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Institutional ownership and corporate governance of public companies in China[☆]

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ABSTRACT

Using information on the identity and percentage ownership of the ten largest shareholders in Chinese nonfinancial firms during the period of 1999–2010, we examine institutional investors' preferences for specific firm characteristics and investigate how institutional ownership affects firm value. We classify institutional investors under two dimensions: (1) pressure-sensitive (or *grey*) institutions versus pressure-insensitive (or *independent*) institutions, and (2) state-owned versus privately-owned institutions. We find that institutional ownership is positively associated with company Tobin's *Q*, and the effect is mainly driven by the ownership of *independent* institutions, rather than driven by the ownership of privately-owned institutions. Moreover, this positive relation gets stronger after 2005, when significant progress has been made in strengthening the legal and institutional foundation of the capital markets in China. In contrast, ownership by *grey* institutions is in general negatively associated with firm performance, manifesting the value-destructive consequences of the conflicts of interest these investors cultivate. The significant change after 2005 suggests that the enhanced external legal and corporate governance environment is critical for *independent* institutions' monitoring role to strengthen.

1. Introduction

In a survey of corporate governance literature, [Shleifer and Vishny \(1997\)](#) point out that in many regions of the world, corporations often have large shareholders playing active roles in corporate governance. Among large shareholders, many are institutional investors such as mutual funds, pension funds, commercial banks and insurance companies. The role of large institutional investors in corporate governance has received growing attention from researchers, firm managers, and securities regulators. As [Ruiz-Mallorquí and Santana-Martín \(2011\)](#) summarize, institutional investors play three potential roles: (1) an active monitoring role that positively affects firm performance, (2) short-term passive role that reduces their incentive to positively affect firm performance, and (3) cooperating with firm managers to take private benefits at the expense of minority shareholders. However, the positive effects of institutional investors may not be fully realized if the legal protection of their voting rights is lacking, or if large shareholders' conceivable incentive to expropriate wealth from other stakeholders is not well contained ([Li et al., 2006](#)).

The determinants of a firm's institutional ownership have been examined by numerous studies (e.g., [Gompers and Metrick, 2001](#); [Dahlquist and Robersson, 2001](#); and [Ferreira and Matos, 2008](#)). These studies find that institutional investors have a strong

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preference for the stocks of large and widely held firms, of firms in countries with strong disclosure standards, and of firms located near their home market. Another strand of literature links a firm's corporate governance quality to its institutional ownership. Results from [Giannetti and Simonov \(2006\)](#), [Li et al. \(2006\)](#) and [Chung and Zhang \(2011\)](#) suggest that institutional investors prefer stocks of companies with good governance structure.

In addition to the determinants of institutional ownership, previous studies have examined the effect of institutional investors on firm valuation and performance. For a sample of U.S. S&P 100 firms, [Cornett et al. \(2007\)](#) find that only institutions that have no potential business relationship with the companies in which they hold shares (also called “independent” institutional investors by [Cornett et al., 2007](#)) show a positive effect on the firms' operating cash flow return on assets, while institutions that have some business relationship with the firms they invest in (called “grey” institutional investors by [Cornett et al., 2007](#)) do not significantly affect the firms' operating cash flow returns. For non-US firms, [Yuan et al. \(2008\)](#) and [Lin et al. \(2009\)](#) examine the relation between institutional ownership and firm performance for publicly traded Chinese companies, [Ruiz-Mallorquí and Santana-Martín \(2011\)](#) study this relation for a sample of Spanish firms, and [Muniandy et al. \(2016\)](#) examine the monitoring role of institutional investors for Australian firms. Their findings are consistent with an effective monitoring role of *independent* institutional investors and a compromised monitoring role of *grey* institutional investors.

In summary, the existing empirical studies that employ a firm's corporate governance characteristics to explain its institutional ownership are based on samples of companies from developed economies (e.g., [Giannetti and Simonov, 2006](#); [Li et al., 2006](#); [Chung and Zhang, 2011](#)). Despite the fact that institutional investors become increasingly significant in emerging markets, how a firm's corporate governance characteristics determine its institutional ownership in emerging markets has not been studied. Our paper contributes to the literature in the following ways. First, we examine the determinants of various types of large institutional ownership in China—one of the largest emerging economies in the world—while considering the corporate governance characteristics of the companies. We contribute to the literature by ascertaining how a firm's corporate governance features and other firm characteristics affect institutional ownership.

Second, unlike previous studies that examine the effect of a single type of institutional ownership of Chinese firms at a time (e.g., [Lin et al., 2009](#) on bank ownership and [Yuan et al., 2008](#) on mutual fund ownership), we study the effects of various institutional ownership on firm performance. We classify institutional investors under two dimensions: (1) pressure-sensitive (or *grey*) institutions versus pressure-insensitive (or *independent*) institutions, and (2) state-owned versus privately-owned institutions. As [Shleifer and Vishny \(1997\)](#) point out, state-owned firms are technically “controlled by the public,” and they are run by political bureaucrats who can be thought of as having “extremely concentrated control rights, but no significant cash flow rights.” This suggests that state-owned institutions may have different incentives from those of privately-owned institutions when monitoring the firms they invest in. Our paper is the first to offer evidence on the determinants of state versus private institutional ownership and their effects on firm performance. Our research contributes to the literature by addressing whether independent versus grey or state versus private institutional ownership matters in explaining how the monitoring role of various institutional ownership affects firm performance.

Third, the rapid growth of institutional investors in the Chinese market provides us with an excellent opportunity to investigate the effect of the external corporate governance environment on the monitoring function of institutional investors. In a country-level study for a sample of 45 countries,¹ [Li et al. \(2006\)](#) find that strong governance environments encourage greater block holdings of institutional investors. However, their study does not directly examine the relation between changes in macro governance environments and the impact of institutional ownership on firm performance. There is also a lack of firm-level study on how the change in external governance environments affects the monitoring role of institutional investors. Our paper fills this gap by examining how the evolution of legal and institutional environments in China affects the ability of institutional investors to influence firm performance. [Herd et al. \(2010\)](#) document that, driven by regulatory reforms, institutional investors in China have grown rapidly since 2005, after which significant progress has been made in strengthening the legal and institutional foundation of the capital markets in China. We examine whether the monitoring role of institutional investors strengthens and becomes more effective after 2005 for Chinese companies.

Our sample includes 1264 publicly-traded Chinese firms from 1999 to 2010. The results indicate that institutional investors in China invest less in firms, in which the largest shareholder holds a more dominant position than the second-largest shareholder. This result is consistent with the view that institutional investors in China mainly enjoy security benefits, which accrue to all shareholders, and they are reluctant to hold shares of firms with weaker corporate governance.

We also find that, except for state-owned institutional investors, institutional investors on average prefer large and older firms with lower stock return volatility. This is consistent with the conjecture that institutional investors hold greater shares in larger, more mature, and safer firms to be prudent. However, we find evidence that state-owned institutions prefer to hold stocks with greater stock return volatility. This suggests that state-owned institutional investors are less concerned about being prudent than privately-owned institutional investors.

Moreover, our findings suggest that *grey* institutions and *independent* institutions exert very different impacts on the value of the companies they invest in. There is evidence that the positive relation between Tobin's Q and institutional ownership is mainly driven by the ownership of independent institutions. Moreover, this positive relation mainly comes from the period after 2005, when significant progress has been made in strengthening the legal and institutional foundation of the capital markets in China ([Herd et al., 2010](#)). We further partition institutional investors into state-owned and privately-owned institutions. The results confirm that it is the institutional investors' sensitivity to pressure from management, rather than their private or state ownership, that determines their

¹ China is not included in the sample of this study.

ownership's impact on the market performance of Chinese companies.

In addition, we find that *independent* institutions are able to influence management and enhance shareholder value, while ownership by *grey* institutions is in general negatively associated with firm performance. These results are robust to potential endogeneity of institutional ownership and to different model specifications. The significant change after 2005 suggests that the enhanced external legal and corporate governance environment is critical for institutions' monitoring to become effective.

Our paper is organized as follows. [Section 2](#) discusses the theory and testable hypotheses. [Section 3](#) describes our data and variable construction, and [Section 4](#) presents the empirical findings. We conclude with [Section 5](#).

