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Does institutional ownership influence firm performance? Evidence from China

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ABSTRACT

In recent decades, institutional investors have played an increasingly important role in China's stock markets, following a series of market-liberalizing reforms. This study uses a simultaneous equations model with a generalized method of moments estimator to investigate the effects of institutional ownership on firm performance in a new large sample of Chinese listed firms from 2004 to 2014. The results generally suggest that institutional ownership positively affects firm performance and are robust to accounting for deregulation, contemporaneous market conditions, and different stock market boards. However, not all institutional investors are active monitors and improve firm performance. In particular, the results indicate that pressure-insensitive, foreign and large institutional shareholders have greater positive effects on firm performance than pressure-sensitive, domestic, and small institutional shareholders. The results further suggest that institutional investors enhance shareholder value by attracting more analysts and reducing insider ownership (among other reasons), and these findings are robust to a series of sensitivity analyses.

1. Introduction

In recent decades, the Chinese government has undertaken a series of important reforms to liberalize Chinese stock markets and incentivize the development of institutional investors, including opening Chinese stock exchanges to qualified foreign institutional investors (QFIIs), social security funds, and insurance companies in 2002, 2003, and 2004, respectively.[1] In addition, from 2005 to 2006, policymakers implemented a split share structural reform that transformed approximately two-thirds of previously non-tradable shares into tradable shares.[2] As a consequence, the number of shares of Chinese listed companies that are owned by institutional investors (including mutual funds, social security funds, insurance companies, broker dealers, and QFIIs, among others) grew dramatically over the 2004–2014 period—from 3.04% of the total number of outstanding shares in 2004 to 32.65% in 2014. This trend has raised an interesting question: Do these institutional investors positively influence firm performance in China?

According to the “active monitoring” view, institutional investors (as large shareholders) should be able to supervise and monitor investee firms, reduce information asymmetries, lower agency problems and maximize shareholder value by virtue of their superior

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[1] Based on the approved investment quota, a QFII can invest in A shares and bonds listed on China's stock exchanges and other financial instruments approved by the China Securities Regulatory Commission (CSRC). A social security fund can invest up to 40% of its total assets in funds and stocks. An insurance company can invest in capital markets through two approaches: a) directly purchasing stocks, with such purchases equaling no more than 5% of its total assets, and b) buying securities investment funds, with such purchases equaling no more than 15% of its total assets (CSRC, 2007).

[2] By the end of 2006, the majority of listed companies had joined the share split reform.

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managerial skills and substantial resources. In addition, these institutional investors can use their ownership rights to pressure managers to improve corporate governance (Shleifer & Vishny, 1986).[3] Alternatively, the "passive monitoring" view suggests that institutional investors act only as passive monitors and do not intervene in management, trading shares to earn speculative short-term trading profits based on informational advantages (David & Kochhar, 1996) or to satisfy idiosyncratic portfolio needs (Elyasiani & Jia, 2010).[4] According to the "exploitation" view, institutional investors cooperate with firm managers to exploit dispersed small shareholders. In particular, they may choose to overlook management fraud if they can benefit from its consequences.[5] As Elyasiani and Jia (2010) indicate, these three views are not "mutually exclusive" (p. 606), but one may play the dominant role in explaining the relationship between firm performance and institutional ownership.

The previous literature notes that institutions are masters at influencing firm performance but presents mixed results. Brickley et al. (1988) examine a sample of 201 US firms with 308 antitakeover amendments in 1984 and find that there is a significant difference between pressure-insensitive and pressure-sensitive institutions in terms of voting for or against antitakeover amendments. Their results suggest that pressure-insensitive institutions are more likely to actively monitor and oppose management than are pressure-sensitive institutions. Cornett, Marcus, Saunders, and Tehranian (2007) investigate the effects of institutional ownership on corporate operating performance in the US from 1993 to 2000 and find that only pressure-insensitive institutional investors (e.g., mutual funds) have a positive impact on firm performance. Ferreira and Matos (2008) provide international evidence regarding the role of institutional ownership in 27 countries over the 2000–2005 period and suggest that foreign and independent (insensitive) institutions improve firm value (as measured by Tobin's Q) and operating performance (as measured by ROA and net profit margin), whereas the applicable coefficients for domestic and non-independent (sensitive) institutions are either insignificant or negative. Elyasiani and Jia (2010) investigate a large sample of 1532 US firms over the 1992–2004 period and find a positive relationship between firm performance and the stability of institutional ownership. These authors also suggest that insensitive institutional investors and investors owning 5% or more of shares have a greater positive impact on firm performance (as measured by industry-adjusted ROA) than sensitive institutional investors and institutional investors owning less than 5% of the outstanding shares, respectively. In addition, these authors find that the channels of such influence include decreased information asymmetry and increased incentive-based compensation.

Although China is the second-largest economy in the world, its stock market remains far from mature, similar to many other transitional and emerging economies. This mismatch has greatly hampered the efficient allocation of resources and, consequently, the sustainable development of the economy. To address this critical issue, the Chinese government has, since 2002, gone to great lengths to encourage the development of institutional investors because such investors are expected to stabilize the stock market by improving corporate governance, lowering information asymmetries, and helping investee firms respond to both external and internal shocks.[6] The China Securities Regulatory Commission (CSRC) even included "continuously promoting the development of institutional investors" as one of the key development strategies for China's capital markets for the period between 2008 and 2020 (CSRC, 2008, p. 137). As mentioned previously, however, different types of institutional investors can influence firm performance in quite different (or even opposite) ways. Therefore, another interesting question is which types of institutional investors contribute to improved investee performance in China? Moreover, the transmission mechanism between institutional ownership and firm performance is a critical issue, not only to policy makers but also managers and investors, because investigating it enables us to identify the key success factors concerning this value-enhancement mechanism.

Surprisingly, to date, only a handful of studies have empirically investigated this important issue in the Chinese context.[7] Yuan, Xiao, and Zou (2008) find that mutual fund stock ownership has a positive effect on firm performance in a sample of 1211 firms between 2001 and 2005. Chen, Du, Li, and Ouyang (2013) note that institutional ownership (both foreign and domestic) increases return volatility in a sample of 1458 Chinese firms for the 1998–2008 period. Examining Chinese listed firms from 2003 to 2008, Chan, Ding, and Hou (2014) indicate that better external governance through sources such as mutual funds could improve financial reporting quality and, in turn, strengthen investors' confidence and enhance financial market liquidity. Using data from 102 local Chinese banks between 2006 and 2011, Wu, Shen, and Lu (2015) demonstrate that having more foreign strategic investors (FSIs) enhances the earnings smoothing of local banks, and such effects become stronger for banks with more FSIs and more FSI directors. Employing data from over 1000 Chinese listed firms with institutional ownership from 2003 to 2011, Firth, Gao, Shen, and Zhang (2016) show that pressure-insensitive institutional ownership has a significantly positive effect on firm performance, whereas pressure-sensitive institutional ownership does not seem to generate such an effect. However, a comprehensive investigation of whether different types of institutions have differential effects on firm performance has yet to be undertaken, and no analysis has been performed of the channels through which institutional investors might affect firm performance.

To fill this gap, the aim of this study is to investigate the effects of institutional ownership on firm performance using a new and large sample of Chinese listed firms from 2004 to 2014. In particular, this study seeks to extend the previous empirical literature in

[3] For example, improvements might include the quality of information disclosure and transparency of firm operations.

[4] For example, fund managers adopt "prudent" investing behavior, treating their portfolio returns the same as index returns and buying stocks that represent the components of an index (e.g., S & P 500) (Elyasiani & Jia, 2010).

[5] For example, investment firms may side with management at the expense of other shareholders with the aim of obtaining more investment banking business (Brickley, Lease, & Smith, 1988).

[6] In 2002, the China Securities Regulatory Commission (CSRC) proposed simplifying the approval process and reducing government control to initiate market reforms in the mutual fund industry. In the same year, the CSRC also issued the *Notification on Relevant Issues Concerning the Examination and Approval of Securities Investment Funds* to stimulate the development of institutional investors.

[7] Several commentators (e.g., Gen, 2002; Tenev, Zhang, & Brevort, 2002) suggest that financial institutions—as short-term traders—play no monitoring role in the Chinese stock market because they represent such a small market share.

several respects. First, we investigate the relationship between institutional ownership and firm performance in China while simultaneously considering institutional investors' geographic origin, their independent business ties to investee firms, and the size of their ownership stakes. This study is also timely because the Chinese government exerted tremendous effort to promote institutional ownership during our sample period. Furthermore, a "one-size-fits-all" policy may not be appropriate because the effects of different institutions are not equal. China's dearth of mature financial institutions and regulatory bodies that address this issue (Allen, Qian, & Qian, 2005) is thus of great importance because Chinese policymakers must understand the ownership effects of different types of institutional investors on firm performance in greater detail to gauge the effects of potential reforms. Second, this study supplements the existing literature by investigating the channels through which institutional investors influence firm performance in China. In theory, institutional investors may improve firm performance by, among other functions, decreasing information asymmetry, enhancing corporate governance, and/or providing/sourcing funding when needed. A clearer understanding of the real-world transmission mechanism between institutional investors and firm performance will help both managers and investors formulate proper strategies based on their development and investment horizons. Third, employing a new and rich dataset, this study analyzes and identifies whether the association between institutional ownership and firm performance in China is robust to deregulation, contemporaneous market conditions, and various capital market boards.[8] In other words, our dataset offers a natural laboratory to conduct scenario analyses concerning the relationship between institutional ownership and firm performance. Furthermore, as argued by Firth, Gao, Shen, and Zhang (2016), institutional investors in China may play a more prominent role in monitoring firms than do their counterparts in developed economies because China's stock market features a large proportion of state ownership, limited protection for minority shareholders, inexperienced individual investors, and weak enforcement of property rights. Because some of these characteristics are common in transitional and emerging financial markets, our findings should be relevant to other transitional and emerging economies that are struggling to improve allocative efficiency and corporate governance. Finally, to address potential endogeneity concerns regarding the relationship between firm performance and institutional ownership,[9] this study uses a simultaneous equations system with a generalized method of moments (GMM) estimator to examine the relationship between institutional ownership and firm performance. The same method is also employed to investigate the channels through which this relationship operates.[10] As opposed to previous studies that use the two-stage or three-stage least squares methods to estimate a simultaneous equations system,[11] this study adopts the GMM estimator because it allows not only for correlation between the right-hand side variables and the error terms, heteroskedasticity, and contemporaneous correlation across the residuals, but it also allows for autocorrelation in the residuals.[12] Furthermore, this study includes a series of sensitivity analyses using different model specifications.

In general, based on a new and sizeable database of information from Chinese listed firms collected over the 2004–2014 period, the results suggest that institutional ownership is positively related to firm performance, lending support to the "active monitoring" view. This finding is robust to accounting for deregulation, contemporaneous market conditions, and the various stock market boards. However, not all institutional shareholders improve firm performance. In particular, this study finds that pressure-insensitive, foreign and large institutional shareholders have a greater positive impact on firm performance than pressure-sensitive, domestic, and small institutional investors, respectively. The results also demonstrate that institutional investors enhance shareholder value by attracting analysts and reducing insider ownership. Moreover, these findings are robust to a series of sensitivity analyses. The remainder of the paper is organized as follows. Section 2 presents a literature review and develops the hypotheses. Section 3 describes the data and the econometric methodology. Section 4 presents the empirical results. Section 5 concludes.

2. Institutional background

China's stock market has experienced dramatic changes over the past two decades. Prior to 2006, two-thirds of outstanding shares were non-tradable and were directly and/or indirectly controlled by the central government, local governments, or state-owned enterprises. Several studies argue that the holders of these non-tradable, government-controlled shares frequently expropriate the interests of the holders of minority (tradable) shares (Bai, Liu, Lu, Song & Zhang, 2004; La Porta, Lopez-de-Silanes, Shleifer & Vishny, 2000; Sun and Tong, 2003; Wei, Xie, & Zhang, 2005). As a result of the small amount of holdings available, it has been difficult for Chinese institutional investors to become controlling owners or to embark on long-term investment strategies to improve investee performance (Gen, 2002; Tenev, Zhang, & Brevort, 2002). In addition, Allen et al. (2005) note that China's legal framework and its institutions are both underdeveloped, as evidenced by poor corporate governance, low accounting standards, loose investor protection systems, for example. To improve the investment environment, the Chinese government launched a series of reforms aimed at promoting privatization and encouraging the development of institutional investors. Moreover, China adopted new accounting standards in 2007 to conform to international standards, and local Generally Accepted Accounting Principles (GAAP)

[8] The details about deregulation, contemporaneous market conditions, and the various capital market boards in China are presented in Section 2.

[9] For example, although institutional investors may enhance firm performance, strong performance may also encourage institutional investors to invest, and institutional investors may also withdraw from poorly performing investee firms by selling their shares.

[10] The GMM estimator is employed in this study because it is the state-of-the-art estimation method to address this type of endogeneity problem.

[11] Examples of such works include Elyasiani and Jia (2010), Ferreira and Matos (2008), Jafarinejad, Jory, and Ngo (2015) and Woidtke (2002).

[12] The two-stage least squares method only allows for correlation between the right-hand side variables and the error terms. The three-stage least squares method allows for heteroskedasticity and contemporaneous correlation in the residuals in addition to correlation between the right-hand side variables and the error terms. However, it does not allow for autocorrelation in the residuals. The simultaneous equation system with a GMM estimator has also been used in recent studies, such as Distinguin, Roulet ,and Tarazi (2013) and Fu, Lin, and Molyneux (2016).

were transformed into International Financial Reporting Standards (IFRS). Thus, there is now a natural setting in which to investigate whether the substantial deregulation discussed above has significantly influenced the relationship between institutional ownership and firm performance by dividing the full sample period into pre- and post-deregulation periods (i.e., the 2004–2006 and 2007–2014 periods).

In addition, China's capital markets experienced two bull years during the 2006–2007 period, and Chinese stocks soared by 500% during this two-year period. In a bull (bear) market, however, institutional investors might be less (more) willing to act as "active monitors" concerned with long-term firm performance and more (less) willing to act as "passive monitors" in pursuit of short-term speculative profits. Thus, to avoid potential sample selection bias, we divide the full sample period into multiple sub-periods—the bull market (2006–2007) and bear market (2004–2005 & 2008–2014) periods—to test whether our main results hold.

