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Does the bonding effect matter in a more integrated capital market world?

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A B S T R A C T

This paper examines the bonding effect of cross-listing before and after the stock market liberalization reforms in China. Consistent with the bonding hypothesis, we find that Chinese firms with foreign listings attain higher valuations than firms without foreign listings. We also find that they manage earnings less than comparable purely domestic-listed firms and have more informative stock prices. Further investigation indicates that the divergence in earnings quality between cross-listed and non–cross-listed firms shrinks dramatically after the Chinese stock market liberalization reforms in 2001 and 2002. Overall, the results suggest that the bonding effect is mitigated in an increasingly integrated capital market world.

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1. Introduction

In the international finance literature, conventional theories suggest that firms list overseas to lower their cost of capital through mitigated investment barriers, reduced risk exposure, enhanced liquidity, visibility, and investor base (e.g., Doukas and Switzer (2000), Foerster and Karolyi (1999), Lins et al. (2005), Miller (1999), Mittoo (1992)). While these hypotheses have had some success in explaining cross-listing practices, their empirical validity and saliency have been questioned recently.

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Major criticisms stem from their failure to explain why firms continue to list their shares overseas after the removal of investment barriers; why relatively few firms cross-list overseas given the proposed benefits; and why the market reacts more positively if the firm chooses to cross-list on major exchanges as opposed to over-the-counter (OTC) and private placements. Moreover, recent studies on the valuation gains of cross listing yield mixed results. For example, Sarkissian and Schill (2009) show that gains from foreign equity listings diminish over time while Doidge et al. (2009) report that they persist. Other studies show that foreign listing has different cost of capital implications. For example, Foerster and Karolyi (1999) report a 28% drop in the local beta of foreign firms listed in the U.S., while Errunza and Miller (2000) document that foreign firms listed in the U.S. experience an 11.4% decline in their cost of equity capital.

The limitations of conventional theories in explaining the cross-listing effect has led to the development of alternative hypotheses, among which the most frequently cited is the bonding hypothesis proposed by Coffee (1999, 2002) and Stulz (1999). In the context of this hypothesis, firms cross-list on more regulated markets to voluntarily bond themselves to higher regulatory, disclosure, and monitoring standards so as to mitigate potential agency conflicts (e.g., Coffee (1999, 2002), Reese and Weisbach (2002), Stulz (1999)). Consistent with the bonding story, Doidge et al. (2004) find that cross-listing on a more regulated market is an effective device in limiting controlling shareholders' expropriation of minority shareholders, and that foreign companies with shares cross-listed in the United States are worth more than similar home country firms. The major contribution of the bonding hypothesis is that it resolves a current paradox concerning why a majority of firms do not cross-list. According to Doidge et al. (2009a,b), a firm's decision to list overseas involves a trade-off between private control and bonding benefits. Cross-listing limits controlling shareholders' consumption of private benefits through both direct (e.g., more stringent disclosure and regulatory requirements) and indirect constraints (e.g., enhanced monitoring by sophisticated foreign investors). For a firm to cross-list, therefore, the benefits of bonding must be large enough to offset controlling shareholders' losses in private control.

Despite its strong theoretical appeal, the empirical evidence to date has been mixed. The literature is permeated with both supportive (e.g., Doidge et al. (2004), Doidge et al. (2009a,b), Reese and Weisbach (2002)) and conflicting findings (e.g., Gozzi et al. (2008), Lang et al. (2006), Siegel (2005)). For instance, based on the evidence that the Tobin's Q ratio falls sharply after firms' foreign listings, Gozzi et al. (2008) conclude that international listings are more consistent with the prediction of the segmentation theory rather than that of bonding hypothesis. The logic behind their argument is that if firms list overseas to bond themselves to a better corporate governance system, then cross-listing should produce an enduring rather than a transitory effect on firm valuation. This argument, however, ignores the fact that the evolution of global markets *per se* might have a significant impact on the effectiveness of the bonding strategy. Since a necessary condition for the bonding hypothesis to sustain itself is the divergence of underlying regulatory, disclosure, and monitoring standards across markets, one important question that emerges is whether the bonding effect persists under conditions of greater financial integration across capital markets. That is, if greater integration across capital markets translates into greater synchronization of regulatory, disclosure, and monitoring standards, then the bonding effect is expected to weaken. If, however, greater integration is not accompanied by harmonization of regulatory environments across markets, then the bonding effect is expected to persist. Therefore, to the extent that the degree of economic integration may influence the regulatory wedge across markets, examination of the cross-listing effect under conditions of increasing market integration allows us to shed new light on the bonding effect. This paper effectively addresses this issue by testing the long-term effects of cross-listing on earnings quality, stock price informativeness, and firm valuation, controlling for the degree of market integration.

Besides the everlasting debate over conventional versus bonding theories, another crucial challenge facing the bonding hypothesis is the signaling hypothesis. As Cantale (1996) and Moel (1999) point out, even though cross-listing has a positive impact on firm value, the observed listing benefits may not necessarily be attributable to the bonding role of cross-listing; rather, it may simply be a reflection of the signaling effect. By cross-listing on a market with more stringent disclosure and regulatory requirements, a firm can signal to the market that it is a high-quality firm, resulting in a higher valuation, even though no significant improvement in its corporate governance is made. Consistent with the signaling hypothesis, Siegel (2005) finds that U.S. listing is not a perfect substitute for a strong legal

environment, nor does it serve as an effective bonding mechanism for deterring malfeasance; it is the "reputational bonding" that explains the success of cross-listing. The second objective of this paper, then, is to distinguish between these competing explanations.

On a theoretical basis, the key to validating the empirical effectiveness of the bonding hypothesis (as opposed to the signaling effect) is to examine whether cross-listing has a real impact on corporate governance. If the benefits are purely due to a signaling effect or the internationalization benefits, then there should be little, if any, improvement in the listing firm's corporate governance and information environment. This motivates the key question empirically addressed in this study: does the bonding effect improve the quality of earnings and price informativeness of cross-listed firms? To the extent that the bonding effect leads to better corporate governance and a stronger information environment, we expect to observe higher valuations for cross-listed firms.

China has been chosen as the research focus of this study for two reasons. First, the structural segmentation and subsequent liberalization of the Chinese stock market provide a unique opportunity for testing the bonding effect upon market integration within a single country setting.[2] While many studies have explored the issue of cross-listing dynamics, the primary focus of previous studies is on whether or not cross-listing is simply associated with long-term valuation gains (e.g., Doidge et al. (2009a,b), Gozzi et al. (2008), King and Segal (2009), Sarkissian and Schill (2009)), the potential influence of market integration is largely ignored. Since a necessary condition for the validity of the bonding hypothesis requires the underlying regulatory and disclosure standards across markets to diverge, the bonding benefits of cross-listing may be mitigated to a large extent in an increasingly integrated world. Therefore, in an increasingly integrated capital market world, testing the merits of the bonding hypothesis requires that we control for the degree of market integration. The introduction of IFRS or SOX certainly induces significant changes in terms of corporate governance and disclosure standards, but it is difficult, if not impossible, to control for other influential factors in a cross-county study. For example, the Sarbanes-Oxley Act of 2002 was introduced around the same time as the Chinese stock market reforms. It is, therefore, hard to differentiate the effects from the SOX and the Chinese regulatory reforms when analyzing firms with U.S. listings. The structural segmentation and subsequent liberalization of the Chinese stock market, on the other hand, provide an ideal setting for testing the bonding effect upon market integration within a single country setting and a relatively short time frame, where omitted-variables problems and structural stationarity are of less serious modeling concerns. Second, despite the increasing importance of the Chinese capital market, empirical evidence to date has been rare and inconclusive in documenting the bonding impact of cross-listing on Chinese firms. For instance, Doidge et al. (2004) find that foreign companies with shares cross-listed in the United States are worth more relative to similar home country firms using data from 40 countries, and Doidge et al. (2009a,b) find that firms' decisions to list overseas involve a trade-off between private control and bonding benefits using data from 31 countries. However, China is excluded from both studies. Given the rising importance of Chinese firms, testing the merit of the bonding hypothesis in this context also bridges an important gap in the literature.

The remainder of the paper develops as follows. The next section introduces the hypothesis development. Section 3 describes the data and the empirical design. Section 4 presents the empirical results. Section 5 concludes.

2. Hypothesis development

The empirical framework of this study builds on the bonding hypothesis of cross-listing proposed by Coffee (1999, 2002) and Stulz (1999), the earnings management literature, the information-based

[2] Before the market liberalization reforms in 2001 and 2002, Chinese domestic firms could issue two distinct classes of stock, identical in all aspects except for their ownership restrictions: A shares, which could only be held and traded by domestic investors, and B shares, which could only be held and traded by foreign investors. As a result, the Chinese stock market has been divided into two separate markets: the local A-share market and the foreign B-share market. The two segmented markets are then forced to be integrated through regulatory reforms, i.e., the opening of the foreign B-share market to Chinese domestic investors on February 19, 2001 and the opening of the domestic A-share market to qualified foreign institutional investors (QFII) on November 5, 2002.

interpretation of stock price synchronicity (e.g., Chan and Hameed (2006), Morck et al. (2000), Roll (1988)), and the structural segmentation and subsequent liberalization of the Chinese stock market.

Before the market liberalization reforms in 2001 and 2002, Chinese domestic firms could issue two distinct classes of stock, identical in all aspects except for their ownership restrictions: A shares, which could only be held and traded by domestic investors, and B shares, which could only be held and traded by foreign investors. As a result, the Chinese stock market has been divided into two separate markets: the local A-share market and the foreign B-share market. Owing to the regulatory segmentation of the Chinese stock market, Chinese domestic firms have an additional cross-listing choice besides listing overseas (e.g., the New York Stock Exchange or the London Stock Exchange). They may list on the foreign-based Chinese B-share market in addition to their domestic A-share listings. What makes the Chinese context interesting are the subsequent regulatory reforms, i.e., the opening of the foreign B-share market to Chinese domestic investors on February 19, 2001 and the opening of the domestic A-share market to qualified foreign institutional investors (QFII) on November 5, 2002. The structural segmentation and subsequent liberalization reforms in China allow us to test the impact of market integration on the bonding effect of cross-listing within a relatively short time frame, where the structural stationarity and omitted-variables problems are of less serious modeling concern.

Given that the primary objective of this study is to investigate the impact of market integration on the bonding effect of cross-listing, we focus mainly on the B-share listings as the means of cross-listing in this study. Firms are henceforth defined as cross-listed if they have B-share listings and non–cross-listed if they do not.

