertical axes are of the same scale, it suffices to compare directly across different figures.

Since positive profit is always required for rights issuance while similar requirements for the delisting policies took effect only after 1998, and the most credible threat of trade suspension emerged around 2000, we can compare our measure before and after 2000 to evaluate the pure effect of delisting. The values of the difference statistics are 10.54 and 42.29, for before- and after-2000 subsample respectively; and their difference is 31.75,[18] which could be attributed to the delisting effect, rather than the rights issuance effect. To note, the jump around 0 per cent in ROE is particularly large after 2000 as shown in Figure 3.

In a nutshell, the rights issuance and delisting incentives are both important, but the latter is the dominant cause. Of particular interest to our result is the fact that profitability requirement for rights issuance peaked in about 2000 and then declined, while the observed earnings management around 0 per cent became most serious after 2000. This further suggests that delisting policy requirements are the dominant factor behind earnings management in China.

Moreover, the strong correspondence between data and policy variations also serves as counter-evidence against alternative hypotheses for the jump around the threshold values in ROE. These alternative hypotheses often raised in the literature include survivorship bias, catering to investors, catering to investors' preferences for positive earnings, or some inherent non-linearities in earnings. Our data do not suffer from the survivorship bias since all listed firms, including dead ones, were included in our sample. Furthermore, if catering to investors' preferences for positive earnings or

[18] One could easily generate the point-wise standard errors for these difference statistics using the same bootstrap idea mentioned in the last section. Then a new *t*-statistic could be constructed for the difference between these two difference statistics. In fact, this double check applies to all the direct comparisons across various groups in the rest of this paper. Nevertheless, we omit the procedures here since the difference is fairly large.

some inherent nonlinearities in earnings matter, these biases should have been always present. That is to say, these hypotheses alone cannot explain the changes in jumps of difference statistics over time, corresponding to the changes in regulation requirements. The claim that some firms manage earnings to cater to the regulations better explains the pattern observed in our data.

4.3 Hong Kong versus mainland listed firms

Given that Chinese firms indeed manage earnings in response to delisting regulation threats, next we compare the potential earnings management of mainland firms cross-listed firms in the HKSE, where same market-orientated rules have been applied both before and after year 2000, and those listed in the mainland only.

First we discuss what kind of firms are more likely to cross-list. Panel A of Table 3 shows that sector-wise, firms from finance, public, and industrial sectors are more likely to cross list. Panel B provides some descriptive statistics of cross-listed and non-cross-listed firms.[19] Cross-listed firms are generally larger in terms of having a higher ratio of cash flows to total assets (or total shareholders' equity), lower liquidity, larger size, and higher leverage level. As we mentioned in the institutional background, governments are interested in listing SOEs to attract more capital, and cross-listing in Hong Kong serves this end as well. The cross-listing decision in the HKSE is highly regulated, and results such a pattern of larger cross-listed firms.

[Table 3 about here]

Figure 4 compares the level of earnings management for cross-listed firms in the

[19] We winsorize the variables at the 1% level for each tail.

HKSE (on the right) and all remaining non-cross-listed firms in the mainland.[20] For cross-listed firms, the difference statistics are 0.5824 and 6.5327 at 0 per cent in ROE before and after 2000 respectively. Cross-listed firms started to manipulate earnings only very slightly. However, for firms listed in the mainland, the parallel figures are 15.8219 and 44.6159 before and after 2000. The contrast is very telling. While mainland regulations provided incentives for listed firms to manage earnings to meet the threshold requirements, cross listing in a mature market – in our case the HKSE – could potentially curb earnings management, at least to some extent. The same set of firms indeed behaved very differently in different regulatory environments.

[Figure 4 about here]

Since larger firms tend to be more profitable and are more likely to be politically connected (especially in China), these firms have less incentive to manage earnings to avoid delisting. Therefore, we try to control firm size in comparison. Figure 5 draws the histograms for ROE of cross-listed and non-cross-listed firms in the group of top and bottom 30% sales, respectively. While the difference between the jump around 0 is barely noticeable for firms with top-level sales, that for firms with bottom-level sales is still quite large. This comparison indicates that larger firms indeed have less incentive to manage earnings. Moreover, though cross-listed firms have a smaller jump around zero compared to non-cross-listed firms in either group, the jump is still quite obvious. Indeed, when we draw similar histograms for local Hong Kong firms that only list in the HKSE, the corresponding "jump" is much smaller. This difference

[20] An ideal comparison would be across the same group of firms before and after cross listing. However, the sample size would be too small for the distributional approach to yield meaningful results if we compare this way. Also, it might be worthwhile to mention that after cross-listing, the accounting announcements on both markets should report the same profit information, though the required measures might differ. Therefore, it is meaningless to compare ROE from the reports on two sides after a firm gets cross-listed.

means that although cross listing in Hong Kong curbs earnings management, it does not eliminate such behavior completely. The result supports the difficulty of law enforcement for malpractice of cross-listed firms in Hong Kong mentioned in the institutional background, and is consistent with the relevant literature on the U.S. case (Siegel, 2005). However, we should note that the level of the jump only hints at the economic significance, and the standard error has not been controlled for in the histograms.

[Figure 5 about here]

Figure 6 shows plots of difference statistics, which take standard errors into account. We see that cross-listed firms do not display statistically significant earnings management around 0, no matter their sales levels are high or low. We do see that non-cross-listed firms with either high or low sales levels do display significant earnings management around 0. Again, it is noticeable that non-cross-listed firms with higher sales levels have much less earnings management than their lower counterparts, which again confirms our valid concern that larger firms have less incentive to manage earnings.

[Figure 6 about here]

5 Difference-in-difference estimation results

5.1 Identification strategy

We resort to the regression approach now and adopt a difference-in-difference (DD) estimation strategy in order to further control the potential influence from various

covariates, including firm size. (See for example Angrist and Krueger (1999), Campello, Ribas and Wang (2011)) The basic idea of DD estimation is to compare the policy effect upon a treatment group and a control group. The control group is not influenced by the policy change during the same time period. Using the two-fold difference, i.e. the DD estimator, one could eliminate the common trend effect from the actual policy effect. Moreover, including covariates in regressions can capture more unobserved heterogeneity.

In our context, the first difference comes from the implementation of delisting regulations before and after 2000, the year when the delisting policy became binding. The second difference is the one between non-cross-listed firms and the cross-listed ones. Cross-listed firms are mainly subject to market-oriented delisting regulations, and are significantly less subject to the threat of involuntary delisting regulation. So the 2000 delisting regulation change does not have a direct impact on them, making them an ideal candidate for comparison. Figure 4 provides direct evidence supporting our identification strategy: cross-listed firms are indeed less affected by regulation changes on the mainland.