Furthermore, China has developed a multi-level capital market with three boards over the past two and half decades, including a Main Board, the Small and Medium-sized Enterprise Board (the SME Board), and the ChiNext Board. The Main Board was created in 1990, whereas the SME Board—of which 75% are manufacturing companies—was inaugurated in 2004. The ChiNext Board was launched in 2009 with the objective of attracting innovative and, particularly, fast-growing enterprises, including high-tech firms. ChiNext's listing standards are less stringent than those of the Main and SME Boards. Given the different functions performed by these three boards,[13] we also divide the entire sample set into three subsamples representing the three boards to test the robustness of the main results. In general, using this new and large sample makes this study of interest to potential domestic and foreign investors because they might glean a better understanding of the relevant changes and the role of institutional investors in China.

3. Hypotheses development

3.1. Institutional investors and firm performance

There are three perspectives on the effects of institutional ownership on firm performance.[14] According to the "active monitoring" view, institutional investors actively monitor firms' business, minimize information asymmetry and agency problems, and enhance firm performance in two ways (Shleifer & Vishny, 1986, 1997). On the one hand, institutional investors apply their highly developed managerial skills, professional knowledge, and voting rights to influence managers to improve both firm efficiency and corporate governance, in addition to helping the firm make business decisions. On the other hand, when the firm needs funding to expand, these institutional investors can provide funding or use their relationships to help the firm source financing. McConnell and Servaes (1990) support this view in a sample of 1173 US firms in 1976 and 1093 US firms in 1986; Smith (1996) also supports this perspective in a sample of 51 US firms targeted by the California Public Employees Retirement System (CalPERS) over the 1987–93 period.

According to the "passive monitoring" view, institutional investors are considered short-term traders that are interested in speculative short-term trading profits based on information advantages (David & Kochhar, 1996) to satisfy their portfolio needs (Elyasiani & Jia, 2010) rather than monitors interested in improving corporate governance and firm performance. Therefore, no relationship or a weak relationship should be expected between firm performance and institutional ownership. In a sample of 383 large US firms in 1987, Agrawal and Knoeber (1996) show that there is no relationship between Tobin's Q and institutional ownership. Similarly, Duggal and Millar (1999) examine US takeover cases to determine whether institutional investors improve management efficiency and find no relationship between bidder gains and institutional ownership during the 1985–1990 period, suggesting that institutional investors do not enhance efficiency.

According to the "exploitation" view, institutional investors may side with management to exploit small shareholders and impair firm performance. Specifically, they may overlook management fraud as long as they can benefit from it. Therefore, a negative relationship between firm performance and institutional ownership would be manifested if management undertakes activities that diminish firm value (Elyasiani & Jia, 2010). In a sample of Fortune 500 firms for the period 1989–1993, Woidtke (2002) demonstrates that Tobin's Q is significantly and negatively related to the proportion of ownership held by public pension funds. Using a comprehensive database of equity holdings in 27 countries during the 2000–2005 period, Ferreira and Matos (2008) also find a significantly negative relationship between domestic institutional ownership and Tobin's Q.

As indicated by the CSRC (2008), before the development of institutional investors, China's stock market was dominated by inexperienced individual investors whose key investment philosophy was speculation. This investor structure greatly hindered the smooth operation of China's stock market and, hence, significantly hampered the efficiency of resource allocation. To improve the investor structure of the stock market, in 2002, the Chinese government began to implement a strategy to aggressively develop institutional investors. Through a series of liberalizing reforms, institutional investors play an increasingly important role in developing China's stock markets, and the prevailing investment philosophy has fundamentally changed from short-term speculation to long-term investment based on fundamental research. Specifically, in contrast to individual investors, institutional investors are usually professionals in certain fields. Therefore, they are better able than their individual counterparts to help improve investee firms' performance by sharing their professional knowledge, management skills and fundraising networks with these firms. In addition, as many listed firms have a great number of individual investors, abuses overlooked or aided by institutional investors can have a critical impact on social stability and market confidence. Therefore, CSRC has been the most active in addressing the

[13] For instance, the Main Board may provide fewer opportunities for speculation to institutional investors than the SME and/or ChiNext Boards, which means that the Main Board may see more "active monitoring" investors that are focused on value investing.

[14] Please refer to Elyasiani and Jia (2010) for an excellent summary of this issue.

abovementioned exploitation problems.[15] As Tenev et al. (2002, p. 1) note, “corporate governance has moved to the center stage of enterprise reform in China”. They also find that many of the requirements for listed companies in China are “even stricter than in Hong Kong and other developed markets … and show the authorities’ determination to protect minority shareholders” (p.102). Therefore, from the institutional investors' perspective, the risk (or cost) of colluding with controlling shareholders or managers to exploit minority shareholders could be considerably high.[16] In addition, China's rapid economic growth over the past two decades has offered a golden opportunity to investors. Hence, it is more likely that the majority of institutional investors in China would attempt to perform the active monitoring role with the aim of earning an abnormal return from investee firms' improved efficiency and performance during this period of economic prosperity. In other words, this study expects to find that institutional ownership has a positive effect on firm performance.

Hypothesis 1. There is a positive relationship between institutional ownership and firm performance.

3.2. Do all types of institutional investors have the same effects?

Previous empirical studies[17] have generally categorized institutional investors based on the independent business relationships that they have with investee firms, their geographic origin, and the size of their shareholdings. First, shareholding by pressure-insensitive institutions is expected to be positively related to firm performance because they are less likely to have business relationships and conflicts of interest with investee firms and are, thus, more likely to actively monitor investee firms and, in turn, pressure managers to maximize shareholder value. By contrast, pressure-sensitive institutions may instead seek to protect their business relationships with investee firms and act as passive investors (Brickley et al., 1988; Cornett et al., 2007; Ferreira and Matos, 2008). Second, foreign institutional investors are generally more involved in actively monitoring investee firms and more likely to demand changes in investee firm corporate governance than are domestic institutional investors because the latter typically have much stronger business relations with domestic investee firms, which may make them feel compelled to be loyal to management (Ferreira & Matos 2008; Gillan & Starks, 2003). Third, larger shareholders have greater incentives to monitor companies because they stand to reap greater rewards than smaller shareholders (Shleifer & Vishny, 1986). Accordingly, institutional investors with large shareholdings (e.g., with 5% or more of the total number of outstanding shares) have a greater incentive to improve firm performance than institutional investors with lower shareholdings (e.g., with less than 5% of the total number of outstanding shares) (Elyasiani & Jia, 2010).

In China, building relationships is a key element of the business culture. As highlighted in a Bloomberg article entitled “The Art of Chinese Relationships” by Michelle Dammon Loyalka, building and maintaining good relationships is essential to business success in China.[18] Gordon Orr, a director in McKinsey's Shanghai office, in his article entitled “A pocket guide to doing business in China” indicates that the fundamental barrier to success in China is less a matter of identifying business opportunities and more about the inability to execute a business plan more effectively than others, and relationships are the key to effective execution.[19] However, relationships are a double-edged sword, particularly from the perspective of corporate governance. Relationships can facilitate the execution of a business plan, and they can also induce participation by passive investors. Both pressure-sensitive and domestic institutional investors in China are more likely to fall within this category than their insensitive and foreign counterparts. In addition, compared to those with small shareholdings, institutional investors in China with large shareholdings should be more active in monitoring investee firms because they will lose more money if the business goes bad. Based on the foregoing, this study thus proposes the following hypotheses:

Hypothesis 2a. The positive relationship between firm performance and institutional ownership is stronger for insensitive institutional investors than for sensitive institutional investors.

Hypothesis 2b. The positive relationship between firm performance and institutional ownership is stronger for foreign institutional investors than for domestic institutional investors.

Hypothesis 2c. The positive relationship between firm performance and institutional ownership is stronger for large institutional investors than for small institutional investors.

3.3. Channels of association

This study further investigates the channels through which institutional investors influence firm performance. First, institutional ownership mitigates information asymmetries between investors and investee firms, which leads to lower agency costs and higher

[15] For instance, CSRC introduced three new regulations aimed at reducing expropriation of minority shareholders by controlling shareholders in the second quarter of 2000. The first regulation substantially increased the rights of minority shareholders at a firm's annual shareholders' meeting. In particular, this regulation prohibited shareholders involved in related party trading from voting on the related party trading. The second regulation prohibited the issuance of loan guarantees by a firm to its controlling shareholder, and the third regulation improved the transparency and regulation of asset transfers to related parties (Berkman et al., 2010).

[16] We thank an anonymous reviewer for bringing this critical point to our attention.

[17] See Brickley et al. (1988), Cornett et al. (2007), Elyasiani and Jia (2010), Ferreira and Matos (2008).

[18] Please refer to the following link for details: http://www.bloomberg.com/news/articles/2006-01-05/the-art-of-chinese-relationships.

[19] Please refer to the following link for details: http://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/a-pocket-guide-to-doing-business-in-china.

investment and enhances firm performance accordingly (Myers & Majluf, 1984). A large stream of the literature indicates that analyst research is an important input into investors' investment decisions because analysts act as important information intermediaries who use their specialized knowledge to process and produce both firm-specific and macroeconomic information.[20] As indicated in O'Brien and Bhushan (1990), institutional investors seek analyst reports for information purposes and for reasons involving their fiduciary responsibilities. Therefore, greater institutional ownership would likely increase the demand for analysts' information services with respect to an investee firm (Frankel, Kothari, & Weber, 2006). Furthermore, increased transparency and disclosure related to these firms might increase the demand for analysts to synthesize additional information, resulting in an even greater following and less information asymmetry (Boone & White, 2015). However, institutional investors may help management to attract increased analyst coverage for the firm based on their substantial connections to financial markets, which may in turn improve the liquidity of institutional shares and reduce the firm's transaction and financing costs as a result (Elyasiani & Jia, 2010). Based on these arguments, we propose that attracting analysts to follow investee firms is one channel through which institutional ownership enhances firm performance.

Hypothesis 3a. Greater institutional ownership is positively associated with the demand for analyst services.

Hypothesis 3b. Increased analyst following is positively associated with firm performance.

Second, increased institutional ownership may enhance firm performance by weakening the controlling power of insider owners who may expropriate wealth from minority shareholders. The traditional view suggests that greater insider ownership benefits firm performance because it can reduce agency costs through better and more efficient alignment of management and shareholder interests (Jensen & Meckling, 1976). However, greater insider ownership may also lead to poorer firm performance because insiders (i.e., managers and directors) can become entrenched and wield sufficient power to expropriate wealth from minority shareholders (Fama & Jensen, 1983; Morck, Shleifer, & Vishny, 1988; Stulz, 1988).[21] The latter is particularly true in China, given the prevalence of state ownership and controlling shareholders (Bradford, Chen, & Zhu, 2013; Jiang & Kim, 2015; Liu, Uchida & Yang, 2014). In state-owned enterprises (SOEs),[22] the insiders are typically government employees (instead of professional managers) who are appointed by the State-owned Assets Supervision and Administration Commission (SASAC) and who will return to their government posts when they finish their terms as firm managers. In particular, the SASAC imposes an implicit or explicit compensation cap on them to maintain social balance (Chen et al., 2010; Conyon & He, 2011; Firth et al., 2007; Jiang & Kim, 2015). Therefore, to earn promotions to high-level government positions after they finish their managerial terms, these SOE insiders may expropriate from minority shareholders mainly to pursue political objectives (e.g., by increasing the employment rate, boosting GDP) rather than engaging in "tunneling" for private benefits (Jiang & Kim, 2015; Wei et al., 2005). For non-SOEs, insiders are mainly controlling shareholders because most non-SOEs are family firms or firms founded by entrepreneurs, i.e., the largest shareholder or founder is the manager (Jiang & Kim, 2015). These managers may simply expropriate wealth from minority shareholders for their private benefit by "tunneling" (Jiang, Lee, & Yue, 2010; Peng, Wei & Yang, 2011). Therefore, this study expects to find that institutional ownership benefits firm performance by reducing insider ownership and proposes the following hypotheses:

Hypothesis 4a. Institutional ownership is negatively associated with insider ownership.

Hypothesis 4b. Greater insider ownership is negatively associated with firm performance.

4. Methodology and data

4.1. The main model

According to the "active-monitoring" perspective, institutional ownership has a positive impact on firm performance. However, good performance may also lead institutional investors to invest more (Yuan et al., 2008), whereas poor performance may lead institutional investors to vote with their feet by selling their shares (Parrino, Sias, & Starks, 2003). As Woidtke (2002), Ferreira and Matos (2008), and Elyasiani and Jia (2010) indicate, institutional ownership and firm performance are to some extent jointly determined. To address this potential endogeneity problem, we use a simultaneous equations model with a GMM estimator. Our panel data model has the following general form:

$$Performance_{it} = \alpha_0 + \alpha_1 IO_{it} + \alpha_2 LEVERAGE_{it} + \alpha_3 C_{it} + YearDummy + \varepsilon_{1it} \quad (1.1)$$

$$IO_{it} = \beta_0 + \beta_1 Performance_{it} + \beta_2 TURNOVER_{it} + \beta_3 C_{it} + YearDummy + \varepsilon_{2it} \quad (1.2)$$

where $Performance_{it}$ is measured by *Tobin's Q* and *ROA*; IO_{it} is the proportion of shares held by institutional investors; $LEVERAGE_{it}$ is the instrumental variable for performance;$TURNOVER_{it}$ is the instrumental variable for institutional ownership; C_{it} are control

[20] See Beyer, Cohen, Lys, and Walther (2010), Brennan and Hughes (1991), Healy and Palepu (2001), Hutton, Lee and Shu (2012), Lang and Lundholm (1996), Merton (1987).

[21] For instance, controlling shareholders may expropriate minority shareholders directly by straightforward theft and fraud and/or indirectly by intercorporate loans, loan guarantees to related companies, favorable transfer pricing to related companies, executive perquisites, excessive compensation, and so forth. (see Johnson, La Porta, Lopez-de-Silanes & Shleifer, 2000; La Porta, Lopez-de-Silanes, & Shleifer, 1999; Shleifer & Vishny, 1997). This phenomenon is often referred to as "tunneling" (Johnson et al., 2000).

[22] A listed firm is designated as an SOE if its largest shareholder is the state. In contrast, the largest shareholder of a non-SOE is often an individual or a family.

variables, including *SIZE*, *NON-STATE*, and *CROSSLISTING*; *Year Dummy* are dummy variables for the years 2004–2014; *t* is a time subscript; and *i* is a firm subscript.