2. Theory and testable hypotheses

Our testable hypotheses address three issues. First, we draw on the theories in [Giannetti and Simonov \(2006\)](#) and [Gompers and Metrick \(2001\)](#) to develop our hypothesis on the determinants of different types of institutional ownership. [Giannetti and Simonov \(2006\)](#) argue that not all large shareholders have the incentive to actively influence managerial decisions. Security benefits accrue to all shareholders, whereas private benefits are only enjoyed by shareholders who are well connected to the management. If different categories of investors expect different returns, depending on the quality of corporate governance, they should exhibit different preferences for this firm factor. Consistent with their argument, [Giannetti and Simonov \(2006\)](#) find that for Swedish-listed companies, investors who enjoy only security benefits (i.e., small domestic individual investors, domestic institutional investors, and foreign individual and foreign institutional investors) are reluctant to hold stocks of companies where the extraction of private benefits is expected to be large; whereas investors who may extract private benefits (i.e., large domestic individual investors) do not avoid companies with weak corporate governance.

[Chen et al. \(2007\)](#) find evidence that for a sample of U.S. companies, large long-term independent institutional investors may not only monitor and influence firm managers, but also generate information that allows them to adjust their portfolios to take private benefits. Along the lines of the discussion in [Giannetti and Simonov \(2006\)](#), these large long-term independent institutional investors may not avoid companies with weak corporate governance either. However, for our sample of Chinese companies, the percentage ownership of independent institutional investors among the top ten shareholders averages 8.3% over our sample period (see [Table 2](#)). This is below the 10% cutoff value for an institution to be considered a large investor by [Giannetti and Simonov \(2006\)](#), and is small relative to the average of 22% share ownership controlled by the five largest institutional investors for the U.S. sample in [Chen et al. \(2007\)](#). Moreover, [Mei et al. \(2009\)](#) document that the share turnover of Chinese A shares could be a few times as high as a typical stock listed on the New York Stock Exchange. It is thus less likely for Chinese independent institutional investors to be large enough and hold a significant long-term position as compared with the sample of Swedish investors in [Giannetti and Simonov \(2006\)](#) and the sample of U.S. investors in [Chen et al. \(2007\)](#). We thus expect the securities benefits accruing to the Chinese institutional investors to be greater than the private benefits. We state our first hypothesis on how a firm's corporate governance characteristics affect its institutional ownership as follows.

Hypothesis 1. Institutional investors in China are reluctant to hold shares of firms with weaker corporate governance.

Moreover, [Gompers and Metrick \(2001\)](#) argue that the legal environment that institutional investors face may require them to be prudent. If being prudent is important for Chinese institutions, we expect institutional ownership to be positively related to firm age and negatively related to stock return volatility. Additionally, firms that are members of the *CSI 300* index are expected to attract more institutional investors than non-members. [Gompers and Metrick \(2001\)](#) also suggest that institutional investors with liquidity and transaction-cost motives may prefer firms with greater share turnover. Our second hypothesis below relates to how other firm characteristics, apart from corporate governance quality, affect institutional ownership.

Hypothesis 2. Institutional ownership of Chinese companies is greater for firms with larger size, older age, greater liquidity, and less stock return volatility; and members of the *CSI 300* index attract greater institutional ownership than non-members.

Our third testable hypothesis involves the effect of institutional ownership on firm performance and is based on theories of [Shleifer and Vishny \(1986 and 1997\)](#), [Almazan et al. \(2005\)](#), and [Cornett et al. \(2007\)](#). Shleifer and Vishny (1986) argue that the benefits to a firm from having large shareholders are the incentives of these large investors to increase firm value. The costs of having large shareholders result from their incentive to expropriate wealth from other stakeholders. As [Cornett et al. \(2007\)](#) explain, pressure-sensitive grey institutional investors might be less willing to challenge management decisions because of their existing or potential non-equity related business relations with the firms. Investors likely to have a business relationship with the firm, in addition to being shareholders, e.g. lending institutions, insurance companies, etc. have a competing interest to influence management towards sustaining and expanding their non-equity related business relationship. Developing their business relationship can dominate over the institutional investor's interest as a shareholder, and might not necessarily align with other shareholders' interests. For example, banks as lenders are naturally interested in assuring the uninterrupted service of their extended debt obligations, and therefore have an interest to encourage their borrowers to undertake safer investment projects with steadier cash flows. To protect their lending business, banks might even be compelled to steer management away from higher risk-higher net present value investment projects, in favor of lower risk-lower net present value projects, leading to reduction of company value. On the other hand, pressure-insensitive independent investors have greater incentive to monitor and impose control on firm management. The grey financial institutions in our sample include banks, insurance companies and credit cooperatives, because they may offer non-equity related services to the firms they hold a stake in. The independent financial institutions include pension funds, asset management, investment advisory, and venture capital firms because they tend to have insignificant non-equity related business with the firms they

invest in. We thus state our third hypothesis as follows.

Hypothesis 3. Pressure-sensitive grey institutions' effect on firm performance is negative or neutral, while pressure-insensitive independent institutions' effect on firm performance is positive.

Our fourth hypothesis is on the difference between the impact of state-owned and privately-owned institutional investors. State ownership is pervasive among public companies in China and the state retains the ultimate control over many partially-privatized companies. The Chinese securities industry remains largely state-owned even after significant restructuring since 2004 (Herd et al., 2010).² However, previous studies have not examined whether state-owned or privately-owned institutional investors have different impact on firm performance. If managers at state-owned companies have greater incentive to pursue their own agenda at the expense of other stakeholders (Shleifer and Vishny, 1997), state-owned institutions may have less incentives than those of private institutions to monitor the firms they invest in. We test the difference in effects between state-owned versus privately-owned institutional investors on firm performance with the following hypothesis.

Hypothesis 4. The positive effect of institutional ownership on firm performance is greater for private institutional ownership than it is for state institutional ownership.

Our fifth hypothesis is on how the external corporate governance environment affects the monitoring role of institutional ownership. Li et al. (2006) argue that the monitoring effect of institutional investors gets stronger when the macro environment improves the infrastructure to increase monitoring effectiveness and efficiency. To the best of our knowledge, no previous research has examined how changes in the legal and institutional environment in China affect the impact of various types of institutional investors on firm performance. As Herd et al. (2010) point out, the financial reforms in China have accelerated and broadened since 2005. The Securities Law and Company Law were amended in 2005 and became effective on January 1, 2006. The amended Securities Law reforms the legal framework for governing exchange listing, securities issues and corporate disclosure. The amended Company Law provides major reform of the legal framework for corporations, corporate governance, and responsibilities for board members and senior management. In addition, the Enterprise Bankruptcy Law of 2007 and the Property Law of 2007 provide legal framework for bankruptcy and property rights. As a result, the enhanced legal and institutional environment after 2005 brings Chinese capital markets more in line with international best practices. We expect these positive changes in the legal and institutional environment to give private institutional investors greater incentive to monitor managerial behavior.

Hypothesis 5. The enhanced external legal and corporate governance environment in China after 2005 improved the monitoring role of institutional investors.

3. Data and variable construction

The data for our empirical tests come from PACAP-CCER Greater China Database. The *Corporate Governance* file offers annual information on the names, types, and percentage holdings of the ten largest shareholders of all public companies with A or B traded shares on the stock exchanges in Shanghai and Shenzhen since 1994. In addition, the file offers information on the board of directors and senior management, allowing the construction of internal corporate governance measures. The *Industrial Firms Annual – A/B Shares* file of the PACAP-CCER Greater China Database is the source of annual accounting information. We merge the *Corporate Governance* file and the *Industrial Firms Annual – A/B Shares* file using the unique company identifier (COID) and the corresponding year (YEAR).

3.1. Institutional ownership measures

We use the information provided in the *Corporate Governance* file to construct our measures of institutional ownership, as well as the corporate governance variables for our tests. Using the names and types of the ten largest investors in each public firm each year we are able to manually identify the financial institutions among them, to determine if they are state-owned or privately-owned, as well as to classify each financial institution into one of the following categories: banks, bank-managed investment funds, credit cooperatives, insurance companies, investment advisors, asset management companies, pension funds, and venture capital companies. Having determined the investors' type, we use the information on their specific percentage holdings to calculate the total institutional ownership in each public company in a given year. The percentage holdings represent the percentage of shares held by a particular investor as a fraction of the total shares as disclosed in the firm's annual report at the end of the fiscal year. Table 1 summarizes the information on institutional ownership in total, as well as for each specific type of institutional investor. Financial institutions among the top ten largest shareholders of the companies on average account for 9.5% of the firms' ownership. Specific to China is the non-trivial percentage ownership by state-owned financial institutions amounting to an average of 2.8%. Moreover, the financial institution's ownership in our sample is heavily dominated by domestic institutions. The average percentage ownership for domestic institutions is 9.1%, while the average percentage ownership for foreign institutions is only 0.4% (not reported in Table 1). The equally-weighted average percentage ownership by domestic financial institutions in China is largely in line with reported

² Lian and Chen (2017) suggest that, state-owned companies may receive more government support than the privately-owned companies during the internationalization process of Chinese firms.