Here we try to estimate this two-fold difference with a DD estimator. Under the classical probit model, we have the following regression specification:

$$\begin{aligned} &\Pr(smallprofit_{it} = 1 \mid X) = \Phi(X'\beta) \\ &X'\beta = \beta_0 + \beta_1 D_{it} + \beta_2 P_{it} + \beta_3 D_{it} \cdot P_{it} + \beta_4 X_{it} + \beta_5 E_t + \alpha_i \end{aligned} \tag{4}$$

where βs are parameters to be estimated and $smallprofit_{it}$ is a dummy that equals to 1 if the ROE of firm *i* in year *t* falls in the region of [0, 1%], where the choice of the cutoff point 1 per cent follows Leuz, Nanda and Wysocki (2003). It is acknowledged

that without any earnings management, a firm's ROE could fall between 0 and 1 per cent as well. However, we would like to argue that such a small profit suggests a higher probability of earnings management. D_{it} is a dummy that equals to 1 for non-cross-listed firms, and 0 for cross-listed firms. P_{it} is the policy break dummy, which equals to 1 after 2000, and 0 before that year. Therefore, β_3 before the interaction of the two dummies yields the DD estimator that interests us most. In addition, X_{it} is a vector of firm-level controls, such as basic characteristics, IPO information, size factors (sales, numbers of staff and stakeholders, etc.), and corporate structure details (numbers of outside directors and high-level officials). E_t stands for factors about the investment environment, which do not vary across firms, such as the year-end Shanghai composite index. α_i denotes the firm-level fixed effect.

5.2 Main results

The outputs of probit regressions on a subsample of annual observations, i.e. those in the last quarter of each year, are shown in Table 4.[21] The regressions are restricted on a shorter time span of 1997 to 2004 in order to capture the immediate effect of the policy changes rather than pick up a long-time trend. The four columns differ in inclusion of covariates in specification; however, they do have close results in terms of β_3, the DD estimator. It estimates the average difference in the increase in the probability of having small profits after 2000 between non-cross-listed firms and cross-listed firms, *ceteris paribus*. The estimate is expected to be positive and

[21] The switch to annual observations is mainly because the delisting regulations are targeted at annual ROEs. Previous choice of quarterly observations of ROEs in demonstrating the graphical results is for the sake of a larger sample size for reliable kernel density estimates. However, our graphical evidence still stands for annual observations as well, and available upon request. Comparability between profits is one reason for the switch, too, since quarterly ROEs could suffer from the seasonal trend.

statistically significant, indicating a higher probability of earnings management for non-cross-listed firms when they face a strict profitability-based delisting threat, thus the curbing effect of cross listing on earnings management.

[Table 4 about here]

The first column in Table 4 reports the net policy effect without any covariates. The estimation results show that the implementation of delisting regulations in 2000 leads to a coefficient of about 20 per cent, which is significant at 1 per cent confidence level. The estimated marginal effect is about 2.4 per cent.

The second column demonstrates the results for the DD estimator without other covariates. The coefficient before the DD estimator is about 80 per cent, which translates into a marginal effect of around 10 per cent, significant at 1 per cent confidence level. The DD estimator is much larger in magnitude compared to the 20 per cent time trend effect reported in Column (1), suggesting that after controlling for the trend effect, the policy has had a larger impact on the listed firms in China. It is also worthwhile to point out that the coefficients in the first and second rows add to about 22 per cent – approximately the same level in Column (1), i.e. the coefficient corresponding to the policy impact on non-cross-listed firms. The coefficient for the non-cross-listing status is about 64 per cent, or a marginal effect of 12 per cent. That is, firms only listed on the mainland markets are less likely to report a small profit, *ceteris paribus*. A smaller probability of reporting a small profit, after controlling for the fixed effects in particular, does not necessarily mean those firms are less likely to manipulate earnings, as there are many reasons why a small profit is reported. One potential candidate could be that firms only listed on the mainland tend to have higher variability in ROE.

The third column shows the results for the specification with covariates except for those regarding corporate structure, since adding those would reduce the sample size significantly. The estimation results are quite robust as compared to Column (2), though the statistical significance of some variables slightly reduces.

The last column, which includes all covariates, yields some other interesting results. For example, it is shown that structural changes in capital stock could lead to a higher probability of small profits for firms, other things equal. Here the structural changes often take place when a firm conducts bonus share, or issues additional rights. Usually stock dilution follows in these cases, and that at least partially explains why the coefficient is negative. Moreover, the number of all stakeholders (in the logarithmic form) also has a negative and statistically significant impact upon the probability of small profits. While the negative correlation could be a natural inverse relationship between the population and the average amount, the sign of the coefficient also suggests potential free riding among shareholders leading to less monitoring and more earnings management (Jensen and Meckling, 1976; Shleifer and Vishny,1986).

5.3 Robustness checks

According to Bertrand, Duflo and Mullainathan (2004), one of the major problems with DD estimation is that the standard error of the estimate could be severely understated, leading to an over-significant result. Table 5 repeats the DD estimation with different specifications, in order to deal with this potential problem and provide several robustness checks.

The first two columns follow exactly the same specifications as in Table 4, but use bootstrapped standard errors for the estimate instead of the conventional ones.

Columns (3) and (4) include year dummies, because of which we have to drop the policy break dummy due to perfect collinearity. The coefficient for the policy impact is still around 80 per cent, or about 10 per cent for the marginal effect, roughly similar to the results in Table 4. The coefficients before the DD estimator are statistically significant at 1 per cent confidence level in Columns (1) and (3), though the significance reduces for the other two columns. Columns (5) and (6) adopt the standard fixed-effects model, while the last column further includes year dummies. The DD estimates are slightly larger in fixed effects regressions (about 14 per cent in Column (5)), as compared to the marginal effects in probit models, they remain statistically significant across all the specifications at at least 10 per cent confidence level.