4.1.1. Firm performance

Tobin's Q and return on assets (*ROA*) are employed to measure firm performance. The former represents market performance and reflects future expectations, whereas the latter represents accounting performance and focuses on current profitability. These measures are widely used in the literature (e.g., Sun & Tong, 2003; Wei et al., 2005; Cornett et al., 2007; Ferreira & Matos, 2008; Yuan et al., 2008; Elyasiani & Jia, 2010). *ROA* is calculated as net profits divided by the book value of total assets. Following Ferreira and Matos (2008) and Wei et al. (2005), *Tobin's Q* is calculated as follows:

$$Tobin'sQ = \frac{Bookvalueoftotalassets + Marketvalueofequity - Bookvalueofequity}{Bookvalueoftotalassets}$$

4.1.2. Institutional ownership

This study defines total institutional ownership (*IO-all*) as the sum of a firm's proportion of the total number of outstanding shares held by all institutional investors at year-end. Thus, total institutional ownership can be divided based on independent business ties to investee firms, geographic origin, and the size of shareholdings. First, following Cornett et al. (2007) and Ferreira and Matos (2008), institutional investors are classified in terms of whether they are sensitive institutions or insensitive institutions based on the independence of their business relationships with investees. Sensitive institutional ownership (*IO-passive*) is measured as the percentage of the total number of outstanding shares held by insurance companies, social security funds, broker dealers and other institutions. Insensitive institutional ownership (*IO-active*) is the percentage of the total number of outstanding shares held by mutual funds and QFIIs.[23]

Second, following Ferreira and Matos (2008), institutional investors are classified with respect to whether they are domestic or foreign institutions based on their geographic origin. Domestic institutional ownership (*IO-domestic*) is the percentage of the total number of outstanding shares held by Chinese institutions. Foreign institutional ownership (*IO-foreign*) is the percentage of the total number of outstanding shares held by foreign institutions. Third, following Elyasiani and Jia (2010), institutional investors are classified according to the size of their shareholdings in terms of whether they are institutional investors with 5% or more of the total number of outstanding shares (*IO-over5*) or institutional investors with less than 5% of the total number of outstanding shares (*IO-under5*).

4.1.3. Control variables and instrumental variables

Following previous empirical studies,[24] the following control variables are included in both equations. Firm size (*SIZE*) is measured by the logarithm of the book value of total assets, which may negatively influence firm performance because larger firms face more bureaucratic intervention (Xu & Wang, 1999) and higher agency costs (Sun & Tong, 2003) and are less able to respond flexibly to changes in market conditions. However, larger firms may benefit from economies of scale, which can lead to better performance. As a result, the effect of firm size on performance is ambiguous. The non-state ownership variable (*NON-STATE*) is a dummy variable that takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. The traditional view suggests that state ownership negatively influences firm performance due to operating inefficiencies, agency problems and property rights problems (Dewenter and Malatesta, 2001; Gul, 1999; Xu & Wang, 1999;). As a result, this variable is assumed to be positively related to firm performance.

The cross-listing dummy (*CROSSLISTING*) is a dummy variable that takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. Firms with foreign ownership, which not only issue A shares but also issue B, H and/or overseas shares, may have better performance because they may obtain more resources (e.g., advanced managerial and technical expertise and funding) to support their business. However, foreign ownership may increase the exposure of their investee firms to global and internationalized risk, particularly in the case of immature financial institutions and regulatory bodies (Stiglitz, 1999, 2000; Bae, Chan, & Ng, 2004). Therefore, the effect of cross-listing on firm performance is mixed. Finally, following Ferreira and Matos (2008) and Yuan et al. (2008), this study also employs year dummies to control for macroeconomic changes.

With regard to instrumental variables, following Elyasiani and Jia (2008) and Hartzell and Starks (2003), a stock's daily turnover (*TURNOVER*) is used as the instrumental variable for institutional ownership and is measured as the ratio of daily trading volume to shares outstanding. In addition, following Elyasiani and Jia (2010), leverage (*LEVERAGE*) is employed as the instrument for firm performance and is measured as the ratio of the book value of total liabilities to the book value of total assets.[25]

[23] Both Cornett et al. (2007) and Ferreira and Matos (2008) classify bank trusts as pressure-sensitive institutions. In China, however, commercial banks have been prohibited from directly investing in the Chinese stock market since 1997. Therefore, they can only passively hold a firm's shares via accepting the shares as collateral for firm loans. Therefore, banks, if any, are included among "other institutions" in the WIND database and are classified as pressure-sensitive institutions in our study. In addition, we classify QFIIs as pressure-insensitive institutions because they potentially maintain fewer business ties with investees and hence are more independent than their domestic counterparts. Such classifications are in line with those adopted by Firth et al. (2016).

[24] See Gul (1999), Xu and Wang (1999), Qi et al. (2000), Sun and Tong (2003), Ferreira and Matos (2008), Yuan et al. (2008), Doong, Fung and Wu (2011), and González (2013).

[25] As a valid instrumental variable should be related to the variable it serves as an instrument for and should be unrelated to the error in the model, we follow common practice in assessing the validity of these two instrumental variables. First, we perform Hausman's (1978) test for exogeneity. Both results reject the null with a *p*-value of 0.000, thus confirming the presence of endogeneity in both models. In addition, the correlation matrix demonstrates that *TURNOVER* and *LEVERAGE* are

4.2. The models for the channels of association

In Section 3.3, we propose that institutional ownership is associated with firm performance through two possible channels: increased analyst following and lower insider ownership. As mentioned previously, higher institutional ownership can reduce information asymmetry, as measured by increased analyst following, and hence enhance firm performance. However, a lower level of information asymmetry and better firm performance may attract institutional investment. Institutions may even seek firms with high information asymmetry problems to mitigate these issues and thereby improve firm performance. In addition, institutional ownership may benefit firm performance through reducing the controlling power of insider owners. In turn, a lower level of insider ownership and better performance may induce greater institutional ownership. Alternatively, institutions may seek firms with a higher level of insider ownership with the aim of reducing it and thereby stimulating firm performance. To address the mutual interdependence and channel effects, we follow Elyasiani and Jia (2010) and employ a simultaneous equation system.[26] Specifically, we use two simultaneous equations models with a GMM estimator to investigate whether analyst following and insider ownership are two possible channels through which institutional ownership influences firm performance.

$$Performance_{it} = \gamma_0 + \gamma_1 ANALYST_{it} + \gamma_2 C_{it} + \gamma_3 LEVERAGE_{it} + YearDummy + \varepsilon_{1it} \quad (2.1)$$

$$ANALYST_{it} = \eta_0 + \eta_1 IO_{it} + \eta_2 Performance_{it} + \eta_3 LNMC_{it} + YearDummy + \varepsilon_{2it} \quad (2.2)$$

$$IO_{it} = \rho_0 + \rho_1 Performance_{it} + \rho_2 ANALYST_{it} + \rho_3 C_{it} + \rho_4 TURNOVER_{it} + YearDummy + \varepsilon_{3it} \quad (2.3)$$

$$Performance_{it} = \theta_0 + \theta_1 INSIDE_{it} + \theta_2 C_{it} + \theta_3 LEVERAGE_{it} + YearDummy + \varepsilon_{1it} \quad (3.1)$$

$$INSIDE_{it} = \nu_0 + \nu_1 IO_{it} + \nu_2 Performance_{it} + \nu_3 AGE_{it} + \nu_4 NONSTATE_{it} + YearDummy + \varepsilon_{2it} \quad (3.2)$$

$$IO_{it} = \delta_0 + \delta_1 Performance_{it} + \delta_2 ANALYST_{it} + \delta_3 C_{it} + \delta_4 TURNOVER_{it} + \quad YearDummy + \varepsilon_{3it} \quad (3.3)$$

In these models, institutional ownership (*IO*) is assumed to affect firm performance (*Performance*) via increased analyst following (*ANALYST*) and decreased insider ownership (*INSIDE*). Following Jiang, Kim and Zhou (2011), Fernando, Gatchev and Spindt (2012), and Huang and Zhu (2015), *ANALYST* is measured as the number of analysts following a listed firm. Following Woidtke (2002) and Cornett et al. (2007), *INSIDE* is measured as the proportion of a firm's total number of outstanding shares held by directors and executive officers. Following Fernando et al. (2012) and Boone and White (2015), firm performance (*Performance*) and market capitalization (*LNMC*) are included in Eq. (2.2) to estimate the determinants of the number of analysts following. *LNMC* is measured by the logarithm of the total market value of the outstanding shares of a listed firm. Following Fahlenbrach and Stulz (2009) and Jiang and Kim (2015), firm age (*AGE*) and the non-state ownership dummy variable (*NON-STATE*) are included in Eq. (3.2) to estimate the determinants of insider ownership (*INSIDE*). *AGE* is measured by the number of years since a firm has been founded.

4.3. Data

The sample data initially include all companies listed on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) for the 2004–2014 period.[27] They cover all companies listed on all three boards, namely, the Main Board, the SME Board, and the ChiNext Board. The sample excludes (1) companies that issue only B shares,[28] (2) companies that are Special Treatment (ST and *ST),[29] (3) companies that are financial companies (e.g., banks, insurance companies, and securities companies),[30] and (4) companies with missing values. Hence, the final sample for this study consists of 2465 listed firms and 18,698 observations. Institutional ownership, the number of analysts following, foreign shares (including B shares, H shares and overseas shares), financial statement data, and firm market value are collected from the WIND database and supplemented by various annual financial reports from individual companies. Insider ownership is obtained from the China Security Market and Accounting Research (CSMAR) database. The *NON-STATE* dummy is hand-collected and based on the name of the ultimate owner in the WIND database and information from the websites and financial reports of each company's ultimate owner.

Table 1 presents the descriptive statistics for all variables used in the study. Panel A shows that the average *Tobin's Q* and *ROA* are 2.343 and 4.403%, respectively. The average percentage of institutional ownership is 22.548%, of which 18.224% is held by sensitive

(*footnote continued*)
significantly correlated with firm performance and institutional ownership, respectively. Finally, following Hahn and Hausman (2002) and Staiger and Stock (1997), we use the joint significance of the *F*-test statistics to examine whether the two instruments are statistically relevant. The results also suggest that *TURNOVER* and *LEVERAGE* are significantly and highly correlated with firm performance and institutional ownership, respectively. The results are available upon request.

[26] The equation system is also used by Tavares and Wacziarg (2001) to investigate the channels through which democracy affects growth in a sample of 65 industrial and developing countries between 1970 and 1989.

[27] The data sample ranges from 2004 to 2014 because the number of analysts following a listed firm is only available from 2004 onwards.

[28] B shares are offered exclusively to foreign investors. These companies are excluded from the sample because their financial characteristics and regulatory environments are different from the sample firms that also issue domestic shares (Wang et al., 2008).

[29] According to the Rules Governing the Listing of Stocks on the Shanghai Stock Exchange, a listed firm will become an ST firm if the abnormality in its financial condition exposes it to the risk that its shares are likely to be terminated from listing or makes investors unable to arrive at a judgment on its prospects and would consequently impair their interest. *ST refers to listed firms that have previously had negative net profits for three consecutive years and are likely to be delisted from the stock exchange. Please see Jiang et al. (2010) and An, Pan and Tian (2014) for details.

[30] Financial companies are excluded because they are heavily regulated and their return-generating processes differ from those of other companies.

Table 1
Summary statistics.

Panel A: Descriptive statistics of the pooled sample (2004–2014)

Variable	No. of observations	Mean	Std. Dev.	Min	Max
Tobin's Q	18,698	2.343	1.739	0.603	53.564
Adjusted Q	18,698	0.361	1.561	-3.769	51.286
ROA (%)	18,698	4.403	7.347	-81.315	293.301
Adjusted ROA (%)	18,698	0.401	7.182	-86.067	290.871
IO-total (%)	18,698	22.548	22.826	0	92.555
IO-passive (%)	18,698	18.224	21.414	0	91.586
IO-active (%)	18,698	4.325	7.240	0	66.520
IO-domestic (%)	18,698	22.447	22.790	0	92.555
IO-foreign (%)	18,698	0.101	0.497	0	13.863
IO-under5 (%)	18,698	0.473	1.081	0	5
IO-over5 (%)	18,698	22.076	23.253	0	92.555
SIZE	18,698	21.175	1.410	17.217	28.222
LEVERAGE (%)	18,698	0.458	0.212	0.007	0.999
CROSSLISTING	18,698	0.075	0.264	0	1
NON-STATE	18,698	0.472	0.499	0	1
TURNOVER	18,698	3.145	3.551	0.002	86.338
INSIDE	18,698	8.623	18.184	0	89.725
ANALYST	18,698	13.433	14.198	0	75
CHINEXT	18,698	0.080	0.272	0	1
QFII	18,698	0.086	0.281	0	1
LNMC	18,698	22.011	1.071	19.030	29.300
AGE	18,698	14.846	5.136	1	65

Panel B: Mean value of institutional ownership by year

Year	Obs.	IO-total (%)	IO-passive (%)	IO-active (%)	IO-domestic (%)	IO-foreign (%)	IO-under5 (%)	IO-over5 (%)
2004	1180	3.043	0.975	2.068	3.014	0.028	0.675	2.368
2005	1181	3.94	1.174	2.766	3.813	0.127	0.656	3.284
2006	1230	6.605	2.484	4.12	6.365	0.239	0.773	5.831
2007	1318	10.94	5.182	5.758	10.772	0.168	0.721	10.22
2008	1383	15.234	9.756	5.478	15.137	0.097	0.506	14.728
2009	1496	26.815	20.925	5.89	26.674	0.141	0.395	26.42
2010	1825	27.872	22.316	5.556	27.778	0.094	0.438	27.434
2011	2119	28.625	23.947	4.678	28.566	0.059	0.405	28.221
2012	2284	28.836	25.002	3.834	28.771	0.065	0.411	28.424
2013	2302	32.386	28.619	3.767	32.304	0.083	0.319	32.067
2014	2380	32.648	29.023	3.625	32.559	0.089	0.312	32.336

Notes: Tobin's Q is calculated as the sum of the market value of equity and the book value of liabilities divided by total assets. Industry-adjusted Q is calculated as the firm's Q minus the median Q of firms within the same CSRC industry classification. ROA is calculated as net income divided by total assets. Industry-adjusted ROA is calculated as the firm's ROA minus the median ROA of firms within the same CSRC industry classification. Total institutional ownership (IO-total) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Sensitive institutional ownership (IO-passive) is the percentage of the total number of outstanding shares held by insurance companies, social security funds, broker dealers and other institutions. Insensitive institutional ownership (IO-active) is the percentage of the total number of outstanding shares held by mutual funds and QFIIs. Domestic institutional ownership (IO-domestic) is the percentage of the total number of outstanding shares held by Chinese institutions. Foreign institutional ownership (IO-foreign) is the percentage of the total number of outstanding shares held by foreign institutions. Large institutions (IO-over5) is defined as institutions holding 5% or more of the total number of outstanding shares, and small institutions (IO-under5) are institutions holding less than 5% of the total number of outstanding shares. Firm size (SIZE) is measured by the logarithm of the book value of total assets. Leverage (LEVERAGE) is measured as the ratio of the book value of total liabilities to the book value of total assets. The non-state ownership dummy variable (NON-STATE) takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. The cross-listing dummy variable (CROSSLIST) takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. A stock's daily turnover (TURNOVER) is measured as the ratio of daily trading volume to shares outstanding. Inside ownership (INSIDE) is the proportion of a firm's total number of outstanding shares held by directors and executive officers at year-end. Analyst following (ANALYST) is the number of analysts covering the firm. The ChiNext dummy variable (CHINEXT) takes a value of one if a firm is listed on ChiNext and zero otherwise. The QFII dummy variable (QFII) takes a value of one if a firm is held by QFII and zero otherwise. Market capitalization (LNMC) is the logarithm of market capitalization. Firm age (AGE) is the number of years since a firm was established.