2.1. Earnings management

In the literature, a substantial body of research consistently documents a nontrivial association between accounting earnings and a firm's stock market performance (e.g., Barth et al. (1998), Burgstahler and Dichev (1997), Collins et al. (1997)). However, the integrity of accounting information has long been questioned, and earnings management has been related to a variety of corporate events. Such events include initial public offerings (Ball and Shivakumar (2008), Teoh et al. (1998a)), seasoned public offerings (Teoh et al. (1998b)), mergers and acquisitions (Erickson and Wang (1999), Louis (2004)), share repurchases (Brockman et al. (2008), Gong et al. (2008)), and compensation plans (Bergstresser and Philippon (2006), Cornett et al. (2008)).

More interestingly, the manipulation of corporate information tends to be more rampant in emerging than in developed capital markets (e.g., Leuz et al. (2003)). For example, firms in emerging markets are found to exhibit more earnings smoothing, a greater tendency to manage toward a target, a weaker association between accounting earnings and share prices, and a less timely recognition of losses (Lang et al. (2006)). This is not surprising because in an environment with ineffective legal enforcement and ill-functioning accounting–auditing systems, investors have neither information transparency nor enforcement capability to prevent such managerial opportunism as earnings management. Additionally, the lack of investor protection in emerging markets also magnifies the benefits of private control. This also increases insiders' incentives to mask firm performance which, in turn, further promotes earnings management.

Extant literature has demonstrated both theoretically and empirically that the legal environment and the degree to which investors are protected in a country play an important role in restricting corporate misconduct and insiders' expropriation of minority shareholders (e.g., La Porta et al. (1998)). While the development of the regulatory environment is not a firm-level choice, it is often possible for firms in weak institutional environments to cross-list on a more regulated capital market to voluntarily bond themselves to higher regulatory, disclosure, and monitoring standards. This is often referred to as the bonding hypothesis (e.g., Coffee (1999, 2002), Stulz (1999)). By doing so, cross-listed firms can effectively mitigate agency costs and potential managerial opportunism, such as earnings management.

Since firms with B-share listings are committed to better information transparency, higher regulatory standard, and enhanced monitoring, the integrity of their reported earnings should differ predictably from that of comparable purely domestic-listed firms. First, the information disclosure requirement is stricter for firms with foreign B-share listings. In China, firms that issue shares to both

domestic and foreign investors are required to prepare their financial statements based on both the Chinese Generally Accepted Accounting Principles (GAAP) and the International Accounting Standards (IAS), whereas firms that issue shares exclusively to domestic investors are subject solely to the Chinese GAAP. The increased financial reporting standard will, to a large extent, make the manipulation of firm-specific information more costly for firms with B-share listings. Second, under IAS requirements, the financial statements of firms with B-share listings must be audited by internationally authorized CPA firms, which are less likely to cooperate with local firms in manipulating their financial figures. Third, sophisticated foreign investors participating in the B-share market, especially institutional investors, often act as powerful external monitors guarding against corporate misconduct, such as earnings management. Because firms with B-share listings bear higher market and regulatory costs for earnings management, one should expect those firms to exhibit better earnings quality than firms without B-share listings if the bonding hypothesis is valid.

Based on the above discussion, the following hypothesis is developed.

H1, Firms with foreign B-share listings have better earnings quality than firms with only domestic A-share listings

2.2. Price informativeness

Given the hypothesized divergence in earnings quality between cross-listed and non–cross-listed firms, an interesting question to ask is whether this kind of bonding commitment and the resultant improvement in financial reporting improves the stock price informativeness of cross-listed firms.

In line with the literature, we use the concept of price synchronicity to measure stock price informativeness. This stream of research is developed upon a hypothesized decomposition of information in stock pricing. As Roll (1988) points out, the extent to which stocks move together depends on the relative amount of firm-level and market-level information incorporated into stock prices. If asset prices mirror both firm-specific and market-wide information, then, in an environment with significant impediments to informed trading, investors will have to rely more on market-wide information, resulting in a higher degree of stock price co-movement. On the other hand, in an environment with sufficient investor protection and information transparency, stock prices will tend to be less synchronous with each other due to informed trading. In the past two decades, a growing body of literature consistently provides empirical support to this information-based interpretation of price synchronicity. For example, Durnev et al. (2003) find that the relationship between current returns and future earnings is stronger for firms and industries with low price synchronicity. Jin and Myers (2006), document that stock price synchronicity decreases with the level of information transparency. Gul et al. (2010) indicate that foreign ownership and auditor quality are inversely associated with synchronicity and that the amount of firm-level information reflected in stock prices is lower for firms with high synchronicity. Morck et al. (2000) find that stock prices move together more in emerging markets, because investors rely more on market-wide information in an environment with significant impediments to informed trading. Overall, these empirical findings point to a single story: higher firm-specific return variation (as a fraction of total variation) indicates more informative stock prices.

Despite these rather clear and strong theoretical grounds, empirical evidence to date has been inconclusive in documenting the impact of cross-listing on price informativeness in emerging markets. For example, Gul et al. (2010) indicate that synchronicity is inversely associated with foreign ownership and auditor quality in an emerging market such as China. In contrast, Fernandes and Ferreira (2008) find that cross-listing improves price informativeness in developed capital markets but decreases price informativeness in emerging markets.

In this study, we expect firms with B-share listings to exhibit more informative stock pricing than purely domestic-listed firms. First, if listing on the B-share market indeed leads to better earnings quality, as proposed in the previous section, then the increased integrity of corporate information among cross-listed firms should undoubtedly promote informed trading and result in more value-relevant B-share prices. Second, because B-share listing imposes a higher level of disclosure and regulatory requirements on listing firms, it will, to a large extent, mitigate information asymmetry between corporate insiders and outsiders and lead to more informative stock prices. Third, foreign

investors participating in the B-share market are generally more sophisticated than Chinese domestic investors in collecting, processing, and analyzing value-relevant corporate information. This will further facilitate the capitalization of firm-specific information into stock valuation. Therefore, the following hypothesis is derived:

H2, Firms with foreign B-share listings have less synchronous (more informative) stock prices than firms with only domestic A-share listings

2.3. Firm value

For a more complete analysis, we also examine the impact of cross-listing on firm value. If cross-listing indeed leads to better corporate governance, improved earnings quality, and more value-relevant stock pricing, then firms that issue shares to both domestic and foreign investors should experience a higher market valuation than similar firms that issue shares exclusively to domestic investors.

In the literature, a substantial body of research indicates that cross-listing on a more advanced capital market is value enhancing. For instance, Doukas and Switzer (2000) find significant positive announcement effects when Canadian firms cross-list on the U.S. market. Lang et al. (2003) document that cross-listing tends to result in increased analyst coverage, improved forecast accuracy, and higher firm valuation. Doidge et al. (2004) find that foreign companies with shares cross-listed in the United States are worth more relative to similar home country firms.

The positive relation between cross-listing and firm value can be justified on multiple grounds. As noted by conventional theories, because cross-listing provides firms with better access to global capital, reduced risk exposure, enhanced visibility, liquidity, and broader investor base, cross-listed firms should have a lower cost of capital and a higher valuation in the marketplace (e.g., Doukas and Switzer (2000), Foerster and Karolyi (1999), Lins et al. (2005), Miller (1999), Mittoo (1992)). According to the bonding hypothesis, since corporate insiders (or controlling shareholders) are committed to increased disclosure, better corporate governance, and improved investor protection by cross-listing on a more regulated market, there should be a valuation premium among cross-listed firms. Both hypotheses predict a positive effect of cross-listing on firm value. Thus, the following hypothesis is formed:

H3, Firms with foreign B-share listings have a higher valuation than firms with only domestic A-share listings

2.4. Increased market integration

Observing significant cross-listing impact, however, is not the end of the story in today's increasingly integrated world. A more relevant and important question to ask is whether and to what extent the ongoing processes of market integration will erode the bonding effect of cross-listing. Despite the expanding body of literature on foreign listings, the evidence on the dynamics of the long-term effects of cross-listing is somewhat limited and inconclusive. Some studies document permanent cross-listing premiums (e.g., Doidge et al. (2009a,b)) while others find that the effects are more transitory (e.g., Gozzi et al. (2008), Sarkissian and Schill (2009)). It is also unclear whether the diminishing impact of cross-listing (if there is a diminishing impact) is due to the transitory nature of valuation gains to overseas listings or the evolution of capital markets *per se*. Conclusions cannot be safely drawn without distinguishing the two distinct possibilities. Gozzi et al. (2008), among others, challenge the empirical validity of the bonding hypothesis based on the evidence that cross-listing fails to produce an enduring effect on firm valuation. This argument, however, ignores the fact that cross-listing benefits might have been seriously eroded by increased market integration. If this is the case, then the mitigated cross-listing impact would provide additional support rather than challenge to the bonding hypothesis.

On a theoretical basis, a necessary condition for the bonding hypothesis to be sustained requires that the underlying investment environments across markets remain divergent. While it is unlikely for the processes of market integration to entirely invalidate the bonding role of cross-listing (Doidge et al. (2004)), a diminishing impact is expected. First, as disclosure and regulatory requirements around the

world are adapted and become more standardized, the bonding role of cross-listing should be less prominent. Second, the power of external monitoring will be less divergent across markets in a more integrated world since the investor base is more or less the same globally. Therefore, we hypothesize the following:

H4. The divergence in earnings quality, price informativeness, and firm value between the cross-listed and non–cross-listed firms will be less pronounced in a more integrated world.

3. Data, key variables, and methodology

3.1. Data description

This study uses panel data to control for potential survivorship bias and omitted-variables problems. For comparison purpose, we first construct a paired sample of cross-listed versus non–cross-listed firms. To better explore the impact of market integration on the bonding effect of cross-listing, this study focuses mainly on B-share listings as the means of cross-listing. Note that purely domestic listed firms are used as the control group in this study. An alternative choice would be to use firms with other types of foreign listings as the control group. This, however, might introduce a significant bias into the analysis, as it is technically difficult, if not impossible, to control for other influential factors in a cross-country study. For example, firms with US listings may be affected by the introduction of SOX in 2002, which happened at exactly the same time as the Chinese regulatory reforms. Such coincidence as the introduction of SOX leaves the use of purely domestic listed firms as the best choice.