[Table 5 about here]

Moreover, we design a placebo test following Bertrand, Duflo and Mullainathan (2004). Intuitively, a pseudo effect is created at another year other than 2000, say 2004, and the policy break dummy is replaced with this pseudo effect dummy. That means, we suppose that the delisting policy were introduced in 2004, and see what whether this would influence the earnings management behavior. If our hypothesis stands, i.e. firms indeed manage earnings more in response to the introduction of delisting policy around 2000 but not to something else, such a pseudo effect in 2004 should be close to zero. The regression specification in Column (2) of Table 4 is repeated with the pseudo policy break dummy, and the coefficient and standard error for the interaction term between the pseudo dummy and the non-cross-listing dummy

is reported. We repeat such practice for each year from 1998 to 2005[22] (except for the real policy change year 2000), and the corresponding results are demonstrated in Figure 7. It is reassuring to see that the coefficients peak around 2000 and 2001, the actual time for implementation of delisting regulations, and are never statistically different from zero at the conventional 5 per cent confidence level in other years. This counterfactual practice provides strong evidence that firms manage more earnings in response to delisting threats introduced around 2000, but not to other potential causes.

[Figure 7 about here]

5.4 Heterogeneous policy impacts

We would like to explore the potential heterogeneity of delisting regulations' impacts. For this purpose, we try to look at an additional dimension of earnings management, i.e. the difference between firms connected with local governments and those connected with upper-level central governments in their behavior. We focus on a subsample of SOEs with such connections and divide these firms into two groups,[23] dubbed as central and local SOEs for short.

There is a strong motivation for investigating along this dimension. A well-known driving force of economic reforms in China is competition between local governments (Qian and Weingast, 1997). As a result, the local governments and local SOEs have strong incentive to compete for capital in the equity market, which is tightly

[22] We start with 1998 and end with 2005, mainly due to sample size concerns.
[23] The rule for categorization is by the ownership concentration information. If the majority of shares of a firm are held by the central government and/or related ministries and commissions, the firm is viewed as a central SOE. Parallel definition applies for local SOEs. Most of the information comes from "Database of China's Listed Firms Ownership Structures" maintained by Andrew Delios (2006). That data set covers the period from 1992 to mid-2003, and we update it to include all firms relevant in our CSMAR data set, i.e. up to year-end 2009, according to the public information on a Chinese website, http://www.eastmoney.com/.

controlled by the central government. Other things equal, they have stronger incentive to manipulate earnings as compared to central SOEs. This is exactly why the central regulator of the stock market designed elaborate rules, hoping to limit such behaviors. On the other hand, central SOEs typically have much better credit rationing, and have better access to bank loans. They also face less credible delisting threat – it is less likely that the regulator may delist those listed central SOEs. In consequence, their incentive to manipulate earnings should be relatively lower.

Our data confirm the above reasoning. As Figure 8 shows, local SOEs demonstrate earnings management around 0 and 10 per cent in ROE before 2000, but central SOEs show no such behavior. After 2000, both kinds of SOEs display significant earnings management around 0 per cent – difference statistics are 39.48 and 31.83 for local and central SOEs, respectively. The increase in earnings management at 0 per cent for local SOEs after 2000, and more importantly, the switch from no earnings management to a significant level for central SOEs, further support the dominant effect of delisting effect. If not for the motivation of preventing potential involuntary delisting, central SOEs would not bother to manipulate earnings. Moreover, the lower level of earnings management at central SOEs in comparison to local SOEs even after year 2000 is consistent with the hypothesis that the former are less concerned with the delisting threat.

[Figure 8 about here]

The DD estimation for non-cross-listed firms facing delisting regulations is repeated for central SOEs and local SOEs, respectively. The regression specifications from Columns (2)-(3) in Table 4 are repeated on two subsamples, and their corresponding

results are shown in Table 6.[24] Comparison between Columns (1) and (3), (2) and (4) in Table 6 indicates that the DD estimate for central SOEs facing delisting regulations is larger than that for local SOEs. Although this result seems to be counter-intuitive and against our graphical evidence, we would like to explain the larger impact on central SOEs as due to going from hardly no earnings management to having such behavior. Moreover, the regression results with central SOEs should be interpreted with care due to limited sample size of such firms.

The last column follows a differences-in-differences-in-differences (DDD) specification and shows the regression results for interactions between the three dimensions. The coefficient before the three-fold DDD estimator is positive but statistically not significant, which echoes the comparison in the previous paragraph.

[Table 6 about here]

6 Conclusions and final remarks

This paper utilizes a natural experiment setup between Chinese mainland stock markets and Hong Kong markets, where delisting regulations were introduced around 2000 in the former but not in the latter. With this setup, we found that cross listing on the Hong Kong markets has a strong curbing effect on earnings management to avoid small losses in response to delisting threats, though earnings management does not vanish completely for cross-listed firms. We deal with sample selection across firms with profits or losses by using some advanced technique in defining earnings

[24] We also repeat the practice in Table 5 and Figure 7 for the case of central SOEs vs. local SOEs, but omit them here for limited space. The results are very robust, and available upon request.

management measures, and we control for various covariates in difference-in-difference estimations in order to overcome potential endogeneity in firms' cross listing decisions. While the previous literature suggests the effectiveness of cross-listing in the U.S. market, but not other countries, for curbing earnings management, our paper shows that the bonding hypothesis works in Hong Kong as well.

Our findings lead to important policy implications, especially for emerging stock markets in developing countries as China and their neighboring markets for potential cross listing. Because we find that the problem of earnings management is rooted in the market institutions, simply changing the thresholds in regulatory requirements for rights issuance and delisting – as the mainland regulators in China did over the past 20 years – only worsened the situation by inducing more earnings management after 2000. More importantly, it is also clear that listed firms from emerging markets do not necessarily manipulate earnings in all environments – cross-listed Chinese firms in Hong Kong markets manage much less. So cross listing may help reduce earnings management even when no effort is made to improve the regulation quality of the home market. Relaxing capital control and allowing more cross listing appears to be an important channel to help emerging markets become more mature.

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TABLE 1 Changes in regulatory requirements for rights issuance and delisting

Period	Rights issuance	Delisting
Before 1994	Profits 3-year average of 10%	N/A
1994 – 1998	Profits 10% for past 3 years	N/A
1998 – 2000	Profits 3-year average of 10% 6% for past 3 years	Special treatment for 2 years of losses
After 2000	Profits 3-year average of 6%	Particular transfer for 3 years of losses

Sources: Based on Yu, Du, and Sun, 2006.
Notes: The entries denote the evolution of regulations in terms of requirements for rights issuance and keeping the listing status. There were no such regulations imposing a threat of delisting before 1998.