Table 1

Average percentage ownership in public firms, 1999–2010.

The descriptive statistics are computed over the entire estimation sample, which comprises of 10,180 firm-year observation from 1264 firms.

Ownership group	Mean	Median	Min	Max
The ten largest shareholders	56.5	57.5	4.0	99.5
Financial institutions	9.5	4.2	0	86.9
Pressure-insensitive (<i>independent</i>) financial institutions (<i>IO_IND</i>)	8.3	3.1	0	86.9
Pressure-sensitive (<i>grey</i>) financial institutions (<i>IO_GREY</i>)	1.1	0	0	59.1
Private financial institutions (<i>IO_PR</i>)	6.7	2.8	0	82.1
State-owned financial institutions (<i>IO_STATE</i>)	2.8	0	0	86.9
Private investment trusts, pension funds, asset management, investment advisory, and venture capital companies (<i>independent</i>) (<i>IO_PR_IND</i>)	5.7	2.0	0	82.0
Private banks, insurance companies, and credit cooperatives (<i>grey</i>) (<i>IO_PR_GREY</i>)	1.0	0	0	54.1
State-owned investment trusts, pension funds, asset management, investment advisory (<i>independent</i>) (<i>IO_STATE_IND</i>)	2.6	0	0	86.9
State-owned banks, and insurance companies (<i>grey</i>) (<i>IO_STATE_GREY</i>)	0.1	0	0	52.9
Other investors ^a	47.1	49.5	0	95.9

^a The other investors' category includes non-financial institutions (for-profit), direct state ownership, non-profit organizations, individual investors, and unclassified investors. The latter group comprises of investors, whose names were either incorrectly entered, e.g. meaningless words or only fragments thereof, or the name was completely uninformative about the type of the investor.

equally-weighted percentage ownership averages for domestic institutions in other non-U.S. countries – Ferreira and Matos (2008) report an equally-weighted average percentage ownership of 7.4% for domestic, non-U.S. financial institutions for a sample covering 27 countries over the period 2000–2005.

We use the following procedures to manually obtain the institutional ownership variables. First, we distinguish between financial institutions and other investors, where the group of other investors includes for-profit non-financial institutions (e.g. manufacturing firms), direct state ownership, non-profit organizations (e.g., university or foundation endowments), individual investors, as well as investors that we were not able to classify in any of the above groups.³ Next, we distinguish between privately-owned and state-owned financial institutions:

- State-owned financial institutions (*IO_STATE*), are identified as financial institutions owned by the state or a state legal entity.
- Privately-owned financial institutions (*IO_PR*) are all financial institutions not owned by the state or by a state legal entity.

Finally, in line with Almazan et al. (2005), we consider different types of financial institutions with respect to their potential for business ties with the corporations they invest in:

- Grey, or pressure-sensitive, financial institutions (*IO_GREY*) include banks, insurance companies, and credit cooperatives.
- Independent, or pressure-insensitive, financial institutions (*IO_IND*) include pension funds, asset management, investment advisory, and venture capital firms.

The identification of these types of financial institutions allows us to additionally identify the intersections between them, e.g. the private grey (*IO_PR_GREY*), the private independent (*IO_PR_IND*), the state grey (*IO_STATE_GREY*), and the state independent institutions (*IO_STATE_IND*).

One complication in the measurement of institutional ownership through direct shareholdings would be the possible wide divergence between cash flow rights and voting rights held by investors. Tian (2001) reports that the separation of cash flow rights and voting rights in public firms in China through pyramids and cross-shareholding is marginal.⁴ Moreover, the China Securities Regulatory Commission (CSRC) prohibits the issuance of shares with differential voting rights, which prevents the divergence of cash flow and voting rights held by direct shareholders. Therefore, we can expect that the direct percentage ownership will closely reflect the voting rights held by an investor in a public company in China.

3.2. Firm characteristics and other control variables

We start with the examination of the preferences of institutional investors for various firm characteristics and then examine if these preferences differ across different types of institutional investors. Our dependent variable is the fractional ownership held by financial institutions in a given public company in a given year. The explanatory variables represent various firm characteristics that potentially could attract or repel institutional investors.

³ We use the names of the investors to determine their type and in some rare occasions the listed name is incomplete, or is completely uninformative about the type of the investor, e.g. “New evidence Joint”, “Service to the East”, “Nuo'an value”, “National Shareholders”, etc. Such cases are tagged as unknown type.

⁴ Tian, L. (2001), *Government Shareholding and the Value of China's Modern Firms*, William Davidson Institute Working Paper Number 395, the University of Michigan Stephen M. Ross Business School.

3.2.1. Internal corporate governance and ownership structure

Ownership in public companies in China is relatively concentrated even when the state is not the largest shareholder. It is not unusual for the largest shareholder to have a stake exceeding 50% of the outstanding shares – the mean percentage ownership of the largest shareholder in our sample is 39% with a median of 37% stake. Dominant shareholders are often tempted to extract company resources pursuing their own interests at the expense of small shareholders. The extraction of company resources is more likely if there is insufficient legal protection of the interests of small shareholders, if monitoring is inefficient, and if ownership is dispersed, making it costly for smaller shareholders to defend their interests. The presence of a larger shareholder, besides the top shareholder, is likely to improve monitoring oversight and to make illegal extraction of company resources more difficult. In a study of the impact of corporate governance quality on the market performance of Chinese firms, Bai et al. (2004) find that the presence of large shareholders, besides the top shareholder, is positively associated with the firm's Tobin's Q. Institutional investors might find that their interests are better protected in companies where the top largest shareholders are closely monitoring each other. To control for the company ownership structure we include the logarithm of the ratio of the percentage holding of the largest shareholder divided by the percentage holding of the second-largest shareholder (*LZINDEX*). Higher values of *LZINDEX* are associated with a more dominant position of the largest shareholder.

The relative quality of corporate governance in a company might be another important characteristic for institutional investors. Following Bai et al. (2004), we include the fraction of independent members of the board of directors (*INDPT*) as a measure of the quality of monitoring provided by the board of directors. A larger fraction of independent directors on the board is expected to facilitate monitoring and mitigate mishandling of company resources.

Another measure of corporate governance quality is the concentration of power in the CEO position by allowing the same person to occupy the CEO and the Chairman of the board of directors' positions. The intuition is that the quality of monitoring by the board is compromised when the CEO, who is supposed to be monitored, serves also as the Chairman of the monitoring body. Bhagat and Bolton (2008) find that CEO-Chairman role separation is positively associated with contemporaneous and subsequent operating performance. Alternatively, some authors have argued that having the CEO serve as the Chairman of the board streamlines strategic decision-making and corporate policy implementation and prevents value-destructive conflicts between senior management and the board of directors. To control for institutional investors' preferences on CEO-Chairman separation we include a dummy variable (*CHAIRCEO*) equal to one if the positions of the CEO and the Chairman are held by the same person, and equal to zero, otherwise.

In China, the state government often retains the ultimate control over many partially-privatized companies. Managers of a state-owned company may make suboptimal decisions that result in inefficiencies in the company operations (Shleifer and Vishny, 1997). Moreover, property rights theory (Alchian and Demsetz, 1972) argues that fully-privatized firms would have superior performance than government-controlled firms, because the control and income rights, given to private shareholders, would drive these firms towards maximizing profit objectives. Therefore, whether the state is the ultimate controlling shareholder in a public company might be an important characteristic for performance-driven institutional investors. The Corporate Governance file provides information on the type of the ultimate controlling shareholder of each public firm, which we use to construct an indicator variable (*STATE*) taking the value of one if the ultimate controlling shareholder is the state, and zero otherwise.

State ownership in public companies can take various forms in China. The local, provincial, and central governments often own stakes in publicly traded companies. The State-owned Assets Supervision and Administration Commission (SASAC) is the government body responsible for managing a selected group of strategically important, state-owned enterprises. SASAC's primary duty is to perform investor's responsibilities, supervise, and manage the state-owned assets in these enterprises. The Commission is legally charged with the preservation and enhancement of value of the state-owned assets and plays a central role in the governance of these enterprises. Currently, there are 117 companies designated as strategically important and called Central State-Owned Enterprises (Central SOEs). They represent the most important industries in the economy – energy, mining, metallurgy, defense, chemicals, manufacturing, food, transportation, and communications, and the SASAC publishes a list of them on its web site.⁵ Note, that the Central SOEs are a very small, elite group of companies, representing only 5.2% of our sample, while the group of companies with the state as the ultimate controlling shareholder represents 72.5% of our sample. The companies, identified by the government as strategically important, can be expected to benefit from preferential government policies and protection. Therefore, in the set of explanatory variables, we include a dummy variable (*STRATEGIC*) taking the value of one if a company belongs to the group of strategically important enterprises, and taking the value of zero otherwise.