This study investigates a panel sample of Chinese firms over a nine-year period, from 1998 to 2006. The sample period begins in 1998 because it is the year that publicly traded firms in China were formally required to release cash flow statements. Data after 2007 is excluded to avoid potential disturbance around the recent worldwide financial crisis. The estimation time frame spans the two regulatory reforms, i.e., the opening of the B-share market to Chinese domestic investors on February 19, 2001 and the opening of the A-share market to qualified foreign institutional investors (QFII) on November 5, 2002. In this study, both firm-level accounting data and stock market figures are compiled from the China Stock Market and Accounting Research Database (CSMAR). Using balanced panel data, we further require the sample firms to be continuously listed on either the Shanghai Stock Exchange (SSE) or the Shenzhen Stock Exchange (SZSE) during the entire sample period from 1998 to 2006. After eliminating firms with insufficient histories or missing values on related accounting items,[3] domestic firms with incomparable sizes (relative to cross-listed firms), firms in financial industries, and those with foreign listings other than B shares, we are left with 701 firms (67 A- and B-share dual-listed firms and 634 comparable purely domestic A-share listed firms), each with a continuous listing history over the entire sample period. To control for potential industry effects, we further classify the sampled firms into six broadly defined industry categories in line with the CSMAR industry code A.[4]

Table 1 provides summary statistics of the sample, sorted by the choice of B-share listing and the time period of estimation. The variables are defined as follows: *SIZE* is the size of the firm, calculated as the natural log of total assets; *BM* is the book-to-market ratio, measured as the difference between total assets and total liabilities, divided by the stock market capitalization of the firm; *LEV* is the leverage (debt-to-equity) ratio; *ROA* is the return on assets ratio, computed as EBXI divided by total assets; *SO* is state ownership, measured as the percentage of common shares owned by the state; *MO* is managerial ownership, measured as the percentage of common shares owned by top managers; *BSIZE* is board size, calculated as the number of directors on the board; *BIND* is board independence, measured as the percentage of independent directors on the board; *Q* is the Tobin's Q ratio, calculated as book value of

[3] Related accounting items include total assets, total liabilities, total equity, earnings before extraordinary items and discontinued operations (EBXI), cash flow from operations (CFO), sales revenues, receivables, and gross property, plant & equipment (PPE).

[4] It is ideal to use a more specifically defined industry classification. Given the small sample of cross-listed firms, however, it would leave only one or two companies in some industries if a more specifically defined industry classification is utilized. Therefore, a broadly defined industry classification is utilized here.

Table 1
Summary statistics.

	Full sample	Cross-Listed vs. Non–Cross-Listed Firms			Before & After Market Liberalization		
		CL (67 firms, 1999–2006)	NC (634 firms, 1999–2006)	Mean diff. (CL–NC)	Before (701 firms, 1999–2001)	After (701 firms, 2003–2006)	Mean diff. (AFT–BEF)
# Obs.	5608	536	5072		2804	2804	
SIZE	21.1017 (0.97)	21.5216 (0.95)	21.0573 (0.96)	0.4643***	20.9404 (0.87)	21.2630 (1.03)	0.3226***
BM	2.7127 (1.52)	2.8047 (1.83)	2.7030 (1.48)	0.1017	2.7390 (1.33)	2.6864 (1.68)	−0.0526
LEV	1.7027 (22.14)	1.0286 (9.09)	1.7739 (23.10)	−0.7453	1.9877 (27.59)	1.4177 (14.82)	−0.5699
ROA	0.1001 (0.64)	0.1186 (0.08)	0.0981 (0.67)	0.0205**	0.1048 (0.07)	0.0953 (0.90)	−0.0095
SO	0.3227 (0.25)	0.3083 (0.24)	0.3242 (0.25)	−0.0159	0.3380 (0.26)	0.3073 (0.24)	−0.0306***
MO	0.0005 (0.01)	0.0001 (0.0002)	0.0006 (0.01)	−0.0005***	0.0005 (0.01)	0.0005 (0.01)	0.0000
BSIZE	9.5711 (2.34)	9.6716 (2.39)	9.5605 (2.33)	0.1111	9.6141 (2.57)	9.5282 (2.09)	−0.0859
BIND	0.2102 (0.16)	0.2149 (0.16)	0.2096 (0.16)	0.0053	0.0802 (0.12)	0.3401 (0.05)	0.2599***
Q	1.1411 (26.64)	0.8585 (0.76)	1.1710 (28.01)	−0.3124	0.7241 (0.29)	1.5581 (37.67)	0.8340
RET	0.0141 (0.49)	0.0344 (0.45)	0.0120 (0.49)	0.0224	0.0375 (0.46)	−0.0093 (0.52)	−0.0468***

This table reports the summary statistics of the sample, sorted by the choice of B-share listing and the time period of estimation. The variables in the table are defined as follows: *SIZE* is the size of the firm, calculated as the natural log of total assets; *BM* is the book-to-market ratio, measured as the difference between total assets and total liabilities, divided by the stock market capitalization of the firm; *LEV* is the leverage (debt-to-equity) ratio; *ROA* is the return on assets ratio, computed as EBXI divided by total assets; *SO* is state ownership, measured as the percentage of common shares owned by the state; *MO* is managerial ownership, measured as the percentage of common shares owned by top managers; *BSIZE* is board size, calculated as the number of directors on the board; *BIND* is board independence, measured as the percentage of independent directors on the board; *Q* is the Tobin's Q ratio, calculated as book value of total assets minus book value of equity plus market value of equity, divided by book value of total assets; and *RET* is annual holding period return on a firm's common stock. The final sample consists of 701 firms (67 A- and B-share dual-listed firms and 634 comparable purely domestic-listed firms), each with a continuous listing history over the entire sample period from 1998 to 2006. Standard deviations are in parentheses.*,**, and*** indicate significance at the 10%, 5%, and 1% levels.

total assets minus book value of equity plus market value of equity, divided by book value of total assets; and *RET* is annual holding period return on a firm's common stock.

Columns 2 and 3 of Table 1 provide a close comparison between firms with and without foreign B-share listings. Compared to purely domestic-listed firms, firms with B-share listings tend to be larger in size (21.52 relative to 21.06) and more efficiently operated (with an average ROA ratio of 11.86% relative to 9.81%). Moreover, managerial ownership is lower on average among cross-listed firms than among non–cross-listed firms (0.01% relative to 0.06%), suggesting that incentive compensation is used less often in firms with foreign ownership. In addition, firms with B-share listings seem to have lower Tobin's Q ratios than firms without B-share listings (0.86 relative to 1.17), implying that cross-listed firms tend to receive a lower valuation or face fewer growth opportunities than their purely domestic-listed peers. Such a comparison must be viewed cautiously, however, given that the mean difference is insignificant and that non–cross-listed firms have a standard deviation that is 37 times higher than that of cross-listed firms.

Across time periods (columns 5 and 6 of Table 1), the data display a clear tendency toward a rise in firm size (the average firms size increases from 20.94 to 21.26), mitigated state control (state ownership decreases from 33.80% to 30.73% on average), and increased board independence (the percentage of independent directors on the board increases from 8.02% to 34.01%) upon market liberalization. In addition, the liberalization reforms also result in a lower cost of capital for Chinese firms, as reflected by a lower level of stock returns for investors (the average holding period return declines from 3.75% to −0.93%). The remaining variables have experienced marginal variations across the two sub-periods.

3.2. Measuring earnings management

In the literature, earnings management is generally investigated using two approaches. The first approach deduces earnings management from accounting information. Measures based on this approach are typically related to the level of accruals (e.g., Dechow and Dichev (2002), Sloan (1996)). The second approach focuses on the association between earnings and stock returns (e.g., Francis and Schipper (1999)). This method extracts information about earnings from stock prices by assuming that

the market is efficient. In this study, we use accounting measures to examine earnings management because of their widespread use in the extant literature and their established significant market effects (e.g., Francis et al. (2004, 2005)). Since there is no agreed-upon accounting measure of earnings management, this study evaluates earnings quality using two alternative proxies: the absolute value of discretionary accruals and accruals quality.

The first measure used in this study is discretionary accruals, *DA*. This proxy is based upon a simple decomposition of corporate earnings. With the accrual accounting method, earnings generally consist of two components, cash flow from operations (CFO) and accounting accruals. Accounting accruals can be further separated into two parts: non-discretionary accruals (necessary accounting adjustments) and discretionary accruals (accruals subject to managerial discretion). Following Hribar and Collins (2002), we calculate total accruals (*TA*) using data from cash flow statements. Specifically, $TA_{it} = EBXI_{it} - CFO_{it}$. To be consistent with the literature (e.g., Bartov et al. (2001), Cornett et al. (2008), Dechow et al. (1995), Yu (2008)), we use the modified Jones (1991) model to estimate discretionary accruals.

First, we conduct the following cross-sectional ordinary least squares (OLS) regression to estimate the coefficients α_1, α_2, and α_3 within each industry over the sample period from 1999 to 2006 (note that the observations of year 1998 are lost in calculating lagged values). Specifically,

$$\frac{TA_{it}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta REV_{it}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{it}}{A_{i,t-1}} + \varepsilon_{it} \tag{1}$$

where *TA* is measured by the difference between EBXI and CFO, *ΔREV* is the change in sales revenues, and *PPE* is gross property, plant, and equipment. All variables are scaled by total assets at the beginning of the fiscal year to control for size effects.

The value of non-discretionary accruals, *NDA*, is then calculated using the estimates of α_1, α_2, and α_3 from model (1). Note that the change in account receivables, *ΔREC*, is included in the equation per the modified Jones model so as to capture the extent to which a change in sales is due to an aggressive recognition of questionable sales. Specifically,

$$NDA_{it} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{(\Delta REV_{it} - \Delta REC_{it})}{A_{i,t-1}} + \alpha_3 \frac{PPE_{it}}{A_{i,t-1}} \tag{2}$$

The difference between total and non-discretionary accruals is discretionary accruals. That is, $DA_{it} = TA_{it}/A_{i,t-1} - NDA_{it}$. Because all variables are scaled by total assets, the magnitude of discretionary accruals is expressed as a percentage of the firm's lagged assets. Larger values of discretionary accruals indicate higher earnings management (lower earnings quality). Since managers may have incentives to both inflate (reflected by positive *DA*) and deflate (reflected by negative *DA*) corporate earnings, the absolute value of discretionary accruals is frequently used in the literature to capture earnings management in both directions. In the context of this study, the first hypothesis predicts that the absolute value of discretionary accruals will be lower for cross-listed firms than for non–cross-listed firms.

In the literature, another widely used measure of earnings management is accruals quality, *AQ*. Accruals quality is often measured by the standard deviation of residuals from the model that regresses current accruals on the lagged, current, and future values of CFO, change in sales revenues, and gross PPE (e.g., Dechow and Dichev (2002), Francis et al. (2005), Francis et al. (2008)). Specifically,

$$\frac{TA_{it}}{A_{i,t-1}} = \gamma_0 + \gamma_1 \frac{CFO_{i,t-1}}{A_{i,t-1}} + \gamma_2 \frac{CFO_{it}}{A_{i,t-1}} + \gamma_3 \frac{CFO_{i,t+1}}{A_{i,t-1}} + \gamma_4 \frac{\Delta REV_{it}}{A_{i,t-1}} + \gamma_5 \frac{PPE_{it}}{A_{i,t-1}} + \varepsilon_{it} \tag{3}$$

Accruals quality is the standard deviation of residuals from the regression in equation (3). That is, $AQ_i = \sigma(\varepsilon_{it})$. A higher standard deviation of residuals implies a lower earnings quality.