TABLE 2 Descriptive statistics

Variable	Mean	Median	S.D.	Obs. #
Returns per share	0.1394	0.0923	0.2264	51256
Equity per share	2.8128	2.6700	1.3279	51256
ROE	0.0406	0.0353	0.0881	51256
# of staff at IPO	2602.7	1468	4241.3	48930
# of board members at IPO	9.6764	9	2.8550	49617
Sales in billion	1.1118	0.4070	2.2258	51256
Debt to asset ratio	4.7781	4.7891	2.0259	51256
Shanghai composite index	1472.0	1258.5	1144.6	51253
=1 if central SOEs	0.1158	0	0.3199	51256
=1 if also cross-listed in Hong Kong	0.0226	0	0.1486	51256
=1 if structural change in capital stock	0.4546	0	0.4979	42451
# of outsider directors	2.7575	3	1.2880	42079
# of high-level officials	6.0912	6	2.2670	42044
# of staff	3059.7	1663	4713.3	42211
# of stakeholders	88029.3	32876	3635387	42509
# of shares in million held by board	2.7953	0.0078	18.3946	42521

Sources: Firm-quarter observations from CSMAR data for the period of 1990-2009, after outlier cleaning.
Notes: The entries provide summary statistics, i.e. mean, median, standard deviation, and number of observation, for each variable. ROE is defined as earnings over book value of equity. Shanghai composite index is the closing value on the corresponding report announcement date. Other variables are self-explanatory by name.

TABLE 3 Characteristics of Cross-listed and Non-cross-listed Firms

Panel A				
Sector	**Cross-listed firms**		**Non-cross-listed firms**	
	Observations	**Frequency**	**Observations**	**Frequency**
Finance	43	9.47	115	0.73
Public	75	16.52	1605	10.25
Real estate	7	1.54	930	5.94
Conglomerate	0	0	1508	9.63
Industrial	329	72.47	10152	64.81
Commercial	0	0	1355	8.65
Total	454	100.00	15665	100.00
Panel B				
Variable				
Primary variables:	**Mean**	**Median**	**Mean**	**Median**
ROE	0.094	0.097	0.080	0.091
CF/A	0.074***	0.071***	0.045	0.044
B/M	0.409	0.396	0.426	0.405
CF/P	0.224***	0.163***	0.093	0.084
LIQ	1.443***	1.257***	1.671	1.323
Control variables:				
SIZE	23.046***	23.139***	20.995	20.912
LEV	8.931***	2.456***	6.033	2.321
GROWTH	0.218	0.173	0.216	0.131
EQUITY_ISS	0.110	0.058	0.107	0.056
DEBT_ISS	0.241	0.151	0.259	0.119
ASSET_TURN	0.591	0.521	0.601	0.487

Sources: Firm-year observations from CSMAR data for the period of 1990-2009.
Notes: Panel A: The entries provide the number of observations and frequency of cross-listed and non-cross-listed firms, respectively, by sector in our sample. Cross-listed firms are more likely to come from finance, public, and industrial sectors. Panel B: *ROE* is earnings divided by book value of equity, *CF/A* as net cash flows from operating activities divided by total assets, *B/M* as capital reserves divided by total shareholders' equity, *CF/P* as net cash flows from operating activities divided by total shareholders' equity, *LIQ* as current assets divided by current liabilities, *SIZE* as the natural log of total assets, *LEV* as total liabilities divided by capital reserves, *GROWTH* as percentage changes in sales, *EQUITY_ISS* as the percentage change in total shareholders' equity, *DEBT_ISS* as the percentage changes in total liabilities, *ASSET_TURN* as sales divided by assets. *** $p < .001$

TABLE 4 Basic effect of policy break at 2000 on probability of "small" profit: interaction with non-cross-listed firms

=1 if ROE in [0, 1%]	**(1)**	**(2)**	**(3)**	**(4)**
	Probit	**Probit**	**Probit**	**Probit**
=1 if policy break for non-cross-listed firms (DD estimator)		**0.830*** **	**0.821** **	**1.054***
		(0.282)	**(0.353)**	**(0.587)**
=1 if policy break	**0.197*** **	**-0.607** **	**-0.586***	**-0.889**
	(0.051)	**(0.277)**	**(0.345)**	**(0.583)**
=1 if not cross-listed		**-0.639*** **	**-0.781*** **	**-0.976***
		(0.192)	**(0.230)**	**(0.538)**
Log(# of staff at IPO)			0.150***	0.076
			(0.045)	(0.058)
# of board members at IPO			0.025*	0.023
			(0.013)	(0.016)
Log(operating sales in billions)			-0.169***	-0.148***
			(0.035)	(0.050)
Debt to asset ratio			0.022	0.021
			(0.024)	(0.026)
Shanghai composite index			-0.000	-0.000
			(0.000)	(0.000)
=1 (top 10 holders relationship, *base group*)				--
=2 (top 10 holders relationship)				0.002
				(0.118)
=3 (top 10 holders relationship)				-0.076
				(0.101)
=1 if structural change in capital stock				0.412***
				(0.104)
# of outside directors				-0.049
				(0.033)
# of high-level officials				0.006
				(0.017)
Log(# of staff)				-0.033
				(0.051)
Log(# of stakeholders)				0.170***
				(0.064)
# of shares in mln held by board				0.004
				(0.003)
Constant	-1.650***	-1.033***	-2.023***	-2.765***
	(0.041)	(0.188)	(0.480)	(1.063)
Industry dummies	No	No	Yes	Yes
Year dummies	No	No	No	No
Time span	1997-2004	1997-2004	1997-2004	1997-2004
Observations	8124	8124	4212	2972
Pseudo R^2	0.01	0.01	0.04	0.06

Sources: A subsample of annual observations from CSMAR data. The reported figures are coefficients estimated, rather than marginal effects. This applies to the following tables involving probit estimation results.

Notes: Robust standard errors in parentheses, clustered at firm level. * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is a dummy if ROE falls between the region of [0, 1%]. The main explanatory variable of interest is the DD estimator

defined as an interaction term between cross-listing status and whether the delisting policy has taken effect. Among the control variables, Shanghai composite index is the value of last trading day of a certain year. The set of three dummies of top 10 holders relationship are categorical variables to capture the relationship between top ten shareholders. Industry dummies are defined as a set of six dummies corresponding to those in Panel A of Table 3. Other variables are self-explanatory by name.