3.2.2. Stock market variables

Stock market information is derived from the *Monthly Stock Returns* and the *Monthly Market Returns* files of the PACAP-CCER Greater China Database. Gompers and Metrick (2001) argue that institutional investors have fiduciary duties of being prudent and prefer investing in older firms with higher returns, lower stock return volatility and greater liquidity. To control for institutional investors' appetite for idiosyncratic risk we include the residual variance from a domestic market model (*SIGMA*) as one of the explanatory variables. We estimate a simple, one-factor, market model using information on individual company monthly stock returns in combination with the corresponding monthly stock market return to derive a measure of company idiosyncratic risk. Ferreira and Matos (2008) find that firms with larger idiosyncratic risk attract larger stakes by overseas institutional investors.

Liquidity is another equity characteristic that might be potentially attractive for institutional investors. Ferreira and Matos (2008)

⁵ The list of Central SOEs managed by SASAC is available at: <http://www.sasac.gov.cn/n2963340/n2971121/n4956567/4956583.html>, accessed on March 20, 2014.

test whether liquidity, as measured by equity trading volume, is an important characteristic attracting international institutional investors and find no evidence supporting its importance. However, Falkenstein (1996), Zhang and Yan (2009), and Chung and Zhang (2011) find that U.S. institutional investors hold larger stakes in companies with higher trading volume. To examine institutional investors' preference for liquidity, we include as an explanatory variable the average monthly trading volume over the past year divided by the number of tradable shares outstanding at the end of the year (*TURNOVER*).

The stock market control measures are calculated on a rolling monthly basis and then the values for the month, when the firm's financial statements are published, are matched with the accounting data set and the corporate governance data set using the unique company identifier (*COID*) and the corresponding year (*YEAR*).

3.2.3. Other firm characteristics

The size of the company has been found to be an important characteristic attracting larger stakes from institutional investors. Falkenstein (1996), Gompers and Metrick (2001), and Zhang and Yan (2009) find that institutional investors in the U.S. have a strong preference for the equity of large companies. Dahlquist and Roberson (2001) and Ferreira and Matos (2008) extend these findings to institutional investors outside the U.S. The equity of larger companies usually characterizes with higher liquidity and lower transaction costs, which make it more attractive to institutional money managers. We use the natural logarithm of market capitalization to measure firm size (*SIZE*).

Firms with lower Tobin's Q (*TBQ*) derive larger percentage of their market value from assets in place, while those with higher Tobin's Q derive a larger portion of their market value from growth options. Tobin's Q is measured as the market value of equity plus book value of assets minus book value of equity divided by the book value of assets. Therefore, a preference for low or high *TBQ* firms would reveal the institutional investors' preference for assets in place versus growth options. Falkenstein (1996) and Zhang and Yan (2009) find evidence for US institutional investors' preferences for high book-to-market (value) stocks. Ferreira and Matos (2008) confirm this finding for US institutional investors, investing in non-US stocks, but also present evidence that non-US institutions are attracted by low book-to-market (growth) stocks when investing on their domestic market. In order to examine institutional investors' preference for value versus growth stocks, we include Tobin's Q (*TBQ*) as an explanatory variable.

Falkenstein (1996) and Zhang and Yan (2009) argue that firms with a longer history as public companies are associated with less information asymmetry and present evidence that institutional investors are attracted to hold larger stakes in such companies. The preference for more established versus younger, newly listed firms is captured by the inclusion of the logarithm of firm age (*AGE*) among the explanatory variables. Firm age is measured as the number of years since the firm's incorporation.

Zhang and Yan (2009) find strong evidence for institutional investors' preferences for stocks included in the S&P500 index. Ferreira and Matos (2008) confirm this result, finding that overseas institutional investors prefer stocks that are members of the MSCI index. Institutional investors might be attracted to invest in the stock of large, liquid, and prominent companies, whose characteristics are often captured by the membership in a leading stock index. The CSI300 index is a free float-weighted index that consists of the top 300 A-share stocks, listed on the Shanghai or Shenzhen Stock Exchanges. The index is compiled by China Securities Index Company and has a base level of 1000 on 12/31/2004.⁶ To examine if institutional investors are attracted by index membership, we include a dummy variable (*CSI300*) equal to one, if a company is member of the CSI300 index in a particular year, and equal to zero otherwise.

We include the current year return on assets (*ROA*) as one of the explanatory variables to capture the institutional investors' preference for superior accounting performance. The return on assets is measured as the net income divided by total assets.

Another firm characteristic that could potentially affect institutional investors' preferences is the company capital structure. Badrinath et al. (1996) argue that institutional investors prefer more established and safer firms with low return volatility and low financial leverage. However, Chung and Zhang (2011) find strong evidence for a positive association between institutional ownership and financial leverage in a sample of U.S. public firms. To control for the effect of leverage on investors' preferences we include the total debt-to-assets ratio of a company (*LEVERAGE*) as one of the explanatory variables.

Lakonishok et al. (1994) argue that both individual and institutional investors have preference for 'glamor' stocks - e.g. stocks with low book-to-market and earnings-to-price ratios, and high sales growth. Ferreira and Matos (2008) confirm this argument finding that, regardless of their type, institutional investors prefer stocks characterizing with higher sales growth. We control for the company's growth opportunities by including its annual sales growth (*SALESGROWTH*) among the explanatory variables.

Finally, companies with significant cash holdings could potentially attract investors in expectation of equity distributions. Ferreira and Matos (2008) report evidence of strong association between institutional ownership and company cash holdings. We include the ratio of cash and short-term investments (e.g. marketable securities) to total assets (*CASH*) to control for its effect on institutional investors' preferences.

3.3. Sample and descriptive statistics

Our sample covers publicly traded non-financial firms over the period from 1999 to 2010. The Securities Law of the Peoples' Republic of China was adopted on December 29th, 1998 and went into effect on July 1st, 1999, organizing the trade in corporate securities and promoting the role of institutional investors in the country. The firms in our sample have issued either A, or B, or both

⁶ Information on the constituencies of the CSI300 index was obtained from China Securities Index Co. Ltd., which publishes a list of their names on its web site: <http://www.csindex.com.cn>.

Table 2

Summary statistics.

The table presents summary statistics of variables for the sample. The variables are: total institutional ownership (*IO_TOTAL*), ownership by state institutions (*IO_STATE*), ownership by private institutions (*IO_PR*), ownership by independent institutions (*IO_IND*), ownership by grey institutions (*IO_GREY*), log of market capitalization in thousands RMB (*SIZE*), an indicator variable equal to 1 if the ultimate controlling entity is the state, and equal to 0 otherwise (*STATE*), an indicator variable equal to 1 if the firm belongs to the government list of strategic companies, and equal to 0 otherwise (*STRATEGIC*), the logarithm of the ratio of the percentage ownership by the largest shareholder divided by the percentage ownership by the second-largest shareholder (*LZINDEX*), the fraction of independent members of the board of directors (*INDPT*), a dummy variable equal to 1 if the CEO and the Chairman positions are occupied by the same person, and equal to 0 otherwise (*CHAIRCEO*), firm age (*AGE*), a dummy variable equal to 1 if the firm is a member of the CSI 300 index, and equal to 0 otherwise (*CSI300*), the return on assets (*ROA*), the total debt-to-assets ratio (*LEVERAGE*), the firm's sales growth (*SALESGROWTH*), the cash and short term investments-to-assets ratio (*CASH*), the average monthly stock trading volume over the past 12 months divided by the total number of tradable shares (*TURNOVER*), the idiosyncratic variance of stock returns estimated from a domestic market model (*SIGMA*), Tobin's *Q* measured as the market value of equity plus book value of assets minus book value of equity divided by the book value of assets (*TBQ*), the 4-digit GICS industry median Tobin's *Q* (*INDUSTRYQ*), and the ratio of inventories and long-term investments to total assets (*TANGIBLE*). There are 10,180 observations in the sample representing 1264 unique firms.