Table 2
Institutional ownership and Tobin's Q.

Panel A: Full sample period, pre- and post-deregulation, bull and bear markets

	2004–2014 (1)		**2004–2006** (2)		**2007–2014** (3)		**Bull** (4)		**Bear** (5)	
	Q	IO-all	Q	IO-all	Q	IO-all	Q	IO-all	Q	IO-all
Q		1.037*** (9.321)		4.194*** (14.321)		0.999*** (8.857)		1.505*** (8.349)		0.963*** (7.539)
IO-all	0.008*** (12.164)		0.037*** (16.306)		0.008*** (11.676)		0.045*** (11.025)		0.006*** (9.484)	
SIZE	-0.483*** (-19.814)	3.922*** (24.149)	-0.305*** (-19.03Following Jiang2)	3.039*** (20.437)	-0.525*** (-17.806)	4.071*** (21.201)	-0.529*** (-10.060)	3.268*** (15.868)	-0.488*** (-18.055)	3.936*** (21.223)
LEVERAGE	-1.275*** (-13.188)		-0.452*** (-5.932)		-1.334*** (-11.142)		-1.928*** (-8.063)		-1.147*** (-10.879)	
CROSSLISTING	0.523*** (7.199)	-7.660*** (-15.784)	0.432*** (10.277)	-4.492*** (-12.474)	0.571*** (6.071)	-9.001*** (-14.424)	0.787*** (5.248)	-7.055*** (-13.260)	0.508*** (6.219)	-7.834*** (-13.791)
NON-STATE	0.234*** (9.585)	-7.642*** (-25.002)	0.046* (1.750)	0.735*** (3.056)	0.245*** (8.260)	-9.385*** (-25.697)	0.227*** (3.338)	0.872** (2.166)	0.220*** (8.535)	-8.820*** (-25.232)
TURNOVER		-1.832*** (-13.775)		-0.308*** (-3.815)		-1.949*** (-13.241)		-0.652*** (-4.712)		-1.975*** (-12.924)
CONSTANT	12.327*** (25.872)	-76.316*** (-21.195)	8.120*** (24.754)	-67.428*** (-20.044)	15.286*** (26.117)	-65.766*** (-14.148)	13.627*** (12.967)	-63.252*** (-13.788)	12.392*** (23.473)	-75.954*** (-18.466)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	18,698	18,698	3591	3591	15,107	15,107	2548	2548	16,150	16,150
Adjusted R^2	0.301	0.407	0.304	0.263	0.278	0.326	0.360	0.229	0.290	0.388

Panel B: Main board, ChiNext board, and SME board

	Main Board (6)		**ChiNext Board** (7)		**SME Board** (8)	
	Q	IO-all	Q	IO-all	Q	IO-all
Q		0.720*** (5.447)		1.142*** (4.612)		1.697*** (6.825)
IO-all	0.006*** (6.869)		0.014*** (4.481)		0.010*** (8.732)	
SIZE	-0.507*** (-18.030)	2.579*** (12.468)	-0.364*** (-4.045)	6.302*** (8.765)	-0.203*** (-6.018)	5.776*** (11.880)
LEVERAGE	-1.019*** (-9.356)		-2.109*** (-7.454)		-2.768*** (-19.919)	
CROSSLISTING	0.531*** (7.198)	-7.177*** (-15.341)			0.416** (2.062)	-20.041*** (-5.172)

(continued on next page)

Table 2 *(continued)*

Panel B: Main board, ChiNext board, and SME board						
	Main Board		**ChiNext Board**		**SME Board**	
	(6)		(7)		(8)	
	Q	IO-all	Q	IO-all	Q	IO-all
NON-STATE	0.301***	-3.575***	-0.166	-9.835***	0.101*	-13.271***
	(9.823)	(-11.065)	(-0.815)	(-4.314)	(1.861)	(-15.705)
TURNOVER		-3.285***		-0.562***		-1.255***
		(-6.784)		(-5.121)		(-8.692)
CONSTANT	12.720***	-46.802***	12.305***	-98.077***	7.023***	-99.013***
	(22.880)	(-9.469)	(7.838)	(-6.849)	(10.622)	(-9.564)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	13,051	13,051	1502	1502	4145	4145
Adjusted R^2	0.279	0.511	0.251	0.240	0.352	0.264

Notes: This table reports the main regression results estimated using a simultaneous equations model with a GMM estimator. The full sample period is 2004–2014. 2004–2006 is the pre-deregulation period, whereas 2007–2014 is the post-deregulation period. Bull market is 2006–2007, bear market otherwise. The Main Board was inaugurated in 1990, the SME board was created in 2004 mainly for small and medium-sized enterprises, and ChiNext was launched in 2009 mainly for young and hi-tech enterprises. Tobin's Q (Q) is calculated as the sum of the market value of equity and the book value of liabilities divided by total assets. Total institutional ownership (IO-all) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Firm size (SIZE) is measured by the logarithm of the book value of total assets. Leverage (LEVERAGE) is measured as the ratio of the book value of total liabilities to the book value of total assets. The cross-listing dummy variable (CROSSLIST) takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. This variable is not included in the models for the ChiNext board because it has few cross-listing firms. The non-state ownership dummy variable (NON-STATE) takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. A stock's daily turnover (TURNOVER) is measured as the ratio of daily trading volume to shares outstanding. Year dummies are also included. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses.

institutions and 4.325% by insensitive institutions; 22.447% of ownership is held by domestic institutions and 0.101% by foreign institutions, and 22.076% is held by large institutions and 0.473% by small institutions. Thus, the data indicate that sensitive institutions, domestic institutions, and large institutions are the primary participants in the Chinese stock markets. Panel B further demonstrates that the participation of these three types of institutions increased between 2004 and 2014, which contributed to the increase in total institutional ownership.[31] In addition, the data show that the proportion of QFIIs has remained low and fluctuating, whereas the shares held by insensitive institutional investors and small institutions have tended to decrease.[32]

5. Empirical results

5.1. Main results

5.1.1. Institutional ownership and firm performance

Table 2 presents the main results reflecting the impact of institutional ownership on market performance, as measured by *Tobin's Q*. As discussed above, this study employed a simultaneous equations model with a GMM estimator. Panel A includes five specifications. Specification (1) is used to test Hypothesis 1 and reports the results for the impact of institutional ownership on firm performance over the full sample period, i.e., from 2004 to 2014. Specifications (2) and (3) test whether the effect of institutional ownership on firm performance is robust to deregulation, whereas specifications (4) and (5) examine whether this effect is the same in both bull and bear markets. Panel B reports on three more specifications (6–8) that test whether this effect is robust to the three different stock market boards, the Main Board, the SME Board, and the ChiNext Board. In general, Table 2 indicates a significantly positive correlation at the 1% level for total institutional ownership in all eight specifications (1–8), which lends support to

[31] The statistics are quite similar to those reported by Yuan et al. (2008) and Firth et al. (2016). For instance, Firth et al. (2016) show that the average percentage of ownership held by insensitive institutions between 2003 and 2011 is 5.6%, while the percentage is 5.74% for the period 2004–2011 in our study.

[32] The correlation matrix shows that the magnitude of all the correlations between the independent variables in,, general is lower than 0.3, suggesting that there is no serious multicollinearity problem in the models. The results are presented in Appendix A1.

Table 3
Institutional ownership and ROA.

Panel A: Full sample period, pre- and post-deregulation, bull and bear markets

	2004–2014		**2004–2006**		**2007–2014**		**Bull**		**Bear**	
	(1)		(2)		(3)		(4)		(5)	
	ROA	IO-all	ROA	IO-all	ROA	IO-all	ROA	IO-all	ROA	IO-all
ROA		0.165*** (6.060)		0.295*** (12.086)		0.159*** (4.944)		0.209*** (3.750)		0.168*** (5.229)
IO-all	0.032*** (12.809)		0.226*** (17.269)		0.028*** (10.754)		0.145*** (13.179)		0.027*** (10.655)	
SIZE	1.130*** (14.679)	3.298*** (21.362)	1.490*** (9.892)	1.635*** (12.658)	0.977*** (11.204)	3.443*** (19.044)	0.867*** (3.042)	2.381*** (11.621)	1.137*** (15.034)	3.350*** (18.939)
LEVERAGE	-13.673*** (-36.933)		-15.163*** (-18.188)		-12.817*** (-31.145)		-13.273*** (-12.167)		-13.628*** (-34.852)	
CROSSLISTING	-0.717*** (-3.262)	-7.049*** (-14.621)	-0.574 (-1.371)	-2.838*** (-8.469)	-0.596** (-2.350)	-8.392*** (-13.529)	0.082 (0.105)	-6.118*** (-11.669)	-0.764*** (-3.610)	-7.268*** (-12.884)
NON-STATE	1.285*** (10.665)	-7.673*** (-25.055)	0.569** (2.290)	0.913*** (3.635)	1.392*** (10.224)	-9.433*** (-25.664)	1.305*** (3.525)	0.985** (2.318)	1.212*** (9.665)	-8.886*** (-25.421)
TURNOVER		-1.848*** (-13.787)		-0.254*** (-4.069)		-1.966*** (-13.258)		-0.672*** (-4.750)		-1.993*** (-12.919)
CONSTANT	-15.043*** (-9.697)	-61.878*** (-18.323)	-22.377*** (-7.441)	-31.992*** (-11.789)	-9.942*** (-5.329)	-49.530*** (-11.520)	-9.566 (-1.640)	-42.416*** (-9.611)	-15.189*** (-9.974)	-62.431*** (-16.122)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	18,698	18,698	3591	3591	15,107	15,107	2548	2548	16,150	16,150
Adjusted R^2	0.161	0.405	0.267	0.190	0.136	0.324	0.126	0.198	0.173	0.387

Panel B: Main board, ChiNext board, and SME board

	Main Board		**ChiNext Board**		**SME Board**	
	(6)		(7)		(8)	
	ROA	IO-all	ROA	IO-all	ROA	IO-all
ROA		0.174*** (5.003)		0.192*** (2.671)		0.211*** (3.355)
IO-all	0.037*** (9.916)		0.021** (2.334)		0.025*** (6.360)	
SIZE	1.084*** (12.188)	2.079*** (10.814)	1.044*** (4.014)	5.749*** (8.029)	2.281*** (16.106)	4.873*** (10.217)
LEVERAGE	-12.541*** (-28.872)		-11.906*** (-10.780)		-17.027*** (-27.433)	

(continued on next page)

Table 3 *(continued)*

Panel B: Main board, ChiNext board, and SME board

	Main Board		ChiNext Board		SME Board	
	(6)		(7)		(8)	
	ROA	IO-all	ROA	IO-all	ROA	IO-all
CROSSLISTING	-0.502**	-6.734***			-2.281**	-19.016***
	(-2.237)	(-14.472)			(-2.354)	(-5.066)
NON-STATE	1.062***	-3.535***	0.539	-10.252***	0.609***	-13.327***
	(6.545)	(-11.007)	(1.006)	(-4.549)	(2.891)	(-15.737)
TURNOVER		-3.273***		-0.567***		-1.276***
		(-6.767)		(-5.139)		(-8.775)
CONSTANT	-14.749***	-35.532***	-6.897	-83.621***	-32.202***	-78.823***
	(-8.165)	(-7.800)	(-1.491)	(-5.909)	(-11.640)	(-7.848)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	13,051	13,051	1502	1502	4145	4145
Adjusted R^2	0.123	0.512	0.152	0.230	0.291	0.257

Notes: This table reports the main regression results estimated using a simultaneous equations model with a GMM estimator. The full sample period is 2004–2014. 2004–2006 is the pre-deregulation period, whereas 2007–2014 is the post-deregulation period. Bull market is 2006–2007, bear market otherwise. The Main Board was inaugurated in 1990, the SME board was created in 2004 mainly for small and medium-sized enterprises, and ChiNext was launched in 2009 mainly for young and hi-tech enterprises. Return on assets (ROA) is calculated as net income divided by total assets. Total institutional ownership (IO-all) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Firm size (SIZE) is measured by the logarithm of the book value of total assets. Leverage (LEVERAGE) is measured as the ratio of the book value of total liabilities to the book value of total assets. The cross-listing dummy variable (CROSSLIST) takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. This variable is not included in the models for the ChiNext board because it has few cross-listing firms. The non-state ownership dummy variable (NON-STATE) takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. A stock's daily turnover (TURNOVER) is measured as the ratio of daily trading volume to shares outstanding. Year dummies are also included. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses.

Hypothesis 1 or the "active monitoring" view. In particular, it suggests that institutional investors in China act as active monitors and help lead investee firms to better performance. This finding is consistent with those of Elyasiani and Jia (2010), Ferreira and Matos (2008), McConnell and Servaes (1990), Smith (1996) and and provides general support for reforms intended to open Chinese stock markets to institutional investors. The results also confirm that the positive effects of institutional ownership on firm performance are robust to accounting for deregulation, contemporaneous market conditions, and different boards.