TABLE 5 Robustness checks for policy break effect at 2000 on probability of "small" profit: interaction with non-cross-listed firms

=1 if ROE falls in [0, 1%]	(1) Probit	(2) Probit	(3) Probit	(4) Probit	(5) FE	(6) FE	(7) Two-way FE
=1 if policy break for non-cross-listed firms (DD)	**0.830*** (0.265)**	**0.821 (0.607)**	**0.831*** (0.281)**	**1.099* (0.617)**	**0.135*** (0.048)**	**0.287* (0.156)**	**0.136*** (0.048)**
=1 if policy break	**-0.607** (0.263)**	**-0.586 (0.608)**			**-0.091* (0.048)**	**-0.262* (0.156)**	**-0.066 (0.049)**
=1 if not cross-listed	**-0.639*** (0.219)**	**-0.781*** (0.187)**	**-0.641*** (0.192)**	**-1.069* (0.572)**			
Basic firm characteristics	No	Yes	No	Yes	No	Yes	No
Corporate structure covariates	No	No	No	Yes	No	Yes	No
Industry dummies	No	Yes	No	Yes	No	Yes	No
Year dummies	No	No	Yes	Yes	No	No	Yes
Time span	1997-2004	1997-2004	1997-2004	1997-2004	1997-2004	1997-2004	1997-2004
Observations	8124	4212	8124	2972	8124	2972	8124
Pseudo R^2	0.01	0.04	0.01	0.06			

Sources: A subsample of *annual* observations from CSMAR data. The original observations are quarterly.

Notes: Robust standard errors in parentheses, clustered at firm level, except for Columns (1)-(2) with bootstrapped standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%. The set of control variables for basic firm characteristics and corporate structure covariates are those included in the baseline regression specification, whose results are reported in Table 4. Industry dummies are the same as in Table 4.

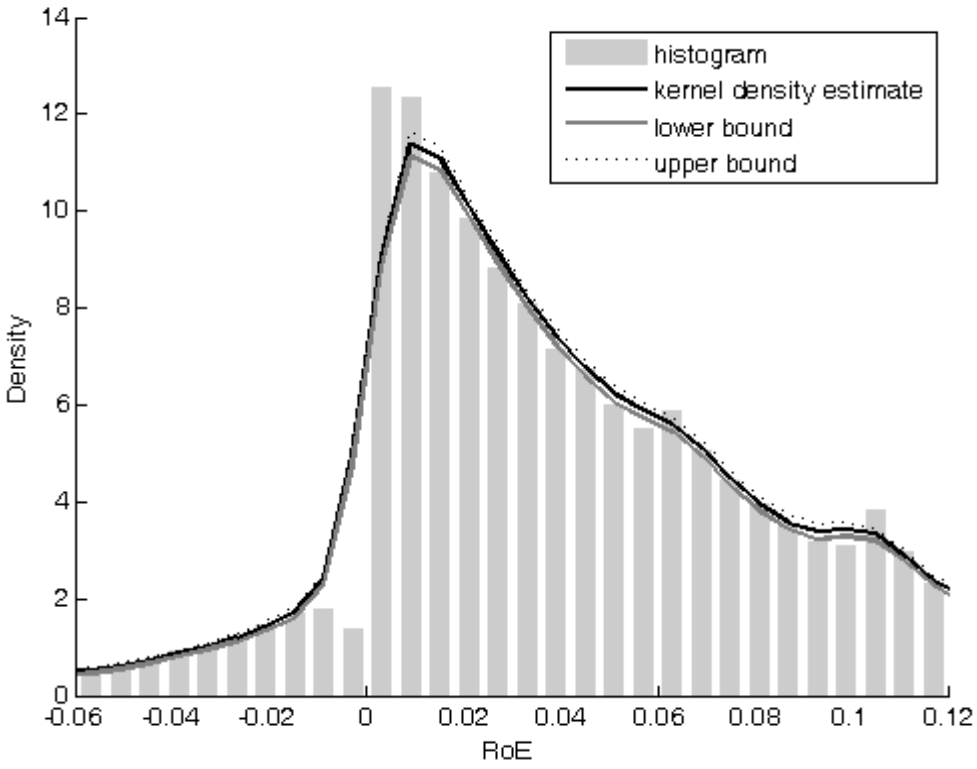
TABLE 6 Policy break effect at 2000 on probability of "small" profit: interaction with non-cross-listed firms, the case of central vs. local SOEs

=1 if ROE falls in [0, 1%]	(1)	(2)	(3)	(4)	(5)
	Central SOEs		Local SOEs		All
	Probit	Probit	Probit	Probit	Probit
=1 if policy break for non-cross-listed firms (DD)	**1.320** **(0.519)**	**1.611** **(0.725)**	**0.799** **(0.299)**	**0.800** **(0.393)**	**0.799** **(0.299)**
=1 if policy break	**-0.580** **(0.493)**	**-0.621** **(0.687)**	**-0.634** **(0.294)**	**-0.639** **(0.387)**	**-634** **(0.294)**
=1 if not cross-listed	**-1.106** **(0.296)**	**-1.337** **(0.441)**	**-0.529** **(0.268)**	**-0.655** **(0.311)**	**-0.529** **(0.268)**
=1 if central SOE					0.190 (0.371)
=1 if policy break for central SOEs					0.053 (0.573)
=1 if non-cross-listed central SOE					-0.577 (0.399)
=1 if policy break for non-cross-listed central SOEs					0.521 (0.598)
Basic firm characteristics	No	Yes	No	Yes	No
Corporate structure covariates	No	No	No	No	No
Industry dummies	No	Yes	No	Yes	Yes
Year dummies	No	No	No	No	No
Time span	1997-2004	1997-2004	1997-2004	1997-2004	1997-2004
Observations	1014	475	7110	3689	8124
Pseudo R^2	0.06	0.17	0.00	0.04	0.01

Sources: A subsample of *annual* observations from CSMAR data. The original observations are quarterly.