Variable	Mean	Std. Dev.	Min	Max
<i>IO_TOTAL</i>	9.49%	0.135	0%	86.94%
<i>IO_STATE</i>	2.80%	0.096	0%	86.94%
<i>IO_PR</i>	6.69%	0.100	0%	82.12%
<i>IO_IND</i>	8.34%	0.130	0%	86.94%
<i>IO_GREY</i>	1.15%	0.035	0%	59.06%
<i>LZINDEX</i>	2.066	1.568	0	7.824
<i>INDPT</i>	0.459	0.259	0	1
<i>CHAIRCEO</i>	0.112	0.315	0	1
<i>SIZE</i>	14.845	0.993	12.826	18.239
<i>AGE</i>	11.636	4.091	3	30
<i>CSI300</i>	0.150	0.357	0	1
<i>TURNOVER</i>	0.371	0.275	0.017	1.355
<i>SIGMA</i>	0.133	0.140	0.001	1.640
<i>TBQ</i>	2.474	1.602	1.013	11.406
<i>STATE</i>	0.725	0.446	0	1
<i>STRATEGIC</i>	0.052	0.222	0	1
<i>ROA</i>	0.024	0.069	-0.355	0.235
<i>LEVERAGE</i>	0.516	0.187	0.064	0.962
<i>SALESGROWTH</i>	0.232	0.674	-0.786	6.589
<i>CASH</i>	0.152	0.109	0.003	0.584
<i>INDUSTRYQ</i>	2.186	0.323	1.787	3.290
<i>TANGIBLE</i>	0.410	0.262	0.013	0.944

types of shares. To reduce the impact of data entry mistakes, we remove firm-year observations with unreasonable values. In particular, we remove observations with recorded negative percentage ownership and percentage ownership exceeding 100%. We also remove observations for which the market value of equity has dropped below its book value, where the ratio of the percentage ownership by the largest shareholder to the percentage ownership by the second-largest shareholder is less than one, as well as firms with only one record of data. Finally, to be included in our sample a firm needs to have non-missing values for the regression variables necessary for the tests. To reduce the influence of outliers, we winsorize the accounting variables at the 0.5 and the 99.5 percentiles. We end up with a sample of 10,180 firm-year observation representing 1264 individual firms.

Table 2 presents summary statistics for two groups of variables for our sample. The first group contains variables measuring institutional ownership: total institutional ownership (*IO_TOTAL*), ownership by state institutions (*IO_STATE*), ownership by private institutions (*IO_PR*), ownership by independent institutions (*IO_IND*), and ownership by grey institutions (*IO_GREY*). Ownership structure measures, internal corporate governance measures, stock market measures, and other firm characteristics comprise the second group of variables.

4. Empirical results

4.1. Institutional investors' preferences

We start with investigating what firm characteristics attract institutional investors. Because of the censored nature of the percentage institutional ownership as dependent variable, we estimate a Tobit model and report the results in Table 3. The dependent variables, in the presented estimations, are measures of institutional ownership, while the explanatory variables are various firm characteristics. All specifications include time-fixed effects ($\Sigma\varphi_t$). In particular, the specification we estimate is the following:

Table 3

Determinants of institutional ownership – Tobit model.

The table presents coefficient estimates from Tobit regressions where the dependent variables are the percentage ownership by *private* financial institutions (*IO_PR*), by *state* financial institutions (*IO_STATE*), by *independent* financial institutions (*IO_IND*), by *grey* financial institutions (*IO_GREY*), by *private independent* financial institutions (*IO_PR_IND*), and by *private grey* financial institutions (*IO_PR_GREY*). Firm-level explanatory variables include the logarithm of the ratio of the percentage ownership by the largest shareholder divided by the percentage ownership by the second-largest shareholder (*LZINDEX*), the fraction of independent members of the board of directors (*INDPT*), a dummy variable equal to 1 if the CEO and the Chairman positions are occupied by the same person, and equal to 0 otherwise (*CHAIRCEO*), log market capitalization (*SIZE*), firm age (*AGE*), a dummy variable equal to 1 if the firm is a member of the CSI 300 index, and equal to 0 otherwise (*CSI300*), the average monthly stock trading volume over the past 12 months divided by the total number of tradable shares (*TURNOVER*), the idiosyncratic variance of stock returns (*SIGMA*), Tobin's *Q*, an indicator variable equal to 1 if the ultimate controlling entity is the state, and equal to 0 otherwise (*STATE*), an indicator variable equal to 1 if the firm belongs to the government list of strategic companies, and equal to 0 otherwise (*STRATEGIC*), the return on assets (*ROA*), the total debt-to-assets ratio (*LEVERAGE*), the firm's sales growth (*SALESGROWTH*), and the cash and short term investments-to-assets ratio (*CASH*). All equations include year dummies.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	IO_PR	IO_STATE	IO_IND	IO_GREY	IO_PR_IND	IO_PR_GREY
<i>LZINDEX</i>	-0.017*** [-11.251]	-0.029*** [-4.575]	-0.017*** [-6.951]	-0.007*** [-5.154]	-0.014*** [-9.938]	-0.006*** [-4.822]
<i>INDPT</i>	0.008 [0.944]	-0.107*** [-2.716]	-0.015 [-1.292]	0.004 [0.617]	0.000 [0.018]	0.010 [1.521]
<i>CHAIRCEO</i>	0.007 [1.049]	0.011 [0.474]	0.008 [1.000]	0.003 [0.712]	0.006 [0.887]	0.003 [0.950]
<i>SIZE</i>	0.021*** [6.820]	-0.025** [-2.012]	0.010** [2.469]	0.024*** [7.305]	0.016*** [5.246]	0.024*** [6.943]
<i>AGE</i>	0.018** [2.308]	0.045 [1.382]	0.022** [1.974]	0.014*** [2.900]	0.016** [2.073]	0.014*** [3.335]
<i>CSI300</i>	-0.000 [-0.060]	0.016 [0.492]	0.005 [0.480]	-0.008 [-1.569]	0.003 [0.464]	-0.009** [-1.999]
<i>TURNOVER</i>	-0.020** [-2.406]	-0.046 [-1.599]	-0.022** [-2.072]	-0.012** [-2.108]	-0.010 [-1.258]	-0.010** [-1.993]
<i>SIGMA</i>	-0.023* [-1.666]	0.189*** [3.030]	0.035 [1.378]	-0.004 [-0.476]	-0.024* [-1.788]	-0.007 [-0.828]
<i>TBQ</i>	0.004*** [2.870]	-0.002 [-0.470]	0.005*** [3.030]	-0.002 [-1.639]	0.005*** [3.221]	-0.002* [-1.760]
<i>STATE</i>	-0.049*** [-7.607]	0.136*** [7.361]	-0.019*** [-2.670]	0.003 [1.049]	-0.051*** [-8.094]	0.002 [0.676]
<i>STRATEGIC</i>	-0.019*** [-3.730]	-0.063** [-2.158]	-0.046*** [-6.612]	0.006 [0.794]	-0.022*** [-5.168]	0.002 [0.320]
<i>ROA</i>	0.116*** [3.880]	-0.077 [-0.807]	0.120*** [3.219]	0.035* [1.681]	0.109*** [3.711]	0.054*** [2.721]
<i>LEVERAGE</i>	0.039*** [3.060]	0.017 [0.352]	0.046*** [2.664]	0.016 [1.396]	0.035*** [2.858]	0.020* [1.888]
<i>SALESGROWTH</i>	0.001 [0.329]	0.015** [2.383]	0.005* [1.722]	-0.003** [-2.273]	0.002 [0.946]	-0.003*** [-2.806]
<i>CASH</i>	0.009 [0.488]	-0.067 [-0.914]	0.011 [0.423]	-0.025 [-1.574]	0.021 [1.163]	-0.020 [-1.354]
Constant	-0.278*** [-4.894]	0.063 [0.306]	-0.130* [-1.821]	-0.396*** [-7.329]	-0.211*** [-3.896]	-0.397*** [-6.992]
<i>ln(σ)</i>	0.104*** [27.424]	0.305*** [19.557]	0.142*** [27.048]	0.065*** [11.530]	0.101*** [25.183]	0.059*** [10.429]
Observations	10,180	10,180	10,180	10,180	10,180	10,180

****p* < .01, ***p* < .05, **p* < .1, *t*-statistics, robust to clustering in the firm dimension, in brackets.

$$\begin{aligned}
 \text{Inst. Ownership}_{it} = & \beta_0 + \beta_1 LZINDEX_{it} + \beta_2 INDPT_{it} + \beta_3 CHAIRCEO_{it} + \beta_4 SIZE_{it} + \beta_5 AGE_{it} + \beta_6 CSI300_{it} + \beta_7 TURNOVER_{it} + \beta_8 \\
 & SIGMA_{it} + \beta_9 TBQ_{it} + \beta_{10} STATE_{it} + \beta_{11} STRATEGIC_{it} + \beta_{12} ROA_{it} + \beta_{13} LEVERAGE_{it} + \beta_{14} \\
 & SALESGROWTH_{it} + \beta_{15} CASH_{it} + \Sigma \varphi_t + \varepsilon_{it}
 \end{aligned} \quad (1)$$

Following Petersen (2009), Table 3 reports *t*-statistics, robust to clustering in the cross-sectional dimension, in parenthesis, under the corresponding estimates. The dependent variables capture different types of institutional investors. As discussed in Section 3.2, explanatory variables *LZINDEX*, *INDPT* and *CHAIRCEO* measure a firm's corporate governance quality, while *SIZE*, *AGE*, *TURNOVER*, *SIGMA* and *CSI300* are included to test whether institutional investors are prudent and prefer to hold stocks with lower risk and greater liquidity. We also include firm characteristic measures *TBQ*, *STATE*, *STRATEGIC*, *ROA*, *LEVERAGE*, *SALESGROWTH* and *CASH* as control variables in Eq. (1).