Table 2 reports the magnitude of earnings management in terms of both the absolute value of discretionary accruals, $|DA|$, and accruals quality, *AQ*. Column 1 of panel A shows that, on the whole, both the absolute value of discretionary accruals (about 10.3% of lagged assets) and the measure of accruals quality (about 7.7% of lagged assets) are much higher than those documented in previous

Table 2
Earnings management.

Panel A: earnings management							
	Full sample (701 firms, 1999–2006)	Cross-listed vs. non–cross-Listed firms			Full sample before & after liberalization		
		CL (67 firms)	NC (634 firms)	Mean diff. (NC–CL)	Before (1999–2001)	After (2003–2006)	Mean diff. (AFT–BEF)
|DA|	0.1026 (0.099)	0.0965 (0.082)	0.1032 (0.101)	0.0067*	0.1017 (0.102)	0.1070 (0.100)	0.0053*
AQ	0.0769 (0.003)	0.0673 (0.010)	0.0770 (0.003)	0.0097***	0.0750 (0.003)	0.0790 (0.001)	0.0040***
Panel B: earnings management before & after market liberalization							
	Full sample (701 firms, 1999–2006)	Before liberalization (1999–2001)			After liberalization (2003–2006)		
		CL (67 firms)	NC (634 firms)	Mean diff. (NC–CL)	CL (67 Firms)	NC (634 Firms)	Mean diff. (NC–CL)
|DA|	0.1026 (0.099)	0.0795 (0.068)	0.1040 (0.104)	0.0245***	0.1089 (0.084)	0.1068 (0.100)	−0.0021
AQ	0.0769 (0.003)	0.0580 (0.004)	0.0759 (0.003)	0.0179***	0.0761 (0.005)	0.0783 (0.001)	0.0022**

This table compares the magnitude of earnings management between cross-listed and non–cross-listed firms. Panel A focuses on the full sample and panel B breaks down into the pre– and post–market-liberalization periods. For a more rigorous analysis, earnings quality is measured using two alternative approaches: the absolute value of discretionary accruals, $|DA|$, and accruals quality, *AQ*. Here, $|DA|$ is calculated using the modified Jones (1991) model and *AQ* is measured as the standard deviation of residuals from the model that regresses current accruals on the lagged, current, and future values of CFO, change in sales revenues, and gross PPE. The final sample consists of 701 firms (67 A- and B-share dual-listed firms and 634 comparable purely domestic-listed firms), each with a continuous listing history over the entire sample period from 1998 to 2006. Standard deviations are in parentheses.*,**, and*** indicate significance at the 10%, 5%, and 1% levels.

studies for developed markets (around 5% of lagged assets; see, e.g., Bergstresser and Philippon (2006), Francis et al. (2005), Yu (2008)). This finding is consistent with the prediction that earnings management is likely to thrive in emerging markets where regulatory and disclosure standards are relatively low and investor protection is weak. In line with hypothesis H1, which postulates that cross-listed firms have better earnings quality, we find that earnings management is less prevalent among cross-listed firms than among non–cross-listed firms during the entire sample period. The $|DA|$ and *AQ* values are 9.65% and 6.73%, respectively, for firms with B-share listings (panel A, column 2), whereas they are 10.32% and 7.70%, respectively, for firms with only domestic A-share listings (panel A, column 3). The mean difference is 0.67% for the $|DA|$ measure and 0.97% for the *AQ* measure. Both are statistically significant at conventional levels. Columns 5 and 6 of panel A present the overall earnings quality of the sample firms before and after the market liberalization reforms. Interestingly, we find that the overall earnings quality (both $|DA|$ and *AQ*) has worsened during the post-liberalization period. The empirical findings in panel B are highly consistent with hypothesis H4, which predicts a diminishing cross-listing effect under increased market integration. During the pre–market-liberalization period, both $|DA|$ and *AQ* values are much lower among cross-listed firms than among non–cross-listed firms (7.95% relative to 10.45% with respect to $|DA|$, and 5.85% relative to 7.59% with respect to *AQ*). The mean difference is significant at the 1% level for both measures. After the introduction of market liberalization reforms, however, the divergence becomes statistically insignificant for the $|DA|$ measure and marginally significant for the *AQ* measure.

Overall, the results provide preliminary evidence that firms with B-share listings tend to have better earnings quality than their purely domestic-listed peers, while the quality differential between the two groups of firms becomes less evident in a more integrated capital market world. A year-by-year analysis of earnings management in Table 3 provides additional support for our central argument. As Table 3 indicates, the divergence in earnings quality between the two groups of firms is highly significant prior to the start of market liberalization in 2001, whereas the difference fades away after the completion of the stock market regulatory reforms in 2002.

The pattern of earnings management for the two groups of firms is presented graphically in Fig. 1. As can be seen, both $|DA|$ and *AQ* values are much lower for cross-listed firms than for non–cross-listed firms during the pre–market-integration period, from 1999 to 2001. Moreover, there is a clear convergence in earnings quality between the two groups of firms during the post–market-integration period, from 2003 to 2006.

Table 3
Earnings management, year by year.

	1999	2000	2001	2002	2003	2004	2005	2006
Panel A: absolute value of discretionary accruals								
Cross-listed firms	0.0815	0.0888	0.0681	0.0979	0.1068	0.1149	0.1038	0.1104
	(0.062)	(0.068)	(0.073)	(0.102)	(0.076)	(0.083)	(0.084)	(0.093)
Non–cross-listed Firms	0.1077	0.1098	0.0946	0.0865	0.1186	0.1102	0.0971	0.1011
	(0.100)	(0.115)	(0.097)	(0.089)	(0.121)	(0.098)	(0.083)	(0.095)
Mean diff. (NC–CL)	0.026***	0.021**	0.027***	−0.011	0.012	−0.005	−0.007	−0.009
Panel B: accruals quality								
Cross-listed firms	0.0584	0.0553	0.0602	0.0691	0.0724	0.0749	0.0811	
	(0.002)	(0.003)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)	
Non–cross-Listed firms	0.0743	0.0803	0.0730	0.0767	0.0780	0.0791	0.0779	
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Mean Diff. (NC–CL)	0.016***	0.025***	0.013***	0.008***	0.006***	0.004**	−0.003**	

This table compares the magnitude of earnings management between cross-listed and non–cross-listed firms, year by year. Consistent with Table 2, earnings quality is measured using two alternative approaches: the absolute value of discretionary accruals, $|DA|$, and accruals quality, AQ, where $|DA|$ is calculated using the modified Jones (1991) model and AQ is measured as the standard deviation of residuals from the model that regresses current accruals on the lagged, current, and future values of CFO, change in sales revenues, and gross PPE. The final sample consists of 701 firms (67 A- and B-share dual-listed firms and 634 comparable purely domestic-listed firms), each with a continuous listing history over the entire sample period from 1998 to 2006. Note that there are no AQ values in 2006 because the observations of year 2006 are lost when calculating forward CFO. Standard deviations are in parentheses.*,**, and*** indicate significance at the 10%, 5%, and 1% levels.

3.3. Cross-listing and earnings management

To achieve a more direct assessment of the cross-listing impact on earnings management, a series of multivariate regressions are conducted. In the regressions, alternative measures of earnings management are regressed on a cross-listing dummy, as well as a number of control variables that have been documented to have nontrivial influences on earnings quality. Such controls include an exchange dummy, firm size, book-to-market ratio, ROA, leverage, state ownership, managerial ownership, board size, and board independence.[5] The control variables are chosen based on previous studies, data availability, and the nature of this study. Here, the book-to-market ratio, ROA, and leverage ratio are included to account for growth opportunities, profitability, and the impact of capital structure, respectively. In the literature, it is widely documented that corporate governance plays an important role in shaping earnings quality (e.g., Leuz et al., 2003). Thus, we further include state ownership, managerial ownership, board size, and board independence in the models to control for the effectiveness of corporate governance. Moreover, a post-listing dummy and an interaction term (between the cross-listing dummy and the post-liberalization dummy) are also included to account for the impact of market liberalization. To address potential industry effects, all regressions are conducted within each industry category.[6] Specifically, the following models are estimated:

$$|DA_{it}| = \lambda_0 + \lambda_1 DCROSS_{it} + \lambda_2 DEXCH_{it} + \lambda_3 SIZE_{it} + \lambda_4 BM_{it} + \lambda_5 ROA_{it} + \lambda_6 LEV_{it} + \lambda_7 SO_{it} + \lambda_8 MO_{it} + \lambda_9 BSIZE_{it} + \lambda_{10} BIND + \lambda_{11} DPOSTL_{it} + \lambda_{12} (DC{*}DPOSTL)_{it} + \varepsilon_{it} \quad (4)$$

$$AQ_{it} = \lambda_0 + \lambda_1 DCROSS_{it} + \lambda_2 DEXCH_{it} + \lambda_3 SIZE_{it} + \lambda_4 BM_{it} + \lambda_5 ROA_{it} + \lambda_6 LEV_{it} + \lambda_7 SO_{it} + \lambda_8 MO_{it} + \lambda_9 BSIZE_{it} + \lambda_{10} BIND + \lambda_{11} DPOSTL_{it} + \lambda_{12} (DC{*}DPOSTL)_{it} + \varepsilon_{it} \quad (5)$$

[5] The regressions are also conducted with additional control variables. The results are not reported because these controls are never statistically significant across all model specifications and have no evident impact on the main results. Such variables include firm age, sales growth, and industry concentration, where sales growth and industry concentration are used to control for demand conditions and product-cycle effects.

[6] As a robustness check, we further duplicate the regressions with industry dummies. The results are consistent.