It is also worth noting that the impact of institutional ownership on firm performance is more pronounced during the pre-deregulation period and in bull markets. As mentioned previously, extant studies suggest that the positive relationship between firm performance and institutional ownership is stronger for both pressure-insensitive and foreign institutional investors. Based on the figures presented in Panel B of Table 1, we compute the ratio of each type of institutional ownership to total institutional ownership[33] and find that, on average, there are proportionally more pressure-insensitive (66.85% vs. 22.86%) and foreign (2.59% vs. 0.50%) institutional investors during the pre-deregulation period compared to the post-deregulation period. Similarly, the average pressure-insensitive and foreign institutional ownership ratios in bull markets are 57.50% and 2.58%, respectively, which are also higher than the ratios computed for bear markets (29.82% and 0.73%, respectively). Therefore, proportionally more pressure-insensitive and foreign institutional investors may lead to a stronger relationship between institutional ownership and firm performance during the pre-deregulation period and in bull markets.

Among the other control variables, the significantly negative coefficient for firm size suggests that larger firms exhibit worse market performance than other firms. This finding is in line with the results of Yuan et al. (2008) and demonstrates that larger firms in China may suffer from more bureaucratic intervention and higher agency costs. Leverage is negatively and significantly related to market performance, which is consistent with the results of Sun and Tong (2003) that imply that a greater interest burden reduces firm earnings. The cross-listing dummy is positively and significantly associated with *Tobin's Q*, suggesting that international capital

[33] For example, the ratios of pressure-sensitive (IO-passive) and pressure-insensitive (IO-active) institutional ownership to total institutional ownership in 2004 are 32.04% (=0.975/3.043) and 67.96% (=2.068/3.043), respectively.

enhances market performance. The non-state dummy is positively and significantly related to market performance, which confirms the traditional view, i.e., a firm with an ultimate owner controlled by the government has worse performance due to operating inefficiency, agency problems and property rights issues (Xu & Wang, 1999). The findings discussed above remain consistent across all eight specifications.

Table 3 examines the impact of institutional ownership on accounting performance, as measured by *ROA*. Both Panels A and B show that institutional ownership positively and significantly influences firm performance in general. This result is robust to considering deregulation, bull and bear markets, and different stock market boards. Such findings confirm those associated with market performance discussed above, although the coefficients on two of the control variables (*SIZE* and *CROSSLISTING*) are different from their counterparts—larger firms and firms with fewer foreign investors exhibit better accounting performance—suggesting that *ROA* is improved by economies of scale and reduced exposure to global risk. These findings are not unusual in light of the fundamental differences between market and accounting performance, i.e., *Tobin's Q* may reflect the expectations of a firm's future prospects, whereas *ROA* is more focused on current firm performance.[34]

Turning to the institutional ownership equations, Tables 2 and 3 show that firm performance (measured by both market and accounting measures) has a significantly positive effect on institutional ownership. These results are in line with Elyasiani and Jia (2010), suggesting that institutional investors are attracted to firms with better performance. In addition, the results confirm a two-way relationship between institutional ownership and firm performance and hence justify the use of a simultaneous equations model with a GMM estimator to address endogeneity concerns.

5.1.2. Institutional ownership and firm performance by investor type

Tables 4 and 5 present the results showing the impact of various types of institutional ownership on market and accounting performance, respectively. Each table includes six specifications. Specifications (1) and (2) are used to test Hypothesis 2a and differentiate institutional ownership with respect to the independent business relationships of investors with investee firms. Specifications (3) and (4) are used to test Hypothesis 2b and differentiate institutional ownership with respect to geographic origin. Specifications (5) and (6) are used to test Hypothesis 2c and differentiate institutional ownership with respect to the size of the applicable shareholdings.

Both Tables 4 and 5 offer further evidence that institutional investors are heterogeneous. Specifications (1) and (2) indicate a positive and significant effect of insensitive institutional ownership on firm performance, whereas no significant relationship is shown between sensitive institutional investors and firm performance. This finding confirms Hypothesis 2a, is consistent with the findings from Ferreira and Matos (2008), Firth et al. (2016) and Yuan et al. (2008), and illustrates that insensitive institutional investors have played a positive role in corporate governance in China. In addition, it confirms that Chinese policymakers' efforts to develop mutual funds and QFIIs as major types of institutional investors have been successful. Specifications (3) and (4) show that the coefficients of institutional ownership are significant and positive for both domestic and foreign investors. Moreover, the coefficient of foreign institutional ownership is greater than that of domestic institutional ownership. This finding supports Hypothesis 2b, suggesting that foreign institutional investors more actively manage their investee firms and are more likely to demand changes in corporate governance than domestic institutional investors (Gillan & Starks, 2003; Ferreira & Matos, 2008).

Specifications (5) and (6) show that institutional investors with shareholdings exceeding 5% of total shares have a positive and significant impact on firm performance but that institutional investors holding less than 5% of total shares have a negative and significant impact on firm performance, which supports Hypothesis 2c. These findings are consistent with those of Shleifer and Vishny (1986) and Elyasiani and Jia (2010) and suggest that large shareholders in China have greater incentives to monitor investees because they will reap greater rewards than their counterparts with smaller shareholdings. In addition, the results imply that institutional investors with lower shareholdings (IO-under5) may side with management to exploit small shareholders and impair firm performance by overlooking management fraud as long as they can benefit from it. This finding provides support for Elyasiani and Jia (2010), who argue that the exploitation scenario is more likely to occur in emerging markets, where the interests of small investors are less protected. The findings regarding the control variables are similar to those presented above in Tables 2 and 3. In general, the findings suggest that the Chinese government should continue opening its stock markets to institutional investors and particularly to insensitive, foreign, and large institutional shareholders.

5.1.3. Channels of association between institutional ownership and firm performance

Table 6 reports the estimation results regarding the channels of association between institutional ownership and firm performance. Again, a simultaneous equations model with a GMM estimator is applied to mitigate any problems associated with endogeneity. Specifications (1) and (2) are used to test Hypothesis 3, whereas Specifications (3) and (4) test Hypothesis 4. In general, the results provide support for both hypotheses. In particular, Specifications (1) and (2) indicate a significantly positive effect of institutional ownership on analyst following and for analyst following on both market and accounting performance, respectively. These findings confirm Hypothesis 3, i.e., greater institutional ownership may improve firm performance through intensified analyst services. These findings also imply that managers should build and maintain good relationships with institutional investors to attract more analyst coverage and enhance firm performance.

Meanwhile, Specifications (3) and (4) reveal that institutional ownership has a significantly negative effect on insider ownership and show that insider ownership has a significantly negative impact on market performance, whereas insider ownership is found to

[34] See Jiang and Kim (2015) for details.

Table 4
Institutional ownership and Tobin's Q by investor type.

	(1) Q	IO-passive	(2) Q	IO-active	(3) Q	IO-domestic	(4) Q	IO-foreign	(5) Q	IO-over5	(6) Q	IO-under5
Q		-0.299***		1.337***		1.023***		0.014***		1.067***		-0.030***
		(-3.494)		(13.702)		(9.239)		(6.506)		(9.415)		(-6.388)
IO-passive	-0.001											
	(-0.731)											
IO-active			0.057***									
			(27.978)									
IO-domestic					0.008***							
					(12.066)							
IO-foreign							0.109***					
							(5.709)					
IO-over5									0.008***			
									(12.353)			
IO-under5											-0.076***	
											(-8.716)	
SIZE	-0.452***	2.043***	-0.544***	1.880***	-0.482***	3.880***	-0.458***	0.042***	-0.483***	3.931***	-0.453***	-0.009
	(-18.735)	(13.441)	(-22.021)	(31.870)	(-19.803)	(23.937)	(-18.910)	(8.825)	(-19.818)	(23.766)	(-18.864)	(-1.142)
LEVERAGE	-1.197***		-0.991***		-1.275***		-1.1890***		-1.278***		-1.240***	
	(-12.305)		(-10.335)		(-13.188)		(-12.252)		(-13.214)		(-12.747)	
CROSSLIST	0.468***	-4.035***	0.646***	-3.625***	0.523***	-7.582***	0.478***	-0.078***	0.523***	-7.696***	0.471***	0.036
	(6.466)	(-8.569)	(8.834)	(-20.540)	(7.188)	(-15.642)	(6.598)	(-6.422)	(7.194)	(-15.549)	(6.514)	(1.319)
NON-STATE	0.164***	-8.324***	0.139***	0.682***	0.233***	-7.633***	0.170***	-0.009	0.234***	-7.796***	0.182***	0.154***
	(6.677)	(-29.193)	(6.046)	(6.110)	(9.564)	(-25.022)	(7.175)	(-1.177)	(9.619)	(-25.029)	(7.656)	(9.292)
TURNOVER		-1.542***		-0.289***		-1.826***		-0.006***		-1.901***		0.069***

(continued on next page)

Table 4 *(continued)*

	(1) Q	IO-passive	(2) Q	IO-active	(3) Q	IO-domestic	(4) Q	IO-foreign	(5) Q	IO-over5	(6) Q	IO-under5
		(-13.662)		(-12.782)		(-13.770)		(-8.210)		(-13.906)		(14.585)
CONSTANT	11.670***	-36.986***	13.310***	-39.330***	12.317***	-75.444***	11.791***	-0.871***	12.329***	-77.076***	11.771***	0.760***
	(24.803)	(-11.065)	(27.843)	(-29.200)	(25.865)	(-20.997)	(24.989)	(-8.473)	(25.889)	(-21.016)	(25.126)	(4.514)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.295	0.398	0.346	0.156	0.301	0.407	0.296	0.021	0.301	0.406	0.297	0.076

Notes: This table contains the results estimated using a simultaneous equations model with a GMM estimator. Tobin's Q (Q) is calculated as the sum of the market value of equity and the book value of liabilities divided by total assets. Sensitive institutional ownership (IO-passive) is the percentage of the total number of outstanding shares held by insurance companies, social security funds, broker dealers and other institutions. Insensitive institutional ownership (IO-active) is the percentage of the total number of outstanding shares held by mutual funds and QFIIs. Domestic institutional ownership (IO-domestic) is the percentage of the total number of outstanding shares held by Chinese institutions. Foreign institutional ownership (IO-foreign) is the percentage of the total number of outstanding shares held by foreign institutions. Large institutions (IO-over5) are defined as institutions holding 5% or more of the total number of outstanding shares, and small institutions (IO-under5) are institutions holding less than 5% of the total number of outstanding shares. Firm size (SIZE) is measured by the logarithm of the book value of total assets. Leverage (LEVERAGE) is measured as the ratio of the book value of total liabilities to the book value of total assets. The cross-listing dummy variable (CROSSLIST) takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. The non-state ownership dummy variable (NON-STATE) takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. A stock's daily turnover (TURNOVER) is measured as the ratio of daily trading volume to shares outstanding. Year dummies are also included. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses.

Table 5
Institutional ownership and ROA by investor type.

	(1) ROA	IO-passive	(2) ROA	IO-active	(3) ROA	IO-domestic	(4) ROA	IO-foreign	(5) ROA	IO-over5	(6) ROA	IO-under5
ROA		-0.105***		0.270***		0.160***		0.005***		0.165***		-0.000
		(-6.207)		(8.978)		(5.968)		(7.681)		(6.055)		(-0.083)
IO-passive	-0.003											
	(-1.278)											
IO-active			0.245***									
			(39.253)									
IO-domestic					0.031***							
					(12.580)							
IO-foreign							0.867***					
							(10.692)					
IO-over5									0.031***			
									(12.799)			
IO-under5											-0.141***	
											(-3.239)	
SIZE	1.264***	2.249***	0.862***	1.049***	1.133***	3.266***	1.216***	0.032***	1.133***	3.291***	1.255***	0.007
	(16.490)	(15.458)	(11.396)	(20.867)	(14.724)	(21.195)	(15.942)	(7.441)	(14.720)	(20.924)	(16.462)	(1.029)
LEVERAGE	-13.330***		-12.459***		-13.672***		-13.270***		-13.680***		-13.443***	
	(-35.788)		(-34.834)		(-36.918)		(-36.186)		(-36.952)		(-36.710)	
CROSSLIST	-0.954***	-4.240***	-0.179	-2.809***	-0.722***	-6.981***	-0.875***	-0.068***	-0.722***	-7.070***	-0.939***	0.021
	(-4.347)	(-9.052)	(-0.834)	(-17.133)	(-3.287)	(-14.497)	(-4.005)	(-5.723)	(-3.286)	(-14.373)	(-4.287)	(0.756)
NON-STATE	0.982***	-8.221***	0.884***	0.548***	1.280***	-7.659***	1.028***	-0.015*	1.283***	-7.820***	1.038***	0.147***
	(8.043)	(-28.858)	(7.478)	(4.628)	(10.625)	(-25.063)	(8.502)	(-1.825)	(10.645)	(-25.068)	(8.528)	(8.903)
TURNOVER		-1.531***		-0.317***		-1.842***		0.103***		-1.917***		0.069***

(continued on next page)

Table 5 *(continued)*

	(1) ROA	IO-passive	(2) ROA	IO-active	(3) ROA	IO-domestic	(4) ROA	IO-foreign	(5) ROA	IO-over5	(6) ROA	IO-under5
		(-13.602)		(-13.077)		(-13.780)		(6.125)		(-13.917)		(14.578)
CONSTANT	-17.855***	-41.586***	-20.292***	-39.330***	-15.110***	-61.230***	-16.916***	-0.648***	-15.082***	-62.252***	-17.539***	0.374**
	(-11.573)	(-13.130)	(-19.108)	(-29.200)	(-9.741)	(-18.167)	(-11.049)	(-7.065)	(-9.721)	(-18.089)	(-11.435)	(2.385)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.155	0.398	0.208	0.154	0.161	0.405	0.158	0.025	0.161	0.404	0.155	0.074

Notes: This table contains the results estimated using a simultaneous equations model with a GMM estimator. Return on assets (ROA) is calculated as net income divided by total assets. Sensitive institutional ownership (IO-passive) is the percentage of the total number of outstanding shares held by insurance companies, social security funds, broker dealers and other institutions. Insensitive institutional ownership (IO-active) is the percentage of the total number of outstanding shares held by mutual funds and QFIIs. Domestic institutional ownership (IO-domestic) is the percentage of the total number of outstanding shares held by Chinese institutions. Foreign institutional ownership (IO-foreign) is the percentage of the total number of outstanding shares held by foreign institutions. Large institutions (IO-over5) are defined as institutions holding 5% or more of the total number of outstanding shares, and small institutions (IO-under5) are institutions holding less than 5% of the total number of outstanding shares. Firm size (SIZE) is measured by the logarithm of the book value of total assets. Leverage (LEVERAGE) is measured as the ratio of the book value of total liabilities to the book value of total assets. The cross-listing dummy variable (CROSSLIST) takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. The non-state ownership dummy variable (NON-STATE) takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. A stock's daily turnover (TURNOVER) is measured as the ratio of daily trading volume to shares outstanding. Year dummies are also included. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses.