Results from Table 3 indicate that the coefficients on *LZINDEX* are significantly negative for all types of institutional investors we investigate, while the coefficients on *CHAIRCEO* and *INDPT* are largely insignificant (except for the significantly negative coefficient

on *INDPT* in Column (2)). The coefficients on *LZINDEX* suggest that institutional investors in China invest less in firms that have a dominant shareholder. This is consistent with [Hypothesis 1](#) which states that institutional investors in China are reluctant to hold shares of firms with weaker corporate governance.

[Hypothesis 2](#) states that institutional ownership of Chinese companies is greater for firms with larger size, greater liquidity and less stock return volatility; and members of the CSI 300 index attract greater institutional ownership than non-members. This prediction is based on the assumption that institutional investors have fiduciary duties of being prudent ([Gompers and Metrick, 2001](#)) and they have greater demand for more liquid stocks. [Table 3](#) presents mixed results for this hypothesis. The positive and statistically significant coefficients on *SIZE* and *AGE* in 5 out of the 6 regressions are consistent with [Hypothesis 2](#) that institutional investors hold greater shares in larger and more mature firms to be prudent. Only for state-owned institutional investors (*IO_STATE* in Column 2) are the coefficient on *AGE* insignificant and the coefficient on *SIZE* significantly negative. The coefficient on *SIGMA* is negative and significant for the *IO_PR* regression but is positive and significant for the *IO_STATE* regression. This suggests that state-owned institutional investors are less concerned about being prudent than privately-owned institutional investors.

The results on the control variables are also interesting. In the first column (*IO_PR*) of [Table 3](#), higher Tobin's Q, leverage, and operating performance (*ROA*), are positively associated with ownership by private institutional investors, while having the state as the ultimate controlling shareholder, being of strategic importance to the government, are negatively associated with private institutional ownership. However, the second column (*IO_STATE*) in [Table 3](#) reveal that unlike privately-owned institutional investors, state-owned institutional investors prefer to hold equity in state-owned firms, firms on the government list of strategically important enterprises, and firms with higher sales growth.

Columns 3 and 4 in [Table 3](#) present the estimation results from specifications where the dependent variables are the percentage ownership by independent (*IO_IND*) and the percentage ownership by grey institutions (*IO_GREY*). Ownership by independent institutions is positively associated with total debt-to-assets ratio (*LEVERAGE*), sales growth ratio (*SALESGROWTH*) and Tobin's Q, while it is negatively associated with the company having the state as the ultimate controlling shareholder (*STATE*), and being of strategic importance to the government (*STRATEGIC*). Ownership by grey institutions (*IO_GREY*) is higher for companies with greater ROA, while it is lower for companies with higher sales growth.

Columns 5 and 6 in [Table 3](#) present results for two groups of investors, formed by partitioning the private institutional investors into private independent (*IO_PR_IND*) and private grey (*IO_PR_GREY*) institutional investors – distinguishing with respect to their sensitivity to pressure on behalf of the company management. As the results indicate, some characteristics are preferred by both groups of investors, both independent and grey private institutional investors prefer higher leveraged firms, as well as firms with superior operating performance (*ROA*). Private independent institutional investors are attracted by firms with high growth opportunities (Tobin's Q), while they avoid firms where the state is the ultimate controlling entity and firms on the government list of strategically important enterprises. In contrast, private grey institutions do not avoid holding stakes in state-owned companies, in the firms on the government list of strategically important enterprises, and firms with lower sales growth.

4.2. Institutional ownership and firm performance

Next we proceed to examine the effect of institutional ownership on firm performance. Our focus is on the ability of institutional investors to monitor and motivate management to deliver superior performance. We examine the effect of various types of institutional ownership on firm valuation, as measured by the firm's Tobin's Q (*TBQ*). As outlined in [Section 2](#), we hypothesize that pressure-sensitive grey institutions' effect on firm performance is negative or insignificant, while pressure-insensitive independent institutions' effect on firm performance is positive. We also examine whether the positive effect of institutional ownership (if there is any) on firm performance is greater for private institutional ownership than it is for state institutional ownership.

Besides monitoring by institutional shareholders,⁷ there are competing internal corporate governance mechanisms that could potentially restrict managerial discretion and facilitate the alignment of interests of managers with those of shareholders. Therefore in addition to the percentage of institutional ownership, we include the fraction of independent directors on the board (*INDPT*), an indicator variable for CEO-Chairman duality (*CHAIRCEO*), and the logarithm of the ratio of the percentage holding of the largest shareholder divided by the percentage holding of the second-largest shareholder (*LZINDEX*) as internal corporate governance measures, in order to control for the effect of these competing mechanisms. Furthermore, we control for specific firm characteristics, e.g., firm size, leverage, sales growth rate, and tangibility of assets, which have been consistently found by previous studies to be related to firm performance. Following [Tian and Estrin \(2007\)](#), we use the ratio of inventories and long-term investments-to-assets (*TANGIBLE*) to measure and control for a firm's tangibility of assets. Due to the unusually high percentage of enterprises ultimately owned by the state in China, as well as the preferential treatment of firms on the government list of strategically important enterprises, we include the two indicator variables *STATE*, and *STRATEGIC* as controls. Finally, following [Doidge et al. \(2009\)](#), we control for the overall performance of the industry, in which a firm operates, by including the industry median Tobin's Q (*INDUS-TRYQ*) in the list of explanatory variables.

4.2.1. Single equation tests

We start with specifying and estimating a panel data model for firm market performance. In particular, the specification we

⁷ [Liu \(2019\)](#) finds that active institutional investors in China tend to sell stocks before negative earnings surprises; and they tend to buy stocks when there are highest earnings surprises. [Balachandran and Williams \(2018\)](#) review various monitoring mechanisms for institutional investors.

Table 4

Institutional ownership and firm value.

The table presents coefficient estimates from panel data linear regressions where the dependent variable is Tobin's Q (*TBQ*). The parameters are estimated using ordinary least squares. Firm-level explanatory variables include the ownership by *private* institutions (*IO_PR*), the ownership by *grey* institutions (*IO_GREY*), the ownership by *independent* institutions (*IO_IND*), the ownership by *state* institutions (*IO_STATE*), the ownership by *private-independent* institutions (*IO_PR_IND*), and the ownership of *private-grey* institutions (*IO_PR_GREY*), as a percentage of market capitalization, the logarithm of the ratio of the percentage ownership by the largest shareholder divided by the percentage ownership by the second-largest shareholder (*LZINDEX*), the fraction of independent members of the board of directors (*INDPT*), a dummy variable equal to 1 if the CEO and the Chairman positions are occupied by the same person, and equal to 0 otherwise (*CHAIRCEO*), log market capitalization (*SIZE*), an indicator variable equal to 1 if the ultimate controlling entity is the state, and equal to 0 otherwise (*STATE*), an indicator variable equal to 1 if the firm belongs to the government list of strategic companies, and equal to 0 otherwise (*STRATEGIC*), the total debt-to-assets ratio (*LEVERAGE*), the firm's sales growth (*SALESGROWTH*), the industry median Tobin's Q (*INDUSTRYQ*), and the ratio of inventories and long-term investments to total assets (*TANGIBLE*). All equations include year dummies.