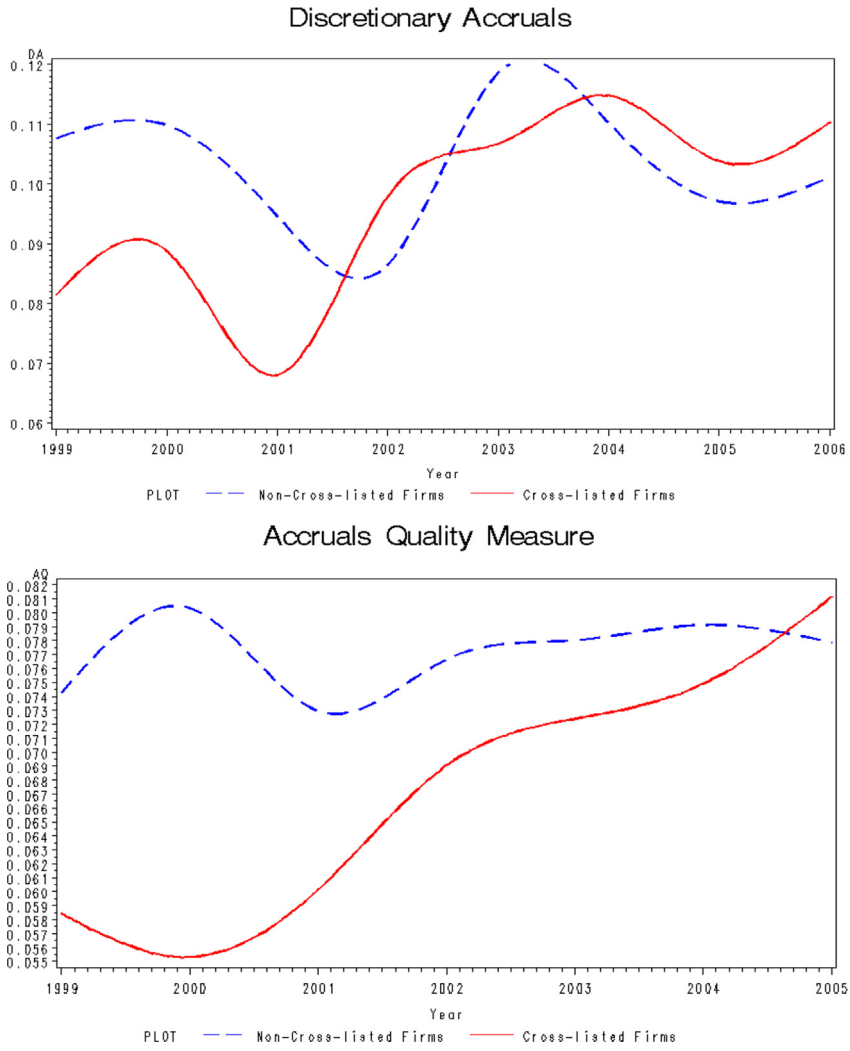


Fig. 1. Earnings management over time. These figures compare the magnitude of earnings management between cross-listed and non–cross-listed firms over the sample period from 1999 to 2006. For a rigorous analysis, earnings quality is measured using two alternative approaches: the absolute value of discretionary accruals, |*DA*|, and accruals quality, *AQ*. Here, |*DA*| is calculated using the modified Jones (1991) model and *AQ* is measured as the standard deviation of residuals from the model that regresses current accruals on the lagged, current, and future values of CFO, change in sales revenues, and gross PPE. The time frame of estimation spans the two regulatory reforms (i.e., the opening of the foreign B-share market to Chinese domestic investors in 2001 and the opening of the domestic A-share market to qualified foreign institutional investors in 2002).

The dependent variable in the regressions is either the absolute value of discretionary accruals, |*DA*|, or accruals quality, *AQ*. The exogenous variables are defined as follows: *DCROSS* is the cross-listing dummy, which takes the value of 1 for firms with both A- and B-share listings and 0 for firms with only domestic A-share listings; *DEXCH* is the exchange dummy, where 1 stands for SSE-listed firms and 0 stands for SZSE-listed firms; *SIZE* is the size of the firm; *BM* is the book-to-market ratio; *ROA* is the return on assets ratio; *LEV* is the leverage ratio; *SO* is state ownership; *MO* is managerial ownership; *BSIZE* is board size, *BIND* is board independence; *DPOSTL* is the post-liberalization dummy, where 1 stands for the post-liberalization period and 0 stands for the pre-

Table 4
Correlation matrix of explanatory variables.

	DCROSS	DEXCH	SIZE	BM	ROA	LEV	SO	MO	BSIZE	BIND
DCROSS	1.0000									
DEXCH	0.0248*	1.0000								
SIZE	0.1412***	−0.0674***	1.0000							
BM	0.0197	−0.0255*	0.5488***	1.0000						
ROA	0.0094	−0.0177	0.1339***	0.0603***	1.0000					
LEV	−0.0099	0.0135	−0.0188	−0.0306**	−0.0008	1.0000				
SO	−0.0186	−0.021	0.1191***	0.1032***	0.0165	−0.0262*	1.0000			
MO	−0.0119	0.0310**	0.1119***	−0.0112	0.0015	0.0014	0.0343**	1.0000		
BSIZE	0.0140	0.0530***	0.1119***	0.1047***	0.0164	−0.0112	0.0094	0.0609***	1.0000	
BIND	0.0098	−0.0101	0.1895***	−0.0171	−0.0067	−0.0088	−0.0729***	0.0146	−0.0283**	1.0000

This table reports the correlation coefficients of explanatory variables. The variables in the table are defined as follows: *DCROSS* is the cross-listing dummy, which takes the value of 1 for firms with both A- and B-share listings and 0 for firms with only domestic A-share listings; *DEXCH* is the exchange dummy, where 1 stands for SSE-listed firms and 0 stands for SZSE-listed firms; *SIZE* is the size of the firm, calculated as the natural log of total assets; *BM* is the book-to-market ratio, measured as the difference between total assets and total liabilities, divided by the stock market capitalization of the firm; *LEV* is the leverage (debt-to-equity) ratio; *ROA* is the return on assets ratio, computed as EBXI divided by total assets; *SO* is state ownership, measured as the percentage of common shares owned by the state; *MO* is managerial ownership, measured as the percentage of common shares owned by top managers; *BSIZE* is board size, calculated as the number of directors on the board; and *BIND* is board independence, measured as the percentage of independent directors on the board. The final sample consists of 701 firms, each with a continuous listing history over the entire sample period from 1998 to 2006.*, **, and*** indicate significance at the 10%, 5%, and 1% levels.

liberalization period; and *DC*DPOSTL* is the interaction term between the cross-listing dummy and the post-liberalization dummy. Both the correlation test and the VIF statistics suggest that the concern about multicollinearity among the independent variables does not appear to be warranted. As Table 4 indicates, while there are a number of statistically significant relationships among explanatory variables, none of them exceeds 0.55.

Based on the Hausman Specification Test, the two-way random effects model is utilized. In order to get a more precise estimation, the error components model and generalized least squares (GLS) estimation are also applied. The standard errors in the regressions account for serial correlations and heteroskedasticity.

Since the purpose of these multivariate regressions is to investigate the cross-listing impact on earnings management, the main variable of focus here is the cross-listing dummy, *DCROSS*. If listing on the B-share market improves earnings quality (as hypothesis H1 contends), then the coefficient estimates of *DCROSS* should be negative and statistically significant. To address the impact of market integration, the regressions are further conducted with respect to the pre− and post−market-liberalization periods. If the impact of cross-listing is mitigated under increased market integration (as hypothesis H4 contends), then the coefficient estimates of *DCROSS* should be less significant after the liberalization reforms.

3.4. Measuring price informativeness

In line with previous studies (e.g., Chan and Hameed (2006), Morck et al. (2000), Roll (1988)), we use the R-squared value from the regression of the capital asset pricing model (CAPM) to measure the departure of firm-specific stock movements from the market. Note that many studies include industry returns in the regression (e.g., Durnev et al. (2004), Gul et al. (2010), Roll (1988)). It is argued, however, that in studies that focus on emerging markets, the inclusion of industry returns might be problematic, because of the difficulties in disentangling the industry effect from the market and the fact that many industries are dominated by a few firms in emerging economies (Chan and Hameed (2006)). This study follows Chan and Hameed's approach.[7] In particular, the following model is estimated:

[7] As a robustness check, additional models with industry returns are also investigated, where the results are statistically unaffected.

$$\left(R_{it} - R_t^F\right) = \alpha + \beta\left(R_t^M - R_t^F\right) + \varepsilon_{it} \tag{6}$$

where R_{it} is the stock return for each individual firm at time t, that is, $R_{it} = log(P_{it}/P_{i,t-1})*100$; R_t^M is the market return at time t, that is, $R_t^M = \log(P_t^M/P_{t-1}^M)*100$; R_t^F is the risk-free rate (China's monthly yield of the three-month household deposit interest rate) at time t; and β is the covariance of the market return with the portfolio return divided by the variance of the market return. The R-squared values from Equation (6) are then used to measure the departure of firm-specific movements from the market. Specifically,

$$R^2 = 1 - \frac{\sum \varepsilon_t^2}{\sum [y_t - \overline{y}]^2} \tag{7}$$

In testing the impact of cross-listing on the capitalization of firm-specific information, we first compare the price synchronicity between cross-listed and non–cross-listed firms. If cross-listing plays an important role in inducing more informative and value-relevant stock prices, then firms with B-share listings should experience less synchronous stock movements than firms without B-share listings, that is, $R_C^2 < R_{NC}^2$. If increased market integration mitigates the bonding effect, then the divergence in price informativeness between the two groups of firms should be less evident after market liberalization.

Related regression results are reported in Table 5, where columns 1 and 2 focus on the full sample period and columns 3–6 break down into pre– and post–market-liberalization periods. As columns 1 and 2 show, firms with B-share listings tend to move in a relatively unsynchronized manner compared to their purely domestic-listed peers (with the R-squared value of 0.37 relative to 0.42), suggesting that cross-listing on the B-share market promotes the capitalization of firm-specific information. According to columns 3 and 4 of Table 5, there is a significant divergence in price synchronicity between the two groups of firms under conditions of market segmentation (the R-squared value is 0.33 for cross-listed firms and 0.53 for non–cross-listed firms). Consistent with hypothesis H4, columns 5 and 6 show that the difference in price synchronicity between cross-listed and non–cross-listed firms shrinks dramatically during the period of increased market integration conditions (the R-squared value is 0.29 for cross-listed firms and 0.39 for non–cross-listed firms). The mean difference in R-squared values declines from 0.2 to 0.1 upon market integration.