Table 6
Channels of association between institutional ownership and firm performance.

	(1) Q	ANALYST	IO-all	(2) ROA	ANALYST	IO-all	(3) Q	INSIDE	IO-all	(4) ROA	INSIDE	IO-all
Q		-0.739*** (-14.371)	0.489*** (5.287)					0.678*** (6.996)	1.098*** (9.121)			
ROA					0.025** (2.377)	0.030* (1.757)					0.998*** (7.804)	0.235*** (6.797)
IO-all		0.153*** (35.553)			0.159*** (36.944)			-0.276*** (-52.856)			-0.943*** (-45.726)	
ANALYST	0.022*** (18.744)		0.410*** (28.389)	0.098*** (21.194)		0.418*** (28.807)						
INSIDE							-0.002** (-2.095)		-0.339*** (-41.799)	0.007*** (7.983)		-0.079*** (-20.948)
SIZE	-0.609*** (-21.355)		1.119*** (6.562)	0.548*** (5.990)		0.797*** (5.022)	-0.455*** (-18.670)		3.354*** (22.162)	1.279*** (16.670)		2.962*** (20.267)
LEVERAGE	-0.976*** (-9.745)			-12.347*** (-32.987)			-1.234*** (-13.144)			-12.912*** (-35.333)		
CROSSLIST	0.508*** (6.983)		-6.837*** (-14.095)	-0.768*** (-3.542)		-6.562*** (-13.580)	0.468*** (6.502)		-7.810*** (-16.429)	-0.939*** (-4.280)		-6.911*** (-14.421)
NONSTATE	0.181*** (7.741)		-7.716*** (-26.220)	1.072*** (8.975)		-7.655*** (-26.072)	0.190*** (7.197)	11.710*** (57.989)	-3.242*** (-10.479)	0.752*** (5.717)	31.916*** (47.906)	-5.003*** (-16.118)
TURNOVERD			-1.601*** (-13.252)			-1.598*** (-13.191)			-1.479*** (-12.866)			-1.414*** (-12.032)
LNMC		8.050*** (79.045)			7.924*** (74.517)							
AGE								-0.755***			-2.268***	

(continued on next page)

Table 6 *(continued)*

	(1) Q	ANALYST	IO-all	(2) ROA	ANALYST	IO-all	(3) Q	INSIDE	IO-all	(4) ROA	INSIDE	IO-all
								(-31.413)			(-25.598)	
CONSTANT	14.854***	-167.948***	-17.083***	-3.350*	-166.543***	-9.604***	11.751***	6.143***	-65.505***	-18.367***	20.943***	-55.892***
	(26.517)	(-78.948)	(-4.614)	(-1.812)	(-74.969)	(-2.817)	(24.593)	(16.199)	(-19.563)	(-11.890)	(16.231)	(-17.644)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.312	0.542	0.442	0.175	0.535	0.441	0.295	0.325	0.457	0.158	0.307	0.438

Notes: This table contains the results estimated using a simultaneous equations model with a GMM estimator. Market performance is measured by Tobin's Q, which is calculated as the sum of the market value of equity and the book value of liabilities divided by total assets. Accounting performance is measured by ROA, which is calculated as net income divided by total assets. Total institutional ownership (IO-all) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Inside ownership (INSIDE) is the proportion of a firm's total number of outstanding shares held by directors and executive officers at year-end. Analyst following (ANALYST) is the number of analysts covering the firm. Firm size (SIZE) is measured by the logarithm of the book value of total assets. Leverage (LEVERAGE) is measured as the ratio of the book value of total liabilities to the book value of total assets. The non-state ownership dummy variable (NON-STATE) takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. The cross-listing dummy variable (CROSSLIST) takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. A stock's daily turnover (TURNOVER) is measured as the ratio of daily trading volume to shares outstanding. Market capitalization (LNMC) is the logarithm of market capitalization. Firm age (AGE) is the number of years since a firm was established. Year dummies are also included. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses.

have a significantly positive influence on accounting performance. These findings confirm Hypothesis 4 within the context of market performance, i.e., greater institutional ownership may enhance shareholder value by reducing insider ownership. However, greater institutional ownership might worsen firms' accounting performance as a result of this channel. Such a finding is not surprising given the fundamental differences between *Tobin's Q* and *ROA* discussed above.[35] The findings suggest that to maximize shareholder value, institutional investors should consider limiting the controlling power of insider owners when developing their investment strategies.

5.2. Robustness checks

5.2.1. Alternative performance measures

Because firm performance and institutional ownership may differ from industry to industry, this study follows Woidtke (2002) and Yuan et al. (2008) by also using *industry-adjusted Tobin's Q* and *industry-adjusted ROA* as independent variables to test all four hypotheses listed in Section 2. *Industry-adjusted Tobin's Q* (*ROA*) is calculated as the firm's *Tobin's Q* (*ROA*) minus the median *Tobin's Q* (*ROA*) of firms in the same industry classification according to the CSRC.[36] Panels A and B in Tables 7 and 8 suggest that institutional ownership is positively related to both industry-adjusted performance measures, and the results remain unchanged even when deregulation, bull and bear markets, and the three stock market boards are considered separately. Panel C in both tables confirms that the relationship varies with investor type. Specifically, pressure-insensitive, foreign and large institutions have greater positive effects on firm performance than their counterparts. Panel D in both tables also reports that institutional investors actively monitor firm performance by increasing analyst following and reducing information asymmetry. Furthermore, greater institution ownership enhances market performance by reducing insider ownership, although decreased insider ownership may worsen accounting performance. In general, the results are consistent with those derived from Tables 2–6 and lend support to all four hypotheses from Section 2 above.

5.2.2. Alternative estimation method

Following Elyasiani and Jia (2010), Ferreira and Matos (2008) and Jafarinejad, Jory, and Ngo (2015), this study also uses three-stage least squares (3SLS) to investigate the relationship between institutional ownership and firm performance. In total, 16 regressions are re-estimated using 3SLS, with the results presented in Tables 9 and 10. Similarly, Panels A and B lend support to the "active monitoring" view and confirm that the result is robust to deregulation, various market conditions, and different stock market boards. Panel C shows that the relationship varies by investor type, and Panel D confirms the two channels of association. Overall, the findings are consistent with the main findings discussed above.

5.2.3. Alternative cutoffs to classify ownership size

Unlike their Western counterparts, which usually have a more diffuse ownership structure, most Chinese listed firms are not widely held. Thus, in addition to using 5% as the cutoff percentage, this study also uses 10% and the median of the institutional ownership share as alternative cutoffs to capture potential size effects in the relationship between institutional ownership and firm performance. Similarly, these variables are labelled *IO-over10*, *IO-under10*, *IO-overmedian*, and *IO-undermedian*, respectively. Employing the same method (i.e., a simultaneous equation system with a GMM estimator), we re-run Eqs. (1.1) and (1.2) and present the results in Table 11. Panels A and B show the estimation results of the models using *Tobin's Q* and *ROA* as the performance measures, respectively. In general, the findings are consistent with those reported in Tables 4 and 5 and lend support to Hypothesis 2c, i.e., the positive link between firm performance and institutional ownership is stronger for large institutional investors than for smaller ones.[37]

5.2.4. Alternative model

To control for the mutual interdependence of institutional ownership, analyst following, insider ownership, and firm performance, we follow Elyasiani and Jia (2010) and develop a new model for the channels of association by including two channels in one system. Again, we use GMM to estimate the simultaneous equations model. The results reported in Table 12 confirm that increased analyst following and decreased insider ownership are two channels of association between firm performance and institutional ownership, thus lending further support to Hypotheses 3 and 4.

$$Performance_{it} = \zeta_0 + \zeta_1 ANALYST_{it} + \zeta_2 INSIDE_{it} + \zeta_3 C_{it} + \zeta_4 LEVERAGE_{it} + YearDummy + \varepsilon_{1it} \quad (4.1)$$

[35] As indicated in Jiang and Kim (2015), caution should be exercised in interpreting the results because the relationship depends on the measure of firm performance used, i.e., market value vs. accounting value.

[36] According to the Guidelines for the Industry Classification of Listed Companies (2012 Revision), the CSRC identifies listed companies using 19 industry classifications, including a) Agriculture, forestry, animal husbandry and fishery; b) Mining industry; c) Manufacturing industry; d) Industry of electric power, heat, gas and water production and supply; e) Construction industry; f) Wholesale and retail industry; g) Transport, storage and postal service industry; h) Accommodation and catering industry; i) Industry of information transmission, software and information technology services; j) Financial industry; k) Real estate industry; l) Leasing and commercial service industry; m) Scientific research and technical service industry; n) Water conservancy, environment and public facility management industry; o) Industry of resident service, repair and other services; p) Education; q) Health and social work; r) Industry of culture, sports and entertainment; and s) Diversified industries. Following common practice, the financial industry is excluded. In addition, the Industry of residential service, repair and other services is dropped due to data unavailability. Thus, there are 17 industries in this study.

[37] Specifications (2) and (4) in Panel B show that the impact of small institutional investors on firm performance is not significant, which is different from the significantly negative impact presented in Table 5. However, this difference does not invalidate Hypothesis 2c.

Table 7
Institutional ownership and industry-adjusted Tobin's Q (Robustness check 1.1).

Panel A: Full sample period, pre- and post-deregulation, bear and bull markets

	2004–2014		2004–2006		2007–2014		Bull		Bear	
	(1)		(2)		(3)		(4)		(5)	
	ADJQ	IO-all	ADJQ	IO-all	ADJQ	IO-all	ADJQ	IO-all	ADJQ	IO-all
ADJQ		1.004***		4.067***		0.939***		1.422***		0.920***
		(8.875)		(14.157)		(8.282)		(7.899)		(7.104)
IO-all	0.007***		0.035***		0.007***		0.041***		0.006***	
	(11.604)		(15.578)		(10.865)		(10.233)		(8.941)	
Obs.	18,698	18,698	3591	3591	15,107	15,107	2548	2548	16,150	16,150
Adjusted R^2	0.151	0.406	0.248	0.249	0.153	0.325	0.180	0.221	0.155	0.387

Panel B: Main board, ChiNext board, and SME board

	Main Board		ChiNext Board		SME Board	
	(6)		(7)		(8)	
	ADJQ	IO-all	ADJQ	IO-all	ADJQ	IO-all
ADJQ		0.531***		1.009***		1.697***
		(4.266)		(4.198)		(6.685)
IO-all	0.004***		0.011***		0.009***	
	(5.492)		(3.944)		(8.214)	
Obs.	13,051	13,051	1502	1502	4145	4145
Adjusted R^2	0.153	0.510	0.114	0.236	0.173	0.264

Panel C: By investor type

	(9)		(10)		(11)		(12)		(13)		(14)	
	ADJQ	IO-passive	ADJQ	IO-active	ADJQ	IO-domestic	ADJQ	IO-foreign	ADJQ	IO- under5	ADJQ	IO-over5
ADJQ		-0.169**		1.173***		0.990***		0.013***		-0.029***		1.033***
		(-1.987)		(12.936)		(8.800)		(6.152)		(-5.919)		(8.959)

(continued on next page)

Table 7 *(continued)*

Panel C: By investor type

	(9)		(10)		(11)		(12)		(13)		(14)	
	ADJQ	IO-passive	ADJQ	IO-active	ADJQ	IO-domestic	ADJQ	IO-foreign	ADJQ	IO- under5	ADJQ	IO-over5
IO-passive	0.000 (0.469)											
IO-active			0.049*** (24.771)									
IO-domestic					0.007*** (11.507)							
IO-foreign							0.103*** (5.673)					
IO-under5									-0.069*** (-7.956)			
IO-over5											0.007*** (11.770)	
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.144	0.397	0.192	0.137	0.151	0.407	0.145	0.021	0.146	0.076	0.151	0.406

Panel D: Channels of association

	(15)			(16)		
	ADJQ	ANALYST	IO-all	ADJQ	INSIDE	IO-all
ADJQ		-0.951*** (-14.961)	0.613*** (6.320)		0.419*** (3.976)	0.984*** (8.273)
IO-all		0.153*** (35.719)			-0.314*** (-54.260)	

(continued on next page)

Table 7 *(continued)*

Panel D: Channels of association						
	(15)			(16)		
	ADJQ	ANALYST	IO-all	ADJQ	INSIDE	IO-all
ANALYST	0.015*** (13.243)		0.411*** (28.826)			
INSIDE				-0.003*** (-4.003)		-0.336*** (-41.626)
Obs.	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.154	0.546	0.442	0.145	0.324	0.455

Notes: This table reports the results estimated using a simultaneous equations model with a GMM estimator. Industry-adjusted Tobin's Q (ADJQ) is calculated as the firm's Q minus the median Q of firms with the same CSRC industry classification. The full sample period is 2004–2014. 2004–2006 is the pre-deregulation period, whereas 2007–2014 is the post-deregulation period. Bull market is for 2006–2007, bear market otherwise. The Main Board was inaugurated in 1990, the SME Board was created in 2004 mainly for small and medium-sized enterprises, and ChiNext was launched in 2009 mainly for young and hi-tech enterprises. Total institutional ownership (IO-all) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Sensitive institutional ownership (IO-passive) is the percentage of the total number of outstanding shares held by insurance companies, social security funds, broker dealers and other institutions. Insensitive institutional ownership (IO-active) is the percentage of the total number of outstanding shares held by mutual funds and QFIIs. Domestic institutional ownership (IO-domestic) is the percentage of the total number of outstanding shares held by Chinese institutions. Foreign institutional ownership (IO-foreign) is the percentage of the total number of outstanding shares held by foreign institutions. Large institutions (IO-over5) is defined as institutions holding 5% or more of the total number of outstanding shares, and small institutions (IO-under5) are institutions holding less than 5% of the total number of outstanding shares. Inside ownership (INSIDE) is the proportion of a firm's total number of outstanding shares held by directors and executive officers at year-end. Analyst following (ANALYST) is the number of analysts covering the firm. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses. The coefficients on the control variables are not presented in this table due to space constraints.

Table 8
Institutional ownership and industry-adjusted ROA (Robustness check 1.2).