Variables	(1)	(2)	(3)
	<i>TBQ</i>	<i>TBQ</i>	<i>TBQ</i>
<i>IO_PR</i>	1.001*** [3.730]		
<i>IO_STATE</i>	0.375** [1.963]		
<i>IO_IND</i>		0.762*** [4.439]	
<i>IO_GREY</i>		-0.589 [-1.172]	
<i>IO_PR_IND</i>			1.177*** [4.001]
<i>IO_PR_GREY</i>			-0.612 [-1.165]
<i>LZINDEX</i>	-0.061*** [-3.845]	-0.068*** [-4.300]	-0.064*** [-4.057]
<i>INDPT</i>	0.166 [1.293]	0.176 [1.378]	0.172 [1.346]
<i>CHAIRCEO</i>	0.012 [0.178]	0.013 [0.195]	0.013 [0.194]
<i>SIZE</i>	0.128*** [3.718]	0.142*** [4.114]	0.135*** [3.896]
<i>STATE</i>	-0.324*** [-4.975]	-0.342*** [-5.337]	-0.303*** [-4.705]
<i>STRATEGIC</i>	0.104 [1.175]	0.112 [1.276]	0.101 [1.157]
<i>LEVERAGE</i>	-1.482*** [-10.805]	-1.473*** [-10.761]	-1.473*** [-10.733]
<i>SALESGROWTH</i>	0.097*** [3.564]	0.096*** [3.494]	0.096*** [3.527]
<i>INDUSTRYQ</i>	0.755*** [8.835]	0.758*** [8.862]	0.745*** [8.734]
<i>TANGIBLE</i>	-0.238* [-1.706]	-0.242* [-1.731]	-0.231* [-1.654]
<i>Constant</i>	0.370 [0.663]	0.188 [0.337]	0.293 [0.522]
<i>Observations</i>	10,180	10,180	10,180
<i>R-squared</i>	0.322	0.322	0.322

*** $p < .01$, ** $p < .05$, * $p < .1$, t -statistics, robust to clustering in the firm dimension, in brackets.

estimate is the following:

$$\begin{aligned}
 \text{Tobin's } Q_{it} = & \alpha_0 + \alpha_1 IO_GROUP1_{it} + \alpha_2 IO_GROUP2_{it} + \alpha_3 LZINDEX_{it} + \alpha_4 INDPT_{it} + \alpha_5 CHAIRCEO_{it} \\
 & + \alpha_6 SIZE_{it} + \alpha_7 STATE_{it} + \alpha_8 STRATEGIC_{it} + \alpha_9 LEVERAGE_{it} + \alpha_{10} SALESGROWTH_{it} \\
 & + \alpha_{11} INDUSTRYQ_{it} + \alpha_{12} TANGIBLE_{it} + \Sigma \eta_t + \varepsilon_{it}
 \end{aligned} \tag{2}$$

where *IO_Group1* and *IO_Group2* represent the institutional ownership percentage from two mutually exclusive groups of investors, e.g. private (*IO_PR*) and state-owned (*IO_STATE*), or independent (*IO_IND*) and grey (*IO_GREY*) institutional investors. Table 4 presents ordinary least squares estimation results from panel data regressions where the dependent variable, measuring firm performance, is Tobin's Q. All specifications contain time-fixed effects ($\Sigma \eta_t$). In parenthesis, we report cluster-robust t -statistics.

The results in the first column in Table 4 reveal that both private (*IO_PR*) and state institutional ownership (*IO_STATE*) are positively associated with Tobin's Q. The second column offers results from a specification where institutional ownership is partitioned into pressure-insensitive, or *independent*, institutions (*IO_IND*), and pressure-sensitive, or *grey*, institutions (*IO_GREY*). The

results indicate that IO_IND is positively associated with Tobin's Q , while IO_GREY is not significantly associated with Tobin's Q . The positive and highly significant coefficient on the variable measuring ownership by independent institutions supports [Hypothesis 3](#) that independent institutions have stronger incentive, and oftentimes the means, to monitor and motivate management towards superior value-enhancing decisions. Our results are consistent with findings by [Cornett et al. \(2007\)](#), for U.S. companies, and by [Ferreira and Matos \(2008\)](#), for companies from 27 different countries, for a strong positive association of independent institutional ownership and firm value. Combined with the findings of Column 1, these results suggest that it is mainly the pressure-insensitive independent institutional investors, no matter if they are privately-owned or state-owned, that exert positive influence on firm performance.

In the third column of [Table 4](#), we further partition the private institutional ownership (IO_PR) into private *grey* institutional ownership (IO_PR_GREY) and private *independent* institutional ownership (IO_PR_IND), in order to allow for differential impact of the two types of private institutional investors on firm performance. Interestingly, the coefficient on private *grey* ownership is negative and insignificant, while the coefficient on private *independent* ownership is positive and highly significant. The result indicates that ownership by private *independent* institutions is strongly positively associated with firm value, as measured by Tobin's Q . This supports the conjecture of a positive monitoring role of private independent institutional investors. On the other hand, ownership by banks, insurance companies, or credit cooperatives is not significantly associated with superior performance. Although insignificant, the negative sign on the coefficient is consistent with previous findings of a negative impact of bank ownership on publicly traded firms in China, e.g. [Lin et al. \(2009\)](#).⁸ Taken together, these results indicate that the sensitivity to pressure from management is a crucial factor for institutional investors' impact on Chinese public firms' market performance. The monitoring incentive of an institutional investor comes from being independent versus being privately-owned. Our study is the first to examine the two dimensions of institutional ownership at the same time, i.e., whether state versus private, or independent versus grey, matters more in their effects on firm performance.

Results on the other explanatory variables in [Table 4](#) show that firm size and sales growth are positively associated with Tobin's Q , while being ultimately controlled by the state, having a dominant shareholder, and high leverage and tangible assets are negatively associated with Tobin's Q . Not surprisingly, operating in an industry with high Tobin's Q is strongly positively associated with Tobin's Q of a particular firm.

The reported goodness of fit measures for the regressions in [Table 4](#) are similar to the values obtained in comparable estimations and reported in the literature – e.g. [McConnell and Servaes \(1990\)](#) report adjusted R -squared values of 13.1–18.4%, while [Ferreira and Matos \(2008\)](#) report adjusted R -squared values of 27.2–27.8%.

4.2.2. Endogeneity and its treatment

One important concern about the results, reported in [Table 4](#), is that institutional ownership and firm value could be determined simultaneously and could be driven by similar firm characteristics. A company's market performance, as summarized by its Tobin's Q measure, could be an influential factor in investors' decisions whether they should take a position in the company stock, as well as how large the position should be. Furthermore, the company's market performance could also be an important factor for current shareholders' decisions when they consider changing the size of their existing position in the company's stock. This line of reasoning suggests a role of Tobin's Q as a potential determinant of institutional ownership.

On the other hand, as previously discussed, the managerial decisions driving a company's market performance, and thus its Tobin's Q , could be influenced by the current company's ownership structure, and the monitoring exercised by its influential shareholders. Therefore, the existing ownership structure, and intensity of monitoring, could have a potential impact on managerial decisions, and ultimately on company performance.

The managerial decisions driving a company's performance, and the investors' decisions driving its ownership structure are likely to be taken simultaneously, in mutual interdependence. Therefore, an estimation approach intending to disentangle the effect of institutional ownership on firm performance, needs to take into account the simultaneity of these decisions. One proper approach to address the potential simultaneity is by specifying a system of equations, where the simultaneously determined variables are the dependent variables in each of the individual equations in the system. Furthermore, the observed levels of institutional ownership and firm performance could potentially be endogenously determined, which would also require a proper treatment. The possible endogeneity between institutional ownership and firm performance, can be addressed by an instrumental variables approach, employed in the estimation of the parameters of the system. Therefore, we specify a system of simultaneous equations and estimate its parameters using the three-stage least squares method. In addition to allowing for potential endogeneity, the three-stage least squares estimator allows for cross-correlation between the equations. In particular, the system specification we estimate is the following:

$$\begin{aligned} \text{Tobin's } Q_{it} = & \alpha_0 + \alpha_1 IO_Group1_{it} + \alpha_2 IO_Group2_{it} + \alpha_3 LZINDEX_{it} + \alpha_4 INDPT_{it} + \alpha_5 CHAIRCEO_{it} \\ & + \alpha_6 SIZE_{it} + \alpha_7 STATE_{it} + \alpha_8 STRATEGIC_{it} + \alpha_9 LEVERAGE_{it} + \alpha_{10} SALES_GROWTH_{it} \\ & + \alpha_{11} INDUSTRYQ_{it} + \alpha_{12} TANGIBLE_{it} + \Sigma \eta_t + \varepsilon_{1,it} \end{aligned}$$

⁸ Similar analysis using the return on assets as the dependent variable, measuring firm's operating performance was also performed. The results, available upon request, indicate similar impact of private *independent* and *grey* institutional ownership on firm operating performance. Private institutional ownership is positively associated with the return on assets and the result seems to be driven by the ownership by private *independent* institutions.