3.5. Cross-listing and price informativeness

For a more direct assessment of the impact of cross-listing on price informativeness, multivariate regressions are further conducted. The dependent variable is price synchronicity, which is measured as $SYNCH = Log[(R^2/1 - R^2)]$ (see, e.g., Chan and Hameed (2006), Durnev et al. (2004), Morck et al. (2000)). Logistic transformation is utilized here because the R-squared value is undesirable for regression purposes (it is bounded between 0 and 1). Additionally, the transformed variable also possesses some useful features. That is, $SYNCH = Log(R^2/1 - R^2) = Log(\sigma_m^2/\sigma_\varepsilon^2) = Log(\sigma_m^2) - Log(\sigma_\varepsilon^2)$. Intuitively, a higher value of $SYNCH$ indicates a greater power of market-wide variation, σ_m^2, relative to firm-specific variation, σ_ε^2, in explaining stock performance. In addition to the control variables in models (4) and (5), trading volume is further included in the regressions to account for the impact of the speed of price adjustments on price synchronicity. Because actively traded stocks may react to market information faster than infrequently traded stocks, we expect individual price movements of stocks with high trading volume to be more synchronous with the market, all else being equal (e.g., Chan and Hameed (2006)). In particular, the following model is estimated:

$$\begin{aligned} SYNCH_{it} = {} & \lambda_0 + \lambda_1 DCROSS_{it} + \lambda_2 DEXCH_{it} + \lambda_3 SIZE_{it} + \lambda_4 BM_{it} + \lambda_5 ROA_{it} + \lambda_6 LEV_{it} + \lambda_7 SO_{it} + \lambda_8 MO_{it} \\ & + \lambda_9 BSIZE_{it} + \lambda_{10} BIND_{it} + \lambda_{11} DPOSTL_{it} + \lambda_{12} (DC*DPOSTL)_{it} + \lambda_{13} VOL_{it} + \varepsilon_{it} \end{aligned} \tag{8}$$

Table 5
Price informativeness.

	Full sample period (1999–2006)		Before liberalization (1999–2001)		After liberalization (2003–2006)	
	Cross-listed firms	Non-cross-listed firm	Cross-listed firms	Non-Cross-Listed firms	Cross-listed firms	Non-Cross-Listed firms
α Estimate	−0.1023***	−0.1445***	−0.1157**	−0.0861***	−0.1640***	−0.1867***
	(−7.77)	(−32.76)	(−2.24)	(−12.66)	(−10.3)	(−34.06)
β Estimate	0.6849***	0.7852***	1.3493***	1.024***	0.5193***	0.6750***
	(17.78)	(61.02)	(8.12)	(46.19)	(11.75)	(44.66)
R-Squared	0.3720	0.4235	0.3332	0.5289	0.2929	0.3864

This table reports the regression results regarding the impact of cross-listing on price informativeness, where the R-squared value from the regression of the capital asset pricing model is used to measure the departure of firm-specific stock movements from the market, and, hence, stock price informativeness. That is, $(R_{it} - R_t^F) = \alpha + \beta(R_t^M - R_t^F) + \varepsilon_{it}$. Here, R_{it} is the stock return for each individual firm at time t; R_t^M is the market return at time t; and R_t^F is the risk-free rate at time t. The final sample consists of 701 firms (67 A- and B-share dual-listed firms and 634 comparable purely domestic-listed firms), each with a continuous listing history over the entire sample period from 1998 to 2006. The t-values are in parentheses.*, **, and*** indicate significance at the 10%, 5%, and 1% levels.

The independent variables include a cross-listing dummy, *DCROSS*, an exchange dummy, *DEXCH*, firm size, *SIZE*, book-to-market ratio, *BM*, return on assets, *ROA*, leverage ratio, *LEV*, state ownership, *SO*, managerial ownership, *MO*, board size, *BSIZE*, board independence, *BIND*, a post-liberalization dummy, DPOSTL, an interaction term between the cross-listing dummy and the post-liberalization dummy, *DC*DPOSTL*, and trading volume, *VOL*. In terms of hypothesis testing, if listing on the B-share market results in more informative (less synchronous) stock movements (as hypothesis H2 contends), then the coefficient estimates of *DCROSS* should be negative and statistically significant. If the impact of cross-listing on price synchronicity becomes less evident under increased market integration (as hypothesis H4 contends), then the coefficient estimates of *DCROSS* should be less significant after the regulatory reforms.

3.6. Cross-listing and firm value

Observing a significant divergence in earnings quality and price informativeness between cross-listed and non–cross-listed firms, the next question to address is whether the increased corporate governance and improved information environment will be correctly reflected in firm valuation. Following the literature, we measure the dependent variable, firm value, using Tobin's Q ratio, which is calculated as book value of total assets minus book value of equity plus market value of equity, divided by book value of total assets (e.g., Doidge et al. (2004), Morck et al. (1988)). Explanatory variables in the model include a cross-listing dummy, *DCROSS*, an exchange dummy, *DEXCH*, firm size, *SIZE*, price-to-earnings ratio, *PE*, return on assets, *ROA*, leverage ratio, *LEV*, state ownership, *SO*, managerial ownership, *MO*, board size, *BSIZE*, board independence, *BIND*, a post-liberalization dummy, DPOSTL, and an interaction term between the cross-listing dummy and the post-liberalization dummy, *DC*DPOSTL*. Given the special relationship between the book-to-market ratio and the dependent variable, Tobin's Q, we use price-to-earnings ratio here to account for growth opportunities, which is measured as current stock price divided by the earnings per share figure. For a complete analysis, the absolute value of discretionary accruals, $|DA|$, accruals quality, *AQ*, and price synchronicity, *SYNCH*, are further included in the model to control for the impact of earnings quality and price informativeness on firm value. Again, the regression is conducted within each industry group to address potential industry effects. Specifically, the following model is estimated:

$$\begin{aligned} Q_{i,t} = {} & \lambda_0 + \lambda_1 DCROSS_{it} + \lambda_2 DEXCH_{it} + \lambda_3 SIZE_{it} + \lambda_4 PE_{it} + \lambda_5 ROA_{it} + \lambda_6 LEV_{it} + \lambda_7 SO_{it} + \lambda_8 MO_{it} \\ & + \lambda_9 BSIZE_{it} + \lambda_{10} BIND_{it} + \lambda_{11} DPOSTL_{it} + \lambda_{12} (DC^*DPOSTL)_{it} + \lambda_{13} |DA|_{it} + \lambda_{14} AQ_{it} \\ & + \lambda_{15} SYNCH_{it} + \varepsilon_{it} \end{aligned} \tag{9}$$

If cross-listing results in higher valuation (as hypothesis H3 contends), then the coefficient estimates of *DCROSS* should be positive and significant. If the impact is mitigated in a more integrated world (as hypothesis H4 contends), then the coefficient estimates of *DCROSS* should be less significant during the post–market-liberalization period.

4. Empirical results

4.1. Earnings management

Table 6 reports the regression results regarding the impact of cross-listing on earnings management, where panel A focuses on the absolute value of discretionary accruals, $|DA|$, and panel B focuses on accruals quality, *AQ*. Consistent with the results reported in Tables 2 and 3, the regression results in Table 6 show that cross-listing has a negative and significant impact on earnings management (in terms of both $|DA|$ and *AQ*) during both the full sample period and the pre–market-liberalization period, even after controlling for the effectiveness of corporate governance. Moreover, we find that the coefficient on the post-liberalization dummy, *DPOSTL*, is positive and significant for both earnings management measures. This finding suggests that market liberalization tends to boost earnings management, all else being equal. One possible explanation for this is that managers tend to manage earnings more in order to meet profit-driven targets in an economy that has just become market oriented while corporate governance mechanisms are still not yet well developed. In addition, the coefficient estimate of the interaction term, *DC*DPOSTL*, is found to be positive and significant, suggesting that the regulatory reforms have a significant impact on earnings quality among cross-listed firms, and that the power of cross-listing in mitigating earnings management is reduced to a large extent after market liberalization. Consistent with hypothesis H4 and the empirical results in Tables 3 and 4, the cross-listing coefficient is found to be insignificant during the post–market-liberalization period (columns 3 and 6 of Table 6). To sum up, the empirical results thus far document a consistent pattern: cross-listed firms manage earnings less than their purely domestic-listed peers, while the divergence in earnings management between the two groups of firms dissipates considerably in a more integrated capital market world.

4.2. Price informativeness

The regression results regarding the impact of cross-listing on stock price synchronicity are reported in Table 7, where columns 1 and 2 focus on the full sample period and columns 3–6 break down into the pre– and post–market-liberalization periods. Consistent with the bonding hypothesis, the coefficient on the cross-listing dummy is negative and significant across all model specifications. This result indicates that firms with B-share listings are valued more on firm-specific information, whereas firms with only domestic A-share listings are valued more on market-wide information. In contrast with the prediction of hypothesis H4, the impact of cross-listing on price synchronicity does not appear to be mitigated after the liberalization reforms. This finding suggests that the convergence in accounting management between cross-listed and non–cross-listed firms has not been completely translated into price informativeness. This is probably due to the distinct disclosure and regulatory standards across the two markets. In terms of control variables, we find that the coefficients on firm size and state ownership are both positive and significant across different model specifications, suggesting that larger firms and state-owned enterprises are more likely to co-move with the market or dominate the movements of the market in China. Moreover, the book-to-market ratio is found to be positive and significant during the pre–market-liberalization period, suggesting that firms with better growth opportunities are more likely to co-move with the market prior to market liberalization. The coefficient on board independence, however, is found to be negative and significant during the post–market-liberalization period, suggesting that independent directors play an important role in inducing more transparent information environment in an economy that becomes more and more market driven. In addition, we find that SSE-listed firms tend to have less synchronous stock movements than SZSE-listed firms. In contrast with the findings of Chan and Hameed (2006), trading volume is found to be insignificant during both the full and the post–market-

Table 6
Impact of cross-listing on earnings management.

	Panel A: discretionary accruals			Panel B: accruals quality		
	Full sample (1999–2006)	Before liberalization (1999–2001)	After liberalization (2003–2006)	Full sample (1999–2006)	Before liberalization (1999–2001)	After liberalization (2003–2006)
Intercept	0.2429*** (7.04)	0.1119 (1.63)	0.1169* (1.77)	0.0747*** (37.76)	0.0728*** (28.29)	0.0811*** (84.30)
DCROSS	−0.0120* (−1.88)	−0.0230*** (−2.66)	0.0020 (0.22)	−0.0160*** (−31.79)	−0.0189*** (−28.53)	−0.0021 (−0.78)
DEXCH	0.0014 (0.52)	−0.0021 (−0.42)	0.0015 (0.28)	−0.00005 (−0.58)	−0.0004** (−1.98)	0.0001*** (14.41)
SIZE	−0.0079*** (−4.44)	−0.0029 (−0.85)	−0.0016 (−0.49)	0.0001 (0.59)	0.0002 (1.53)	−0.0002*** (−5.15)
BM	0.0077*** (7.28)	0.0062*** (2.87)	0.0041** (2.37)	−0.0002 (−1.35)	−0.0004 (−1.18)	0.00002 (1.21)
ROA	0.0088*** (4.23)	0.3728*** (10.49)	0.0028 (1.51)	−0.0034* (−1.84)	−0.0060* (−1.77)	−0.0010*** (−3.36)
LEV	0.00005 (0.77)	0.000001 (0.01)	0.0001 (1.33)	−0.0001 (−1.06)	−0.0001 (−1.08)	−0.000004** (-2.26)
SO	−0.0109** (−2.06)	−0.0215** (−2.29)	−0.0010 (−0.10)	0.0005 (1.19)	0.0003 (0.97)	0.0005 (0.73)
MO	−0.1230 (−1.13)	−0.2442 (−1.19)	−0.1726 (−0.77)	−0.0377 (−0.22)	−0.1546 (−0.34)	0.0013 (2.25)
BSIZE	0.0004 (0.63)	0.0007 (0.71)	−0.0001 (−0.05)	0.00005** (2.15)	0.00002 (1.22)	0.00005*** (4.29)
BIND	−0.0204 (−1.41)	0.0017 (0.06)	0.0347 (0.88)	0.0032*** (3.09)	−0.0073*** (−4.62)	0.00005 (0.26)
DPOSTL	0.0153*** (3.31)			0.0016*** (4.71)		
DC*DPOSTL	0.0159* (1.78)			0.0133*** (7.31)		
R-Squared	0.1730	0.0690	0.0450	0.6183	0.6698	0.4618