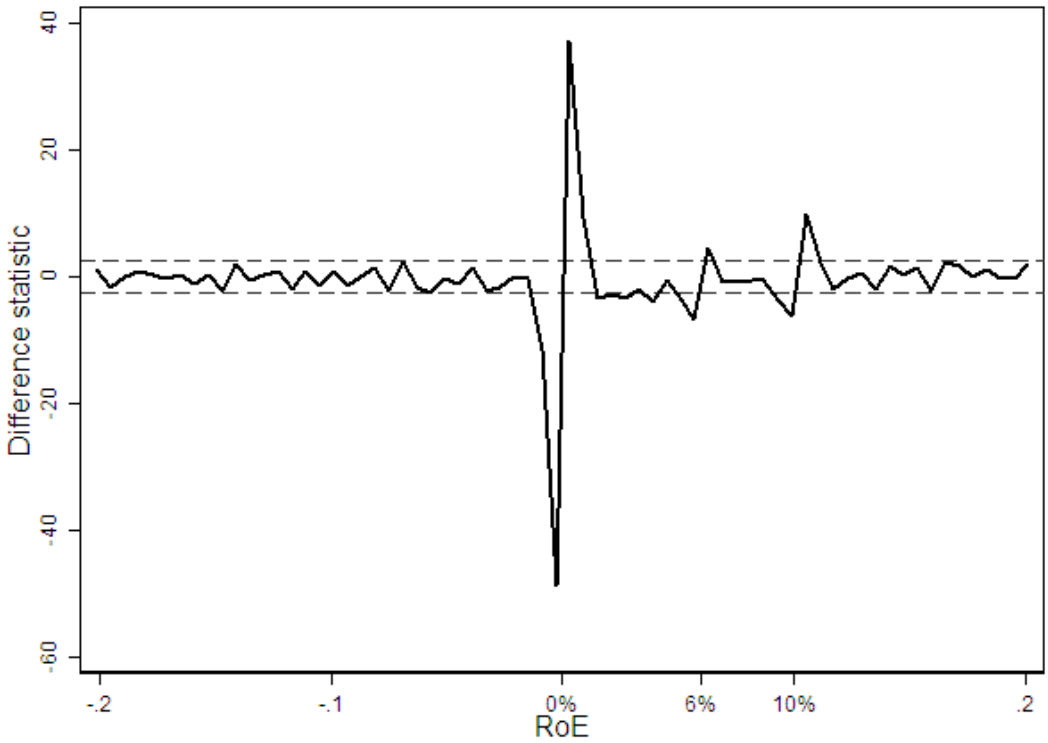
Notes: Robust standard errors in parentheses, clustered at firm level, except for Columns (1)-(2) with bootstrapped standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%.

FIGURE 1 Histogram with kernel density estimates: full sample



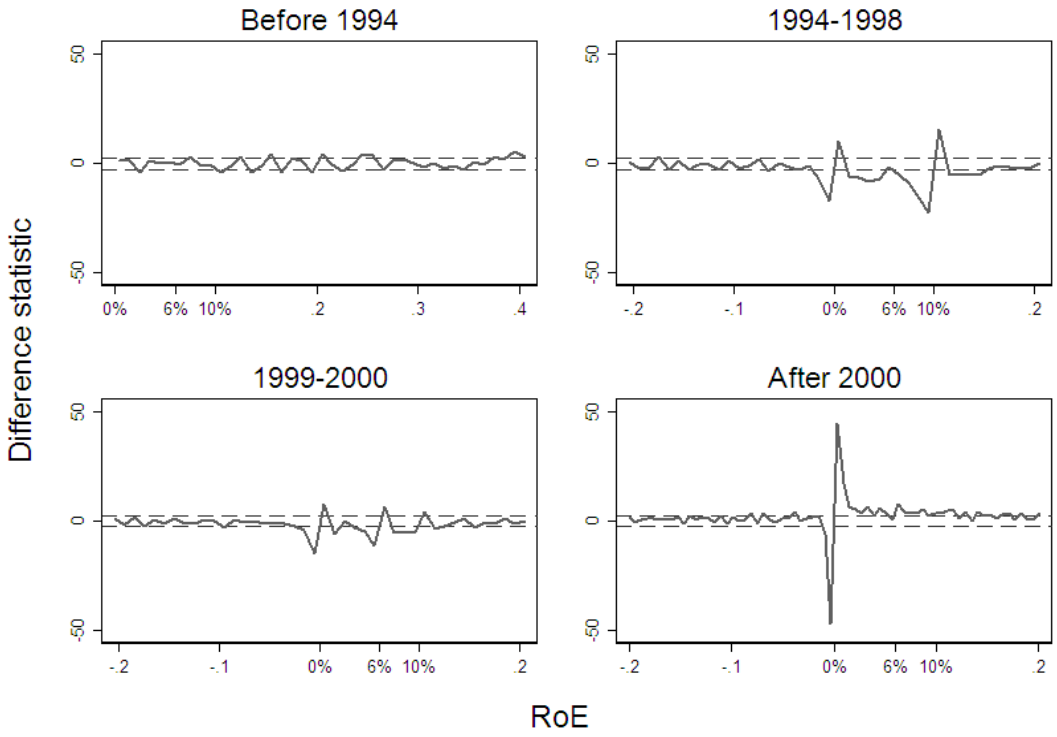
Sources: Full sample of firm-quarter observations in the CSMAR data, 1990-2009.
Notes: The figure shows a histogram with kernel density estimate for the probability density of the empirical distribution of ROE in our data. The two bounds indicate the 99 per cent confidence interval for the kernel density estimate. The cutoffs on the horizontal axis are only for demonstration purpose; and the similar rule applies for the following figures.

FIGURE 2 Difference statistic: full sample



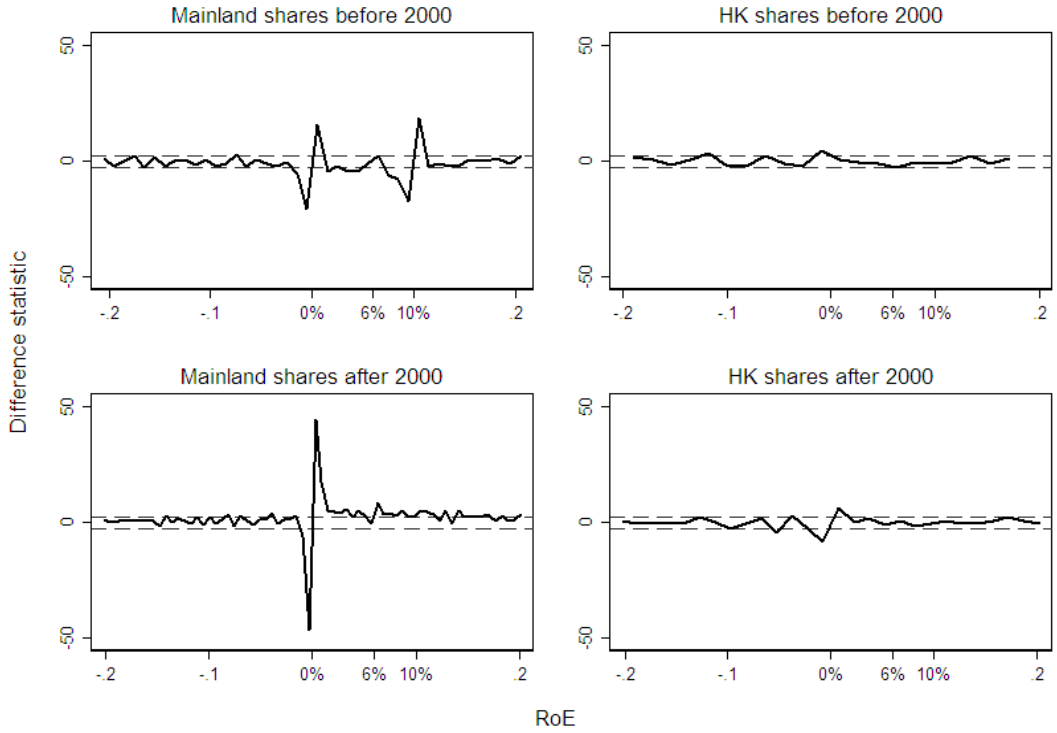
Sources: Full sample of firm-quarter observations in the CSMAR data, 1990-2009.
Notes: The figure shows the transformed difference statistic corresponding to the histogram and the kernel density estimate in Figure 1. Calculation of the statistic is based on equation (3).