Panel A: Full sample period, pre- and post-deregulation, bear and bull markets

	2004-2014		2004-2006		2007-2014		Bull		Bear	
	(1)		(2)		(3)		(4)		(5)	
	ADJROA	IO-all	ADJROA	IO-all	ADJROA	IO-all	ADJROA	IO-all	ADJROA	IO-all
ADJROA		0.170***		0.295***		0.162***		0.214***		0.170***
		(5.988)		(11.834)		(4.882)		(3.708)		(5.126)
IO-all	0.032***		0.221***		0.027***		0.148***		0.027***	
	(12.751)		(17.281)		(10.637)		(13.595)		(10.476)	
Obs.	18,698	18,698	3591	3591	15,107	15,107	2548	2548	16,150	16,150
Adjusted R^2	0.124	0.405	0.240	0.187	0.108	0.324	0.106	0.199	0.155	0.387

Panel B: Main board, ChiNext board, and SME board

	Main Board		ChiNext Board		SME Board	
	(6)		(7)		(8)	
	ADJROA	IO-all	ADJROA	IO-all	ADJROA	IO-all
ADJROA		0.168***		0.155**		0.206***
		(4.802)		(2.136)		(3.239)
IO-all	0.035***		0.015*		0.024***	
	(9.612)		(1.734)		(6.005)	
Obs.	13,051	13,051	1502	1502	4145	4145
Adjusted R^2	0.095	0.512	0.103	0.229	0.267	0.257

Panel C: By investor type

	9		(10)		(11)		(12)		(13)		(14)	
	ADJ ROA	IO-passive	ADJ ROA	IO-active	ADJ ROA	IO-domestic	ADJ ROA	IO-foreign	ADJ ROA	IO-under5	ADJ ROA	IO-over5
ADJROA		-0.091***		0.262***		0.165***		0.005***		-0.000***		0.170**
		(-5.561)		(8.633)		(5.908)		(7.441)		(-0.389)		(5.992)

(continued on next page)

Table 8 *(continued)*

Panel C: By investor type

	9		(10)		(11)		(12)		(13)		(14)	
	ADJ ROA	IO-passive	ADJ ROA	IO-active	ADJ ROA	IO-domestic	ADJ ROA	IO-foreign	ADJ ROA	IO-under5	ADJ ROA	IO-over5
IO-passive	-0.002 (-0.666)											
IO-active			0.234*** (38.090)									
IO-domestic					0.031*** (12.532)							
IO-foreign							0.834*** (10.646)					
IO-under5									-0.145*** (-3.348)			
IO-over5											0.031*** (12.748)	
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.117	0.398	0.168	0.148	0.123	0.405	0.120	0.025	0.117	0.025	0.123	0.404

Panel D: Channels of association

	(15)			(16)		
	ADJROA	ANALYST	IO-all	ADJROA	INSIDE	IO-all
ADJROA		0.011 (1.095)	0.048*** (2.683)		0.232*** (7.270)	0.239*** (6.572)
IO-all		0.159*** (36.869)			-0.264*** (-49.517)	
ANALYST	0.086***		0.416***			

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Table 8 *(continued)*

Panel D: Channels of association						
	(15)			(16)		
	ADJROA	ANALYST	IO-all	ADJROA	INSIDE	IO-all
	(18.453)		(28.794)			
INSIDE				0.013***		-0.347***
				(4.417)		(-41.469)
Obs.	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.133	0.535	0.441	0.118	0.404	0.457

Notes: This table reports the results estimated using a simultaneous equations model with a GMM estimator. Industry-adjusted return on assets (ADJROA) is calculated as the firm's ROA minus the median ROA of firms with the same CSRC industry classification. The full sample period is 2004–2014. 2004–2006 is the pre-deregulation period, whereas 2007–2014 is the post-deregulation period. Bull market is for 2006–2007, bear market otherwise. The Main Board was inaugurated in 1990, the SME Board was created in 2004 mainly for small and medium-sized enterprises, and ChiNext was launched in 2009 mainly for young and hi-tech enterprises. Total institutional ownership (IO-all) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Sensitive institutional ownership (IO-passive) is the percentage of the total number of outstanding shares held by insurance companies, social security funds, broker dealers and other institutions. Insensitive institutional ownership (IO-active) is the percentage of the total number of outstanding shares held by mutual funds and QFIIs. Domestic institutional ownership (IO-domestic) is the percentage of the total number of outstanding shares held by Chinese institutions. Foreign institutional ownership (IO-foreign) is the percentage of the total number of outstanding shares held by foreign institutions. Large institutions (IO-over5) is defined as institutions holding 5% or more of the total number of outstanding shares, and small institutions (IO-under5) are institutions holding less than 5% of the total number of outstanding shares. Inside ownership (INSIDE) is the proportion of a firm's total number of outstanding shares held by directors and executive officers at year-end. Analyst following (ANALYST) is the number of analysts covering the firm. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses. The coefficients on the control variables are not presented in this table due to space constraints.

Table 9
Institutional ownership and Tobin's Q using 3SLS (Robustness check 2.1).

Panel A: Full sample period, pre- and post-deregulation, bear and bull markets

	2004-2014		2004-2006		2007-2014		Bull		Bear	
	(1)		(2)		(3)		(4)		(5)	
	Q	IO-all	Q	IO-all	Q	IO-all	Q	IO-all	Q	IO-all
Q		1.037*** (11.920)		0.295*** (11.834)		0.999*** (10.346)		1.505*** (14.062)		0.963*** (9.564)
IO-all	0.008*** (13.275)		0.037*** (25.030)		0.007*** (12.077)		0.045*** (13.778)		0.006*** (10.412)	
Obs.	18,698	18,698	3591	3591	15,107	15,107	2548	2548	16,150	16,150
Adjusted R^2	0.301	0.407	0.304	0.263	0.278	0.326	0.360	0.229	0.290	0.388

Panel B: Main board, ChiNext board, and SME board

	Main Board		ChiNext Board		SME Board	
	(6)		(7)		(8)	
	Q	IO-all	Q	IO-all	Q	IO-all
Q		0.720*** (7.576)		1.142*** (5.137)		1.697*** (7.593)
IO-all	0.006*** (7.403)		0.014*** (4.979)		0.010*** (10.316)	
Obs.	13,051	13,051	1502	1502	4145	4145
Adjusted R^2	0.279	0.511	0.251	0.240	0.352	0.264

Panel C: By investor type

	(9)		(10)		(11)		(12)		(13)		(14)	
	Q	IO-passive	Q	IO-active	Q	IO-domestic	Q	IO-foreign	Q	IO-foreign	Q	IO-over5
Q		-0.299*** (-3.641)		1.336*** (40.617)		1.023*** (11.776)		0.014*** (5.951)		-0.030*** (-5.883)		1.067*** (12.037)

(continued on next page)

Table 9 *(continued)*

Panel C: By investor type

	(9)		(10)		(11)		(12)		(13)		(14)	
	Q	IO-passive	Q	IO-active	Q	IO-domestic	Q	IO-foreign	Q	IO-foreign	Q	IO-over5
IO-passive	-0.000 (-0.741)											
IO-active			0.057 *** (38.404)									
IO-domestic					0.008*** (13.171)							
IO-foreign							0.109*** (5.009)					
IO-under5									-0.076*** (-7.535)			
IO-over5											0.008*** (13.430)	
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.295	0.398	0.346	0.156	0.301	0.407	0.296	0.021	0.297	0.076	0.301	0.406

Panel D: Channels of associations

	(15)			(16)		
	Q	ANALYST	IO-all	Q	INSIDE	IO-all
Q		-0.739*** (-16.922)	0.489*** (5.690)		0.653*** (8.868)	1.098*** (13.191)
IO-all		0.153*** (41.997)			-0.315*** (-54.693)	
ANALYST	0.022***		0.410***			

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Table 9 *(continued)*

Panel D: Channels of associations						
	(15)			(16)		
	Q	ANALYST	IO-all	Q	INSIDE	IO-all
	(21.901)		(34.433)			
INSIDE				-0.002**		-0.339***
				(-2.374)		(-41.475)
Obs.	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.312	0.542	0.442	0.295	0.325	0.457

Notes: This table reports the results estimated using a simultaneous equations model with a three-stage least squares (3SLS) estimator. Tobin's Q (Q) is calculated as the sum of the market value of equity and the book value of liabilities divided by total assets. The full sample period is 2004–2014. 2004–2006 is the pre-deregulation period, whereas 2007–2014 is the post-deregulation period. Bull market is for 2006–2007, bear market otherwise. The Main Board was inaugurated in 1990, the SME Board was created in 2004 mainly for small and medium-sized enterprises, and ChiNext was launched in 2009 mainly for young and hi-tech enterprises. Total institutional ownership (IO-all) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Sensitive institutional ownership (IO-passive) is the percentage of the total number of outstanding shares held by insurance companies, social security funds, broker dealers and other institutions. Insensitive institutional ownership (IO-active) is the percentage of the total number of outstanding shares held by mutual funds and QFIIs. Domestic institutional ownership (IO-domestic) is the percentage of the total number of outstanding shares held by Chinese institutions. Foreign institutional ownership (IO-foreign) is the percentage of the total number of outstanding shares held by foreign institutions. Large institutions (IO-over5) is defined as institutions holding 5% or more of the total number of outstanding shares, and small institutions (IO-under5) are institutions holding less than 5% of the total number of outstanding shares. Inside ownership (INSIDE) is the proportion of a firm's total number of outstanding shares held by directors and executive officers at year-end. Analyst following (ANALYST) is the number of analysts covering the firm. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses. The coefficients on the control variables are not presented in this table due to space constraints.

Table 10
Institutional ownership and ROA using 3SLS (Robustness check 2.2).

Panel A: Full sample period, pre- and post-deregulation, bear and bull markets

	2004-2014		2004-2006		2007-2014		Bull		Bear	
	(1)		(2)		(3)		(4)		(5)	
	ROA	IO-all	ROA	IO-all	ROA	IO-all	ROA	IO-all	ROA	IO-all
ROA		0.165***		0.295***		0.159***		0.209***		0.168***
		(9.242)		(18.087)		(7.438)		(9.529)		(8.094)
IO-all	0.032***		0.226***		0.028***		0.145***		0.027***	
	(11.965)		(15.674)		(10.010)		(8.972)		(10.316)	
Obs.	18,698	18,698	3591	3591	15,107	15,107	2548	2548	16,150	16,150
Adjusted R^2	0.161	0.405	0.267	0.190	0.136	0.324	0.126	0.198	0.173	0.387

Panel B: Main board, ChiNext board, and SME board

	Main Board		ChiNext Board		SME Board	
	(6)		(7)		(8)	
	ROA	IO-all	ROA	IO-all	ROA	IO-all
ROA		0.174***		0.192***		0.211***
		(9.525)		(2.770)		(3.817)
IO-all	0.037***		0.021**		0.025***	
	(9.853)		(2.350)		(6.995)	
Obs.	13,051	13,051	1502	1502	4145	4145
Adjusted R^2	0.123	0.512	0.152	0.230	0.291	0.257

Panel C: By investor type

	(9)		(10)		(11)		(12)		(13)		(14)	
	ROA	IO-passive	ROA	IO-active	ROA	IO-domestic	ROA	IO-foreign	ROA	IO-under5	ROA	IO-over5
ROA		-0.105***		0.270***		0.160***		0.005***		0.000		-0.165***
		(-6.216)		(39.946)		(8.964)		(10.589)		(-0.078)		(9.071)

(continued on next page)

Table 10 *(continued)*

Panel C: By investor type

	(9)		(10)		(11)		(12)		(13)		(14)	
	ROA	IO-passive	ROA	IO-active	ROA	IO-domestic	ROA	IO-foreign	ROA	IO-under5	ROA	IO-over5
IO-passive	-0.003 (-1.151)											
IO-active			0.245*** (35.701)									
IO-domestic					0.031*** (11.760)							
IO-foreign							0.867*** (8.647)					
IO-under5									-0.141*** (-3.019)			
IO-over5											0.031*** (11.89)	
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.155	0.398	0.209	0.154	0.161	0.405	0.158	0.025	0.155	0.074	0.161	0.404

Panel D: Channels of association

	(15)			(16)		
	ROA	ANALYST	IO-all	ROA	INSIDE	IO-all
ROA		0.025** (2.436)	0.030* (1.678)		0.244*** (17.125)	0.242*** (14.112)
IO-all		0.159*** (43.424)			-0.264*** (-47.819)	
ANALYST	0.098***		0.418***			

(continued on next page)

Table 10 *(continued)*

Panel D: Channels of association						
	(15)			(16)		
	ROA	ANALYST	IO-all	ROA	INSIDE	IO-all
	(21.469)		(34.845)			
INSIDE				0.016***		-0.349***
				(4.983)		(-42.533)
Obs.	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.175	0.535	0.441	0.156	0.404	0.457

Notes: This table reports the results estimated using a simultaneous equations model with a three-stage least squares (3SLS) estimator. Return on assets (ROA) is calculated as net income divided by total assets. The full sample period is 2004–2014. 2004–2006 is the pre-deregulation period, whereas 2007–2014 is the post-deregulation period. Bull market is for 2006–2007, bear market otherwise. The Main Board was inaugurated in 1990, the SME Board was created in 2004 mainly for small and medium-sized enterprises, and ChiNext was launched in 2009 mainly for young and hi-tech enterprises. Total institutional ownership (IO-all) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Sensitive institutional ownership (IO-passive) is the percentage of the total number of outstanding shares held by insurance companies, social security funds, broker dealers and other institutions. Insensitive institutional ownership (IO-active) is the percentage of the total number of outstanding shares held by mutual funds and QFIIs. Domestic institutional ownership (IO-domestic) is the percentage of the total number of outstanding shares held by Chinese institutions. Foreign institutional ownership (IO-foreign) is the percentage of the total number of outstanding shares held by foreign institutions. Large institutions (IO-over5) is defined as institutions holding 5% or more of the total number of outstanding shares, and small institutions (IO-under5) are institutions holding less than 5% of the total number of outstanding shares. Inside ownership (INSIDE) is the proportion of a firm's total number of outstanding shares held by directors and executive officers at year-end. Analyst following (ANALYST) is the number of analysts covering the firm. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses. The coefficients on the control variables are not presented in this table due to space constraints.

Table 11
Firm performance and institutional ownership with alternative cutoffs (Robustness check 3).