This table reports the regression results regarding the impact of cross-listing on earnings management. The dependent variable is either the absolute value of discretionary accruals, |*DA*|, or accruals quality, *AQ*. The independent variables include a cross-listing dummy, *DCROSS*, an exchange dummy, *DEXCH*, firm size, *SIZE*, book-to-market ratio, *BM*, return on assets, *ROA*, leverage ratio, *LEV*, state ownership, *SO*, managerial ownership, *MO*, board size, *BSIZE*, board independence, *BIND*, a post-liberalization dummy, *DPOSTL*, and an interaction term between the cross-listing dummy and the post-liberalization dummy, *DC*DPOSTL*. The final sample consists of 701 firms, each with a continuous listing history over the entire sample period from 1998 to 2006. The *t*-values are in parentheses.*, **, and*** indicate significance at the 10%, 5%, and 1% levels.

Table 7
Impact of cross-listing on price informativeness.

	Full sample period (1999–2006)		Before liberalization (1999–2001)		After liberalization (2003–2006)	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Intercept	−2.3052*** (−4.94)	−2.2547*** (−4.51)	−2.8309*** (−3.49)	−2.2512*** (−2.60)	−1.5317** (−2.34)	−1.4232** (−1.97)
DCROSS	−0.4281*** (−4.95)	−0.4266*** (−4.93)	−0.4603*** (−4.56)	−0.4391*** (−4.32)	−0.3984*** (−4.62)	−0.3954*** (−4.56)
DEXCH	−0.2083*** (−5.83)	−0.2080*** (−5.82)	−0.2015*** (−3.47)	−0.2016*** (−3.47)	−0.2111*** (−4.17)	−0.2104*** (−4.16)
SIZE	0.1141*** (4.77)	0.1115*** (4.34)	0.1370*** (3.32)	0.1055** (2.37)	0.1013*** (3.14)	0.0956*** (2.66)
BM	0.0313** (2.19)	0.0320** (2.21)	0.0932*** (3.48)	0.1042*** (3.80)	0.0166 (0.88)	0.0182 (0.94)
ROA	−0.0206 (−0.73)	−0.0201 (−0.71)	−0.9842** (−2.20)	−1.0072** (−2.25)	−0.0121 (−0.42)	−0.0110 (−0.38)
LEV	−0.0001 (−0.17)	−0.0001 (−0.17)	−0.0001 (−0.08)	−0.0001 (−0.07)	0.0001 (0.07)	0.0001 (0.08)
SO	0.2413*** (3.37)	0.2428*** (3.38)	0.2008* (1.78)	0.2034* (1.81)	0.2612** (2.50)	0.2648** (2.52)
MO	−0.7476 (−0.51)	−0.7606 (−0.52)	−0.8579 (−0.36)	−0.7564 (−0.31)	−0.7125 (−0.34)	−0.7571 (−0.36)
BSIZE	−0.0091 (−1.17)	−0.0091 (−1.16)	−0.0124 (−1.10)	−0.0130 (−1.15)	−0.0128 (−1.00)	−0.0126 (−0.99)
BIND	−0.2557 (−1.31)	−0.2545 (−1.30)	0.1973 (0.53)	0.1931 (0.51)	−1.4257*** (−2.84)	−1.4294*** (−2.85)
VOL		0.0001 (0.28)		0.0033* (1.88)		0.0001 (0.36)
DPOSTL	−0.0363 (−0.58)	−0.0336 (−0.53)				
DC*POSTL	0.0147 (0.12)	0.0148 (0.12)				
R-Squared	0.0248	0.0248	0.0356	0.0373	0.0249	0.0250

This table reports the regression results regarding the impact of cross-listing on price informativeness. The dependent variable in the regression is price synchronicity, measured as $SYNCH = Log(R^2/(1 - R^2))$. The independent variables include a cross-listing dummy, *DCROSS*, an exchange dummy, *DEXCH*, firm size, *SIZE*, book-to-market ratio, *BM*, return on assets, *ROA*, leverage ratio, LEV, state ownership, *SO*, managerial ownership, *MO*, board size, *BSIZE*, board independence, *BIND*, a post-liberalization dummy, DPOSTL, and an interaction term between the cross-listing dummy and the post-liberalization dummy, *DC*DPOSTL*. To account for the impact of the speed of price adjustments on price synchronicity, trading volume, *VOL*, is further added to the regressions. The final sample consists of 701 firms, each with a continuous listing history over the entire sample period from 1998 to 2006. The *t*-values are in parentheses.*, **, and*** indicate significance at the 10%, 5%, and 1% levels.

Table 8
Impact of cross-listing on firm value.

Panel A: Full sample period (1999–2006)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intercept	3.1315* (1.66)	3.1369* (1.65)	3.0054 (1.52)	3.0047 (1.51)	4.3929*** (3.11)	4.3864*** (3.12)	3.2053 (1.63)	3.2177 (1.62)
DCROSS	0.3036*** (3.29)	0.1964** (2.30)	0.3322*** (3.23)	0.2710*** (3.57)	0.2433*** (2.63)	0.2326*** (3.24)	0.3013*** (3.09)	0.1939** (2.13)
DEXCH	0.0526 (0.84)	0.0530 (0.85)	0.0469 (0.76)	0.0487 (0.78)	0.0432 (0.69)	0.0426 (0.69)	0.0418 (0.69)	0.0418 (0.70)
SIZE	−0.0744 (−0.62)	−0.0736 (−0.61)	−0.0851 (−0.77)	−0.0845 (−0.76)	−0.1744*** (−2.62)	−0.1738*** (−2.62)	−0.0778 (−0.63)	−0.0774 (−0.62)
PE	−0.0012 (−0.87)	−0.0011 (−0.84)	−0.0009 (−0.84)	−0.0009 (−0.80)	0.0001 (0.90)	0.0002 (1.01)	−0.0012 (−0.88)	−0.0012 (−0.86)
ROA	−8.5306 (−1.03)	−8.5200 (−1.03)	−8.5619 (−1.03)	−8.5533 (−1.03)	−0.1877 (−0.51)	−0.1805 (−0.47)	−8.5243 (−1.03)	−8.5118 (−1.03)
LEV	0.0098 (1.06)	0.0099 (1.07)	0.0094 (1.01)	0.0094 (1.01)	0.0221 (1.08)	0.0221 (1.08)	0.0098 (1.05)	0.0098 (1.06)
SO	−0.2005* (−1.71)	−0.2030* (−1.72)	−0.1420** (−2.13)	−0.1450** (−2.14)	−0.0739* (−1.95)	−0.0722* (−1.89)	−0.2083* (−1.92)	−0.2096* (−1.90)
MO	−31.4990 (−1.10)	−28.7910 (−1.04)	−32.2278 (−1.07)	−29.3844 (−1.01)	−10.0964 (−0.58)	−8.9577 (−0.56)	−39.9507 (−0.97)	−36.8319 (−0.93)
BSIZE	0.0132 (0.78)	0.0127 (0.73)	0.0064 (0.61)	0.0058 (0.54)	−0.0024 (−0.73)	−0.0028 (−0.75)	0.0131 (0.77)	0.0125 (0.72)
BIND	0.5886*** (3.44)	0.3354 (1.45)	0.6007*** (3.35)	0.5461 (1.29)	0.4150*** (4.14)	0.2074** (2.02)	0.5920*** (3.46)	0.3350 (1.44)
DPOSTL		0.0736 (0.97)		0.0071 (0.06)		0.0814 (1.27)		0.0753 (0.96)
DC*POSTL		0.2160(1.26)		0.1213 (1.11)		0.0296 (0.27)		0.2164 (1.26)
|DA|			3.6754 (1.02)	3.6937 (1.02)				
AQ					−1.1671 (−1.45)	−0.9460 (−1.38)		
SYNCH							0.0105 (0.51)	0.0117 (0.54)
R-Squared	0.4179	0.4281	0.4199		0.2976	0.3058	0.4262	0.4366

Panel B: Before & after market liberalization

	Before liberalization (1999–2001)				After liberalization (2003–2006)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Intercept	2.2400*** (6.86)	2.2439*** (6.83)	2.2318*** (7.04)	2.1499*** (7.03)	4.1904* (1.66)	4.1445 (1.62)	6.0152** (2.59)	4.3271 (1.64)
DCROSS	0.1303*** (3.16)	0.1307*** (3.21)	0.1323*** (3.24)	0.1242*** (3.06)	0.4469** (2.27)	0.4206** (2.50)	0.3004** (2.03)	0.4474** (2.36)
DEXCH	−0.0189 (−1.13)	−0.0182 (−1.09)	−0.0190 (1.13)	−0.0196 (−1.26)	0.0676 (0.68)	0.0297 (0.29)	0.0740 (0.69)	0.0504 (0.54)
SIZE	−0.0714*** (−5.74)	−0.0717*** (−5.71)	−0.0711*** (−5.92)	−0.0668*** (−5.96)	−0.1160 (−0.95)	−0.1307 (−1.18)	−0.2268** (−2.43)	−0.1225 (−0.96)
PE	−0.0001 (−0.66)	−0.0001 (−0.68)	−0.0001 (−0.67)	−0.0001 (−0.64)	−0.0013 (−0.82)	−0.0008 (−0.73)	0.0001 (0.16)	−0.0014 (−0.88)
ROA	−0.5594* (−1.65)	−0.5551* (−1.65)	−0.5541 (−1.62)	−0.5705* (−1.67)	−8.4679 (−1.02)	−8.5535 (−1.03)	0.1856 (0.25)	−8.4704 (−1.02)
LEV	0.0422 (1.24)	0.0423 (1.24)	0.0425 (1.23)	0.0421 (1.23)	0.0059 (0.90)	0.0049 (0.73)	0.0074 (0.34)	0.0056 (0.83)
SO	−0.0283 (−1.11)	−0.0261 (−1.06)	−0.0291 (−1.17)	−0.0321 (−1.54)	−0.1813** (−2.22)	−0.1980** (−2.26)	−0.1077 (−1.32)	−0.1910 (−1.13)
MO	−35.3238 (−0.79)	−35.6545 (−0.81)	−34.6110 (−0.79)	−35.9540 (−0.80)	−68.2038 (−1.10)	−75.6509 (−1.10)	−53.5742 (−1.10)	−78.8693 (−1.02)
BSIZE	−0.0012 (−0.37)	−0.0013 (−0.41)	−0.0012 (−0.36)	−0.0012 (−0.37)	0.0210 (0.50)	0.0118 (0.37)	−0.0179 (−1.26)	0.0214 (0.51)
BIND	0.2523*** (5.74)	0.2522*** (5.57)	0.2532*** (5.75)	0.2546*** (6.14)	−0.1270 (−0.13)	−0.2400 (−0.26)	−0.5497 (−0.72)	−0.1260 (−0.13)
|DA|		0.0098 (0.16)				4.6529 (1.03)		
AQ			−0.0131 (−0.03)				−3.5622 (−1.53)	
SYNCH				−0.0123** (−2.16)				0.0282 (1.02)
R-squared	0.3646	0.3667	0.3656	0.3713	0.4448	0.4473	0.3464	0.4565