FIGURE 3 Difference statistic: comparing CSRC regulatory requirements



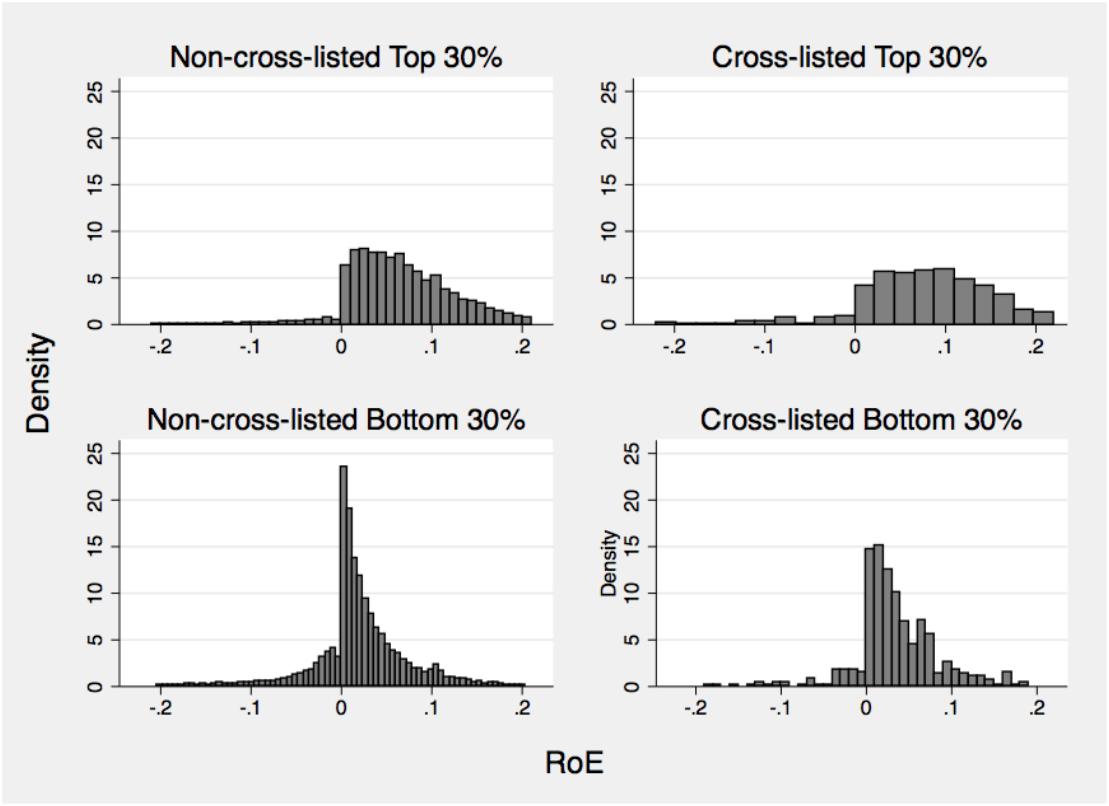
Sources: Firm-quarter observations in the CSMAR data, 1990-2009.

FIGURE 4 Comparison for before/after 2000 and mainland/HK-listed firms



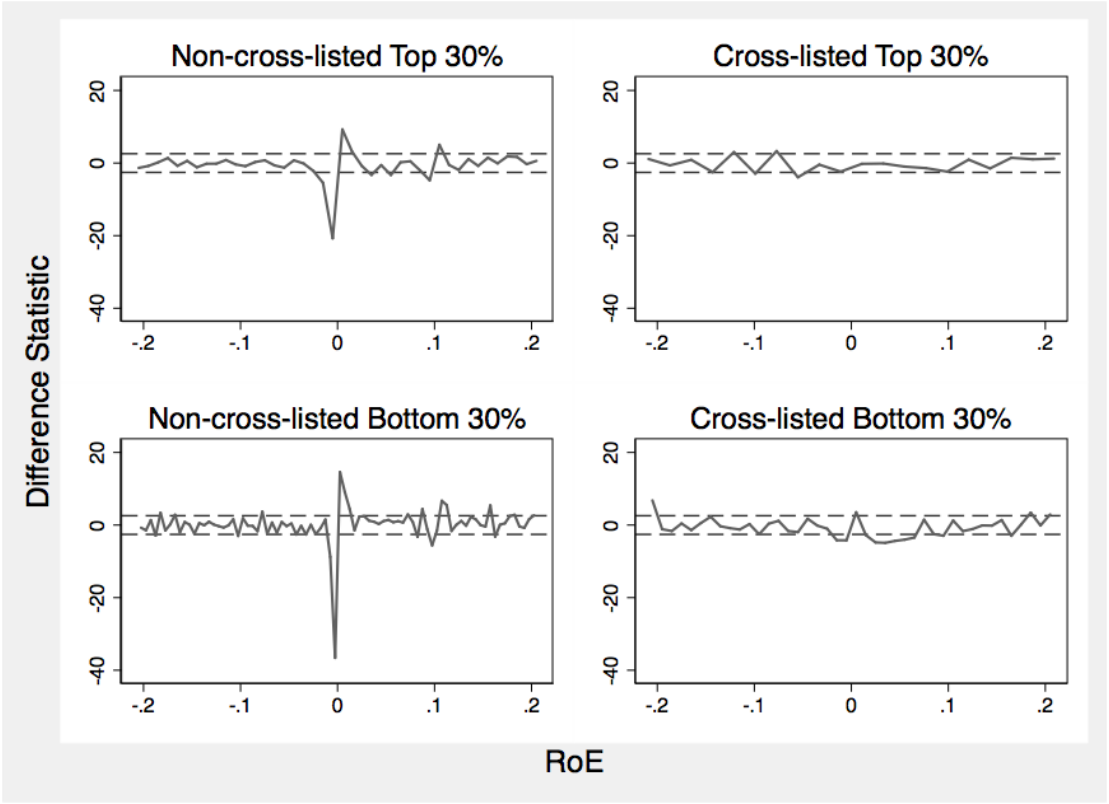
Sources: Firm-quarter observations in the CSMAR data, 1990-2009.