Panel A: Tobin's Q								
	(1)		(2)		(3)		(4)	
	Q	IO-over10	Q	IO-under10	Q	IO-overmedian	Q	IO-undermedian
Q		1.078***		-0.041***		1.040***		-0.003
		(9.384)		(-4.028)		(9.015)		(-0.164)
IO-over10	0.007***							
	(12.270)							
IO-under10			-0.025***					
			(-6.341)					
IO-overmedian					0.007***			
					(11.594)			
IO-undermedian							-0.006**	
							(-2.009)	
SIZE	-0.481***	3.937***	-0.452***	-0.014	-0.479***	3.966***	-0.453***	-0.044*
	(-19.772)	(23.174)	(-18.823)	(-0.843)	(-19.687)	(22.861)	(-18.845)	(-1.756)
LEVERAGE	-1.281***		-1.236***		-1.277***		-1.213***	
	(-13.242)		(-12.730)		(-13.210)		(-12.539)	
CROSSLIST	0.521***	-7.719***	0.470***	0.059	0.517***	-7.767***	0.470***	0.106
	(7.165)	(-15.147)	(6.506)	(0.905)	(7.119)	(-14.840)	(6.504)	(1.126)
NON-STATE	0.234***	-8.165***	0.182***	0.523***	0.231***	-8.442***	0.173***	0.800***
	(9.601)	(25.393)	(7.592)	(13.887)	(9.484)	(-25.564)	(7.263)	(14.428)
TURNOVER		-1.927***		0.095***		-1.920***		0.088***
		(-13.768)		(11.459)		(-13.636)		(9.154)
CONSTANT	12.305***	-77.813***	11.726***	1.498***	12.267***	-78.682***	11.709***	2.366***
	(25.854)	(-20.671)	(25.029)	(25.763)	(25.865)	(-20.484)	(24.961)	(4.353)

(continued on next page)

Table 11 *(continued)*

Panel A: Tobin's Q	(1) Q	IO-over10	(2) Q	IO-under10	(3) Q	IO-overmedian	(4) Q	IO-undermedian
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	18,698	18,698	18,698	18,698	18,698	18,,698	18,698	18,698
Adjusted R^2	0.301	0.397	0.296	0.053	0.301	0.387	0.295	0.053
Panel B: ROA	(1) ROA	IO-over10	(2) ROA	IO-under10	(3) ROA	IO-overmedian	(4) ROA	IO-undermedian
ROA		0.153*** (5.511)		0.012*** (4.868)		0.149*** (5.444)		0.016*** (4.428)
IO-over10	0.028*** (11.691)							
IO-under10			0.017 (0.736)					
IO-overmedian					0.027*** (11.470)			
IO-undermedian							0.012 (0.819)	
SIZE	1.144*** (14.856)	3.296*** (20.407)	1.256*** (16.480)	0.002 (0.112)	1.149*** (14.913)	3.348*** (20.298)	1.256*** (16.476)	-0.050** (-2.116)
LEVERAGE	-13.678*** (-36.841)		-13.350*** (-35.741)		-13.671*** (-36.833)		-13.354*** (-36.035)	
CROSSLIST	-0.741*** (-3.367)	-7.093*** (-14.000)	-0.941*** (-4.298)	0.044 (0.680)	-0.749*** (-3.407)	-7.162*** (-13.756)	-0.941*** (-4.301)	0.113 (1.201)
NON-STATE	1.271*** (10.577)	-8.167*** (-25.365)	1.003*** (8.403)	0.494*** (13.145)	1.264*** (10.523)	-8.446*** (-25.545)	1.003*** (8.369)	0.773*** (13.920)
TURNOVER		-1.941***		0.094***		-1.934***		0.086***

(continued on next page)

Table 11 *(continued)*

Panel B: ROA	(1) ROA	IO-over10	(2) ROA	IO-under10	(3) ROA	IO-overmedian	(4) ROA	IO-undermedian
		(-13.776)		(11.349)		(-13.644)		(9.011)
CONSTANT	-15.289***	-62.949***	-17.702***	1.071***	-15.386***	-64.328***	-17.706***	2.450***
	(-9.841)	(-17.816)	(-11.541)	(3.121)	(-9.896)	(-17.841)	(-11.532)	(4.878)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.160	0.394	0.155	0.054	0.160	0.385	0.155	0.054

Notes: This table contains the results estimated using a simultaneous equations model with a GMM estimator. Tobin's Q (Q) is calculated as the sum of the market value of equity and the book value of liabilities divided by total assets. ROA is calculated as net income divided by total assets. Large institutions (IO-over10) are defined as institutions holding 10% or more of the total number of outstanding shares, and small institutions (IO-under10) are institutions holding less than 10% of the total number of outstanding shares. Alternative large institutions (IO-overmedian) are defined as institutions holding 13.88% (median) or more of the total number of outstanding shares, and alternative small institutions (IO-undermedian) are institutions holding less than 13.88% (median) of the total number of outstanding shares. Firm size (SIZE) is measured by the logarithm of the book value of total assets. Leverage (LEVERAGE) is measured as the ratio of the book value of total liabilities to the book value of total assets. The cross-listing dummy variable (CROSSLIST) takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. The non-state ownership dummy variable (NON-STATE) takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. A stock's daily turnover (TURNOVER) is measured as the ratio of daily trading volume to shares outstanding. Year dummies are also included. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses.

Table 12
Channels of association between institutional ownership and firm performance (Robustness check 4).

	(1) Q	ANALYST	INSIDE	IO-all	(2) ROA	ANALYST	INSIDE	IO-all
Q		-0.739***	0.678***	0.507***				
		(-14.371)	(6.996)	(5.277)				
ROA						0.025**	0.236***	0.102***
						(2.377)	(7.630)	(4.540)
IO-all		0.153***	-0.276***			0.159***	-0.283***	
		(35.553)	(-52.856)			(36.944)	(-53.033)	
ANALYST	0.022***			0.445***	0.099***			0.443***
	(18.752)			(32.436)	(21.211)			(31.873)
INSIDE	-0.002*			-0.360***	0.017***			-0.364***
	(-1.918)			(-47.389)	(5.746)			(-47.318)
SIZE	-0.610***			0.275*	0.567***			-0.037
	(-21.208)			(1.674)	(6.155)			(-0.245)
LEVERAGE	-1.005***				-12.022***			
	(-10.323)				(-32.661)			
CROSSLIST	0.506***			-6.925***	-0.752***			-6.620***
	(6.989)			(-14.566)	(-3.474)			(-13.981)
NON-STATE	0.201***		11.710***	-3.049***	0.850***		11.747***	-3.043***
	(7.690)		(57.989)	(-10.313)	(6.290)		(59.220)	(-10.307)
TURNOVER				-1.207***				-1.214***
				(-12.134)				(-12.140)
LNMC		8.050***				7.924***		
		(79.045)				(74.517)		
AGE			-0.755***				-0.730***	
			(-31.413)				(-29.734)	
CONSTANT	14.901***	-167.948***	6.143***	-0.510	-3.886**	-166.543***	6.357***	6.639**
	(26.225)	(-78.948)	(16.199)	(-0.144)	(-2.082)	(-74.969)	(17.398)	(2.047)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	18,698	18,698	18,698	18,698	18,698	18,698	18,698	18,698
Adjusted R^2	0.312	0.542	0.393	0.498	0.176	0.535	0.398	0.498

Notes: This table contains the results estimated using a simultaneous equations model with a GMM estimator. Market performance is measured by Tobin's Q, which is calculated as the sum of the market value of equity and the book value of liabilities divided by total assets. Accounting performance is measured by ROA, which is calculated as net income divided by total assets. Total institutional ownership (IO-all) is the sum of the proportion of a firm's total number of outstanding shares held by all institutional investors at year-end. Inside ownership (INSIDE) is the proportion of a firm's total number of outstanding shares held by directors and executive officers at year-end. Analyst following (ANALYST) is the number of analysts covering the firm. Firm size (SIZE) is measured by the logarithm of the book value of total assets. Leverage (LEVERAGE) is measured as the ratio of the book value of total liabilities to the book value of total assets. The non-state ownership dummy variable (NON-STATE) takes a value of one if a firm's ultimate owner is not directly or indirectly controlled by the Chinese government and zero otherwise. The cross-listing dummy variable (CROSSLIST) takes a value of one if a firm issues both A shares and foreign shares and zero otherwise. A stock's daily turnover (TURNOVER) is measured as the ratio of daily trading volume to shares outstanding. Market capitalization (LNMC) is the logarithm of market capitalization. Firm age (AGE) is the number of years since a firm was established. Year dummies are also included. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. *T*-statistics are in parentheses.

$$ANALYST_{it} = \mu_0 + \mu_1 IO_{it} + \mu_2 Performance_{it} + \mu_3 LNMC_{it} + YearDummy + \varepsilon_{2it} \quad (4.2)$$

$$INSIDE_{it} = \varphi_0 + \varphi_1 IO_{it} + \varphi_2 Performance_{it} + \varphi_3 AGE_{it} + \varphi_4 NONSTATE_{it} + YearDummy + \varepsilon_{3it} \quad (4.3)$$

$$IO_{it} = \psi_0 + \psi_1 Performance_{it} + \psi_2 ANALYST_{it} + \psi_3 INISDE_{it} + \psi_4 C_{it} + \psi_5 TURNOVER_{it} + YearDummy + \varepsilon_{4it} \quad (4.4)$$

6. Conclusion

Institutional ownership is a key force in capital markets. As institutional investors rapidly expand in developing countries, their access to the stock markets has drawn increasing attention from both academics and policymakers. This study attempts to provide additional evidence regarding this issue by investigating whether all types of institutional investors act as active monitors and contribute equally to firm performance and by examining the channels by which this association operates in China, the largest emerging economy. Using a new and large data sample of Chinese listed firms over the 2004–2014 period, this study also compares and identifies whether this association is robust to accounting for deregulation, contemporaneous market conditions, and various stock market boards.

Employing a simultaneous equations model with a GMM estimator, the results generally suggest that institutional ownership significantly and positively affects firm performance. This finding is robust to accounting for deregulation, contemporaneous market conditions, and various stock market boards. Nonetheless, not all institutional investors act as active monitors and improve firm performance. In particular, the results indicate that pressure-insensitive, foreign and large institutional shareholders have greater positive effects on firm performance than pressure-sensitive, domestic, and small institutions, respectively. The results further suggest that institutional investors enhance shareholder value by increasing analyst following and decreasing insider ownership, among other effects, and these findings are robust to a series of sensitivity analyses.

The empirical results highlight important issues for policymakers, managers, and investors. First, China's continuous series of reforms aimed at promoting the development of institutional investment has generally been successful and is reflected in better firm performance. Second, the Chinese government should continue opening its stock markets to institutional investors and particularly to insensitive, foreign, and large institutional shareholders. Third, managers should build and maintain good relationships with institutional investors to attract more analyst coverage. Finally, institutional investors should consider limiting the controlling power of insider owners when formulating their investment strategies.

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Appendix A1. Correlation matrix

	Q	Adjusted Q	ROA	Adjusted ROA	IO-all	IO-passive	IO-active	IO-domestic	IO-foreign	IO-under5	IO-over5
Adjusted Q	0.921***										
ROA	0.298***	0.274***									
Adjusted ROA	0.253***	0.273***	0.982***								
IO-all	0.002	-0.030***	0.071***	0.050***							
IO-passive	-0.065***	-0.086***	-0.020***	-0.036***	0.948***						
IO-active	0.200***	0.160***	0.282***	0.265***	0.348***	0.032***					
IO-domestic	0.002	-0.030***	0.070***	0.048***	1.000***	0.950***	0.343***				
IO-foreign	0.011	0.006	0.072***	0.073***	0.083***	0.013*	0.225***	0.062***			
IO-under5	-0.012*	-0.012	0.009	0.010	-0.375***	-0.336***	-0.190***	-0.375***	-0.037***		
IO-over5	0.003	-0.029***	0.069***	0.048***	0.999***	0.947***	0.350***	0.999***	0.084***	-0.415***	
SIZE	-0.402***	-0.296***	-0.012*	0.023***	0.235***	0.217***	0.101***	0.235***	0.061***	-0.065***	0.234***
LEVERAGE	-0.281***	-0.241***	-0.330***	-0.293***	0.144***	0.160***	-0.019***	0.144***	0.006	-0.100***	0.146***
CROSSLIST	-0.045***	-0.031***	-0.023***	-0.024***	-0.002	0.014*	-0.049***	-0.002	-0.006	-0.016**	-0.002
NON-STATE	0.199***	0.167***	0.116***	0.100***	-0.148***	-0.154***	-0.012*	-0.147***	-0.048***	0.075***	-0.149***
TURNOVER	0.206***	0.108***	0.084***	0.053***	-0.307***	-0.289***	-0.114***	-0.307***	-0.041***	0.217***	-0.312***
INSIDE	0.157***	0.119***	0.153***	0.127***	-0.262***	-0.280***	0.003	-0.261***	-0.047***	0.161***	-0.264***
ANALYST	-0.035***	-0.079***	0.195***	0.168***	0.499***	0.378***	0.457***	0.497***	0.157***	-0.181***	0.499***
CHINEXT	0.138***	0.101***	0.096***	0.068***	-0.134***	-0.151***	0.023***	-0.133***	-0.034***	0.083***	-0.135***
QFII	0.010	0.001	0.086***	0.082***	0.088***	0.036***	0.171***	0.074***	0.662***	-0.020***	0.088***
LNMC	0.172***	0.069***	0.297***	0.253***	0.396***	0.292***	0.386***	0.395***	0.108***	-0.096***	0.394***
AGE	0.023***	0.026***	-0.037***	-0.033***	0.277***	0.299***	-0.011	0.278***	-0.017**	-0.133***	0.278***
	SIZE	LEVERAGE	CROSSLIST	NON-STATE	TURNOVER	INSIDE	ANALYST	CHINEXT	QFII	LNMC	
LEVERAGE	0.326***										
CROSSLIST	0.244***	0.096***									
NON-STATE	-0.264***	-0.280***	-0.179***								
TURNOVER	-0.333***	-0.195***	-0.076***	0.195***							
INSIDE	-0.217***	-0.374***	-0.129***	0.483***	0.277***						
ANALYST	0.480***	0.046***	0.120***	-0.103***	-0.245***	-0.051***					
CHINEXT	-0.176***	-0.332***	-0.084***	0.286***	0.216***	0.453***	-0.044***				
QFII	0.106***	-0.001	0.043***	-0.078***	-0.037***	-0.058***	0.212***	-0.045***			
LNMC	0.533***	0.021***	0.241***	-0.126***	-0.053***	-0.057***	0.657***	-0.061***	0.189***		
AGE	0.089***	0.144***	0.123***	0.026***	-0.143***	-0.128***	0.131***	-0.117***	-0.020***	0.111***	

Notes: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

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