This table reports the regression results regarding the impact of cross-listing on firm value as measured by Tobin's Q ratio, where panel A focuses on the full sample and panel B breaks down into the pre- and post-market-liberalization periods. The independent variables include a cross-listing dummy, *DCROSS*, an exchange dummy, *DEXCH*, firm size, *SIZE*, price-to-earnings ratio, *PE*, return on assets, *ROA*, leverage ratio, *LEV*, state ownership, *SO*, managerial ownership, *MO*, board size, *BSIZE*, board independence, *BIND*, a post-liberalization dummy, *DPOSTL*, and an interaction term, *DC*DPOSTL*. For a complete analysis, we further include the absolute value of discretionary accruals, *|DA|*, accruals quality, *AQ*, and price synchronicity, *SYNCH*, in the model to account for the impact of earnings quality and price informativeness on firm value. The final sample consists of 701 firms, each with a continuous listing history over the entire sample period from 1998 to 2006. The *t*-values are in parentheses.*, **, and *** indicate significance at the 10%, 5%, and 1% levels.

liberalization periods, and it is only marginally significant during the pre–market-liberalization period. One possible explanation is that firm size and trading volume are highly correlated, and firm size subsumes trading volume in explaining synchronicity. Overall, the empirical findings in Table 7 suggest that cross-listing plays an important role in inducing informed trading and facilitates the capitalization of firm-specific information. The effect remains significant even during periods of increased market integration.

4.3. Firm value

Table 8 presents the regression results regarding the impact of cross-listing, earnings quality, and price informativeness on firm value, where panel A covers the full sample period and panel B reports results based on the pre– and post–market-liberalization periods. Consistent with hypothesis H3, which predicts a positive impact of cross-listing on firm value, the coefficient estimates of *DCROSS* are found to be positive and significant across all model specifications. This result is consistent with the main finding of Doidge et al. (2004), which indicates that firms cross-listed on a more advanced capital market are worth more than similar home country firms. In contrast with the prediction of hypothesis H4, the coefficient estimate of the interaction term, *DC*DPOSTL*, is found to be insignificant, suggesting that the regulatory reforms do not significantly mitigate the valuation differential between the two groups. A close comparison in panel B indicates that, while the statistical significance of *DCROSS* changes from the 1% level to the 5% level after market liberalization, the economic magnitude does not appear to be mitigated. These results suggest that market liberalization reforms and the resultant convergence in financial reporting practices between cross-listed and non–cross-listed firms have not been completely embedded into firm valuation.[8] The positive impact of cross-listing on firm value remains significant even after controlling for the effectiveness of corporate governance, earnings quality, and price informativeness. In terms of control variables, we find that firm size has a negative impact on firm value and board independence has a positive impact on firm value during the pre–market-liberalization period. All other control variables are either insignificant or inconsistent across different model specifications. As can be seen, the coefficient estimates of earnings quality and price informativeness are insignificant across all model specifications. One possible explanation is that the cross-listing dummy subsumes earnings quality and price informativeness in explaining variations in firm value. Overall, the observed long-lasting valuation premiums indicate that market liberalization reforms and the resultant convergence in earnings quality between the two groups of firms have not been completely translated into firm valuation. This finding suggests that there is a lack of attention among investors and that the values of domestic and cross-listed stocks are determined by different forces in such an emerging market as China.

4.4. Robustness checks

In the literature, an inevitable empirical challenge associated with studies that assess strategy performance is endogeneity. With potential simultaneous bias, observing a positive relationship between cross-listing and earnings quality does not necessarily lead to the conclusion that cross-listing results in better earnings quality. The positive link between the two variables may be attributable to the fact that firms with better corporate governance (less earnings manipulation) are more likely to cross-list on the B-share market (i.e., reverse causality).[9] Alternatively, there might be a third variable that

[8] Given the continued significance of *DCROSS* after market integration, a natural question to ask is whether or not this remaining positive impact of cross-listing is due to growth opportunities. To address this concern, we repeat the regression with an additional interaction term between cross-listing and the price-to-earnings ratio. The results are not reported, because the interaction term is neither statistically significant nor does it have any impact on the main findings. That is, the positive link between cross-listing and firm value is not driven by growth opportunities.

[9] Likewise, the positive association between cross-listing and firm value may be attributable to the fact that firms with better growth opportunities are more likely to cross-list on the B-share market. The relationship between cross-listing and stock price informativeness is relatively immune from this type of simultaneous bias.

drives both a firm's cross-listing decision and earnings quality (i.e., omitted variables bias). A popular way to address endogeneity in the literature is the use of instrumental variables. Nevertheless, given that both cross-listing decisions and earnings management practices remain largely unexplored in emerging economies, the construction of instrumental variables seems to be very subjective. Therefore, the following approaches are used to address endogeneity in this study.

First, note that endogeneity, omitted-variables bias in particular, is less of an issue for panel models than cross-sectional models. This is because panel models control for omitted-variables bias automatically (since the past values of the variables in the panel automatically capture the effects of the missing variables). Second, to address reverse causality, we rerun all multivariate regressions using lagged independent variables, where the results are highly consistent with the results in Tables 6–8 These results provide additional confidence concerning endogeneity. Finally, as an additional robustness check, we also conduct a difference-in-differences analysis, where cross-listed firms are the treatment group and the non–cross-listed firms are the control group.[10] Consistent with our main results in Table 6, the difference-in-differences estimates for both earnings management measures are positive and significant, indicating that the regulatory reforms have a significant impact on earnings quality among cross-listed firms (as compared to the control group) and that the effect of cross-listing in mitigating earnings management is less bonding after the market liberalization reforms. These results provide supplemental support to our central argument that the bonding role of cross-listing is mitigated to a large extent in an increasingly integrated capital market world. The same technique is also applied to price synchronicity and firm value analysis, where the difference-in-differences estimates are insignificant. These results are consistent with our main results in Tables 7 and 8, indicating that market liberalization reforms have a marginal impact on stock price informativeness and firm value among cross-listed firms (as compared to the control group).[11]

Besides endogeneity, it is also argued that Chinese firms tend to manage earnings not only through operation-related accrual mechanisms but also through non-operating transactions with related parties or tunneling (e.g., Aharony et al. (2010), Chen and Yuan (2004)). For instance, the parent company can inject valuable assets into or absorb unprofitable units from its listed subsidiaries prior to their subsidiaries' new equity offerings to influence the share prices and "cash back" later on through non-operating transactions with related parties. For a more rigorous analysis, therefore, we further replicate regressions in Table 8 with "non-operating income to sales" as an additional control variable.[12] The empirical results are statistically unaffected, suggesting that accrual-based proxies are a proper measure of corporate earnings management for our sample.

5. Concluding remarks

This study examines the quality of corporate earnings, stock price informativeness, and firm valuation before and after the stock market liberalization reforms in China. Using a panel sample of Chinese firms over a nine-year period from 1998 to 2006, we find that cross-listing on a more regulated stock market leads to better earnings quality, improved information environment, and higher valuation, while the impact of cross-listing is mitigated to some extent after the introduction of market liberalization reforms in 2001 and 2002. These results are robust using various earnings management measures and different model specifications. Overall, the empirical findings suggest that the bonding effect of cross-listing is significant but its role is mitigated to some extent in an increasingly integrated capital market world.

The present study offers several new insights into the literature. First, while the bonding hypothesis has been researched significantly, little attention has been paid to directly testing the effectiveness of this kind of commitment in bonding real corporate practices. In the literature, the major concern regarding the bonding hypothesis is the signaling effect. That is, listing firms may realize higher valuation without significant improvement in their corporate governance if the market considers the

[10] We thank an anonymous referee for recommending this approach.
[11] For brevity all these results are not reported, but are available upon request.
[12] Consistent with existing studies (e.g., Bertrand et al. (2002), Wang and Yung (2011)), we use "non-operating income to sales" ratio as a proxy for non-operating transactions with related parties.

cross-listing decision as a positive signal. An effective way to separate the bonding effect from the signaling effect is to examine whether cross-listing results in changes in real corporate behavior. If the valuation premium is purely due to a signaling effect, then there should be little, if any, change in the listing firm's real corporate practices. This study examines the bonding effect of cross-listing on corporate governance in the context of earnings management and price informativeness, as well as its impact on firm value.

Second, while the issue of cross-listing has stimulated a considerable amount of quality research, the effect of increased market integration on the dynamics of cross-listing decisions is largely ignored. Since a necessary condition for the validity of the bonding hypothesis requires the underlying regulatory and disclosure standards across markets to diverge, testing the merits of the bonding hypothesis requires that we control for the degree of market integration. Drawing on the unique opportunity of the Chinese stock market segmentation and subsequent liberalization reforms, we are allowed to address the bonding effect of cross-listing under increased market integration within a single country setting and a relatively short time frame, where omitted-variables problems and structural stationarity are of less serious modeling concern.

Moreover, while the issues of earnings management, price informativeness, cross-listing, and market liberalization have been objects of focus in modern finance literature, no systematic attempt to date has been made to address these issues in an integrated framework. By investigating the impact of cross-listing on corporate earnings quality, price informativeness, and firm valuation, contingent upon the regulatory reforms of Chinese stock market liberalization, this study provides a meaningful synthesis of these disparate research streams. The empirical findings of this paper also offer a possible explanation for recent worldwide foreign delistings that have been plaguing major stock exchanges.

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