FIGURE 5 Histograms of ROE for two groups: top and bottom 30% sales



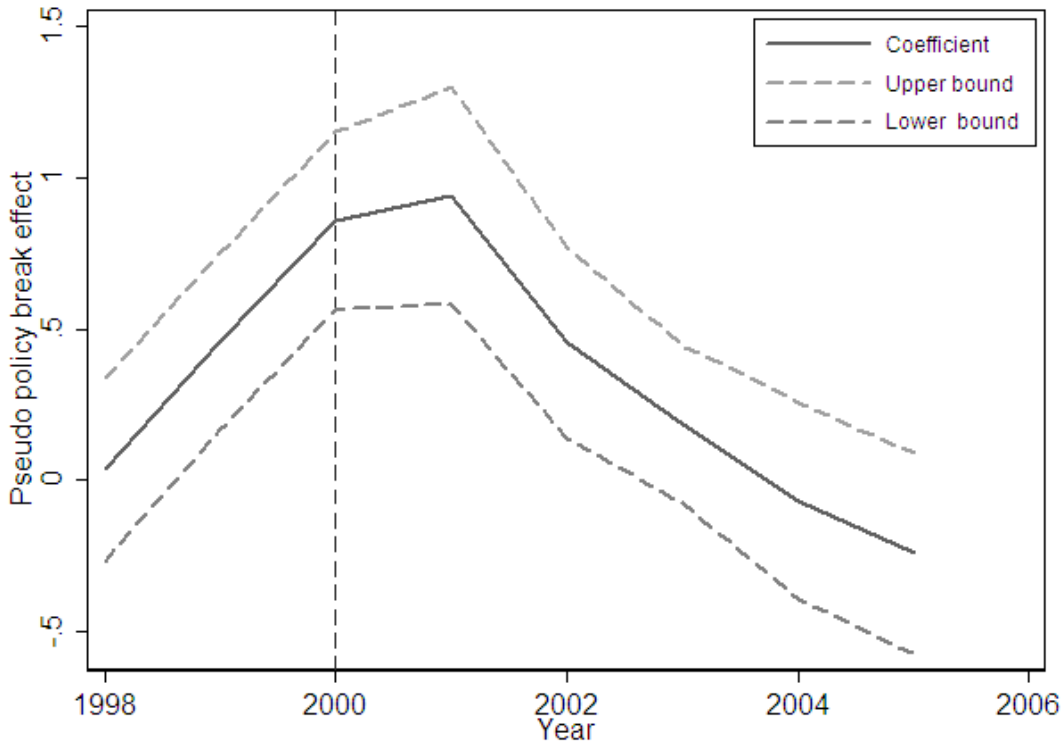
Sources: Firm-quarter observations in the CSMAR data, 1990-2009.
Notes: Sales is expressed in terms of log billion. The jump in the bar levels around zero ROE hints at the economic significance of our earnings management measure.

FIGURE 6 Difference statistic for two groups: top and bottom 30% sales



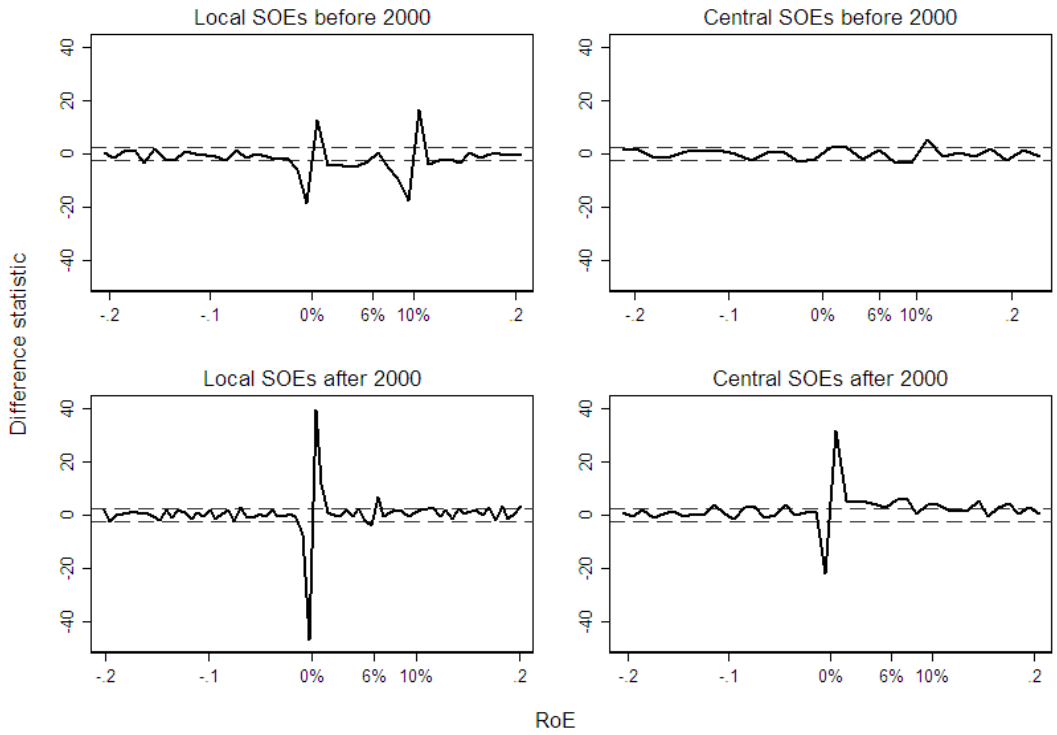
Sources: Firm-quarter observations in the CSMAR data, 1990-2009.
Notes: Sales is expressed in terms of log billion.

FIGURE 7 Pseudo policy break effects for non-cross-listed firms: 1998 to 2005



Sources: Firm-year observations in the CSMAR data, 1998-2005.
Notes: The coefficients and standard errors are for the interaction term between the policy break dummy and the non-cross-listing firm dummy from the regression specification in Column (2) of Table 4, repeated with the pseudo policy break dummy shifting from year to year.

FIGURE 8 Comparison for before/after 2000 & local/central SOEs



Sources: Subsample of local and central SOEs from CSMAR data, 1990-2009.
Notes: The four panels of this figure compare the difference statistic for four groups. They are local SOEs before and after 2000, and central SOEs before and after 2000.