$$\begin{aligned}
IO_Group1_{it} &= \beta_0 + \beta_1 LZINDEX_{it} + \beta_2 INDPT_{it} + \beta_3 CHAIRCEO_{it} + \beta_4 SIZE_{it} + \beta_5 AGE_{it} + \beta_6 CSI300_{it} \\
&+ \beta_7 TURNOVER_{it} + \beta_8 SIGMA_{it} + \beta_9 TBQ_{it} + \beta_{10} STATE_{it} + \beta_{11} STRATEGIC_{it} + \beta_{12} ROA_{it} \\
&+ \beta_{13} LEVERAGE_{it} + \beta_{14} SALES GROWTH_{it} + \beta_{15} CASH_{it} + \Sigma v_i + \varepsilon_{2,it} \\
IO_Group2_{it} &= \gamma_0 + \gamma_1 LZINDEX_{it} + \gamma_2 INDPT_{it} + \gamma_3 CHAIRCEO_{it} + \gamma_4 SIZE_{it} + \gamma_5 AGE_{it} + \gamma_6 CSI300_{it} \\
&+ \gamma_7 TURNOVER_{it} + \gamma_8 SIGMA_{it} + \gamma_9 TBQ_{it} + \beta_{10} STATE_{it} + \gamma_{11} STRATEGIC_{it} + \gamma_{12} ROA_{it} \\
&+ \gamma_{13} LEVERAGE_{it} + \gamma_{14} SALES GROWTH_{it} + \gamma_{15} CASH_{it} + \Sigma \zeta_i + \varepsilon_{3,it}
\end{aligned} \tag{3}$$

In addition to addressing the simultaneity and possible endogeneity between institutional ownership and firm performance, the specification allows for the direct comparison of the marginal effects on firm performance that the ownership by each one of the two mutually-exclusive groups of investors has. Identification of the parameters is achieved by sets of excluded variables, e.g. excluded from the performance equation and included in the ownership equations, and vice versa. In particular, firm age (*AGE*), membership in the CSI300 index (*CSI300*), return on assets (*ROA*), the cash and short-term investments-to-assets ratio (*CASH*), average stock trading volume (*TURNOVER*), and the idiosyncratic risk measure (*SIGMA*) are included only in the institutional ownership equations, while median industry Tobin's *Q* (*INDUSTRYQ*) and the ratio of inventories and long-term investments-to-assets (*TANGIBLE*) are included only in the Tobin's *Q* equation. Our main test of interest in these systems of equations is the Tobin's *Q* regression. The other two regressions on *IO_Group1* and *IO_Group2* in the system are used to address the potential endogeneity issue. We thus emphasize the discussion of the results from the Tobin's *Q* regressions in this section.

Table 5 presents estimation results from a three-equation system, where the dependent variable of one of the equations is Tobin's *Q*, and the dependent variables in the other two equations are the ownership shares of private and of state institutional investors. The system parameters are estimated using the three-stage least squares method.⁹ The first three columns in the table present estimates from the entire sample, while the middle three columns present results from the first half of the sample period (1999–2004), and the last three columns present results from the second half of the sample period (2005–2010). In the first column of Table 5, the parameter estimates for the private and the state institutional investors' ownership share are positive, with the estimate on the private ownership being marginally significant, while the estimate on the state ownership is strongly significant. This result is consistent with the single-equation results in Table 4. The positive impact of state institutional ownership on firm Tobin's *Q* indicated in the first column is confirmed with positive and highly significant estimates in the first and the second half of the sample period, reported in columns four and seven. This result suggests that ownership by state institutional investors has had a positive effect on firm value throughout the entire sample period. Private institutional ownership, on the other hand has no significant effect on firm value in the early half of the sample period, as indicated by a coefficient of 3.933, which is not statistically different from zero, while its effect on firm value becomes positive and highly significant in the second half of the sample period, as indicated by a coefficient of 10.031, which is significant at the 1% level. This result is consistent with Hypothesis 5 that the influence of private institutional investors in China evolved through time and strengthened after 2005 with the evolution and the maturity of the legislation protecting shareholder rights.

Table 6 presents estimation results from a system of three equations over the same three periods as in Table 5. Tobin's *Q* is the dependent variable in one of the equations, while the percentage ownerships by independent and grey institutional investors are the dependent variables in the remaining two equations. Focusing on the effect of institutional ownership on firm value in the first column, ownership by independent institutions has positive and highly significant effect on firm value, as indicated by the parameter estimate of 13.757. The positive and significant effect of independent institutional ownership on firm value holds also in the two sub-period estimations, presented in columns four and seven. This finding is consistent with our single-equation result in Table 4 and supports Hypothesis 3 which states that independent institutions have stronger incentives to perform their monitoring role and to guide management towards value creation. However, the parameter estimates associated with grey institutional investors have negative signs and only the one from the estimation based on the entire sample period is marginally significant at the 10% level, while those from the sub-period estimations are not significantly different from zero. The result is consistent with the view that the role of grey institutions as effective monitors is compromised, because they face a conflict between their monitoring role and the development of any business that they might be having with the company they invest in.

The magnitudes of the coefficients in Table 6 also indicate that the impact of institutional ownership on performance is economically significant. The coefficient on *independent* ownership, in the first column of Table 6, suggests that one percentage point increase in *independent* ownership results in an increase of 0.1358 in Tobin's *Q*, which is approximately 5.5% of the mean value (of 2.474) in the sample.

As discussed in Section 2, some private institutional investors might have different sensitivity to pressure from management than others, and consequently different motivation and ability to perform effective monitoring. Therefore, examining the effect of *private independent* and *private grey* institutional investors separately, would provide an insight on, which type of private institutions contributes to an improved market performance. To address this question, we estimate a system of three simultaneous equations that allows us to differentiate between the *private independent* and the *private grey* institutions' impact on firm performance. The specification of the Tobin's *Q* equation remains the same as in Table 5, except we partition the private institutional ownership into a *private independent* and a *private grey* institutional ownership, which in turn become the dependent variables of the two ownership equations in the system. The set of explanatory variables for the ownership equations remains the same as in the institutional ownership

⁹ Appendix A describes the three-stage least squares (3SLS) method to estimate the system of equations.

Table 5

Institutional ownership and firm value – Tobin's Q, private and state institutions.

The table presents coefficient estimates from systems of three equations where the dependent variables are Tobin's Q (*TBQ*), ownership by private institutions (*IO_PR*), and ownership by state institutions (*IO_STATE*) as a percentage of market capitalization. The system of equations is estimated using three-stage least squares. Firm-level explanatory variables include ownership by private and state institutions, the logarithm of the ratio of the percentage ownership by the largest shareholder divided by the percentage ownership by the second-largest shareholder (*LZINDEX*), the fraction of independent members of the board of directors (*INDPT*), a dummy variable equal to 1 if the CEO and the Chairman positions are occupied by the same person, and equal to 0 otherwise (*CHAIRCEO*), log market capitalization (*SIZE*), firm age (*AGE*), a dummy variable equal to 1 if the firm is a member of the CSI 300 index, and equal to 0 otherwise (*CSI300*), the average monthly stock trading volume over the past 12 months divided by the total number of tradable shares (*TURNOVER*), the idiosyncratic variance of stock returns (*SIGMA*), Tobin's Q, an indicator variable equal to 1 if the ultimate controlling entity is the state, and equal to 0 otherwise (*STATE*), an indicator variable equal to 1 if the firm belongs to the government list of strategic companies, and equal to 0 otherwise (*STRATEGIC*), the return on assets (*ROA*), the total debt-to-assets ratio (*LEVERAGE*), the firm's sales growth (*SALESGROWTH*), the cash and short term investments-to-assets ratio (*CASH*), the industry median Tobin's Q (*INDUSTRYQ*), and the ratio of inventories and long-term investments to total assets (*TANGIBLE*). All equations include year dummies.

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	<i>TBQ</i>	<i>IO_PR</i>	<i>IO_STATE</i>	<i>TBQ</i>	<i>IO_PR</i>	<i>IO_STATE</i>	<i>TBQ</i>	<i>IO_PR</i>	<i>IO_STATE</i>
<i>IO_PR</i>	5.440*			3.933			10.031***		
	[1.848]			[0.541]			[3.004]		
<i>IO_STATE</i>	20.682***			21.126***			20.806***		
	[6.053]			[2.695]			[5.837]		
<i>LZINDEX</i>	0.055	−0.013***	−0.004***	−0.013	−0.011***	−0.003***	0.178***	−0.016***	−0.004***
	[1.168]	[−19.825]	[−4.913]	[−0.131]	[−10.256]	[−2.861]	[2.930]	[−16.863]	[−4.388]
<i>INDPT</i>	0.363**	0.004	−0.009	0.447	0.006	−0.019	0.314*	0.007	−0.006
	[2.376]	[0.771]	[−1.362]	[1.275]	[0.482]	[−1.446]	[1.737]	[1.026]	[−0.788]
<i>CHAIRCEO</i>	−0.090	0.007**	0.005	−0.371**	0.003	0.016***	0.069	0.011***	−0.005
	[−1.146]	[2.379]	[1.490]	[−2.119]	[0.790]	[3.242]	[0.619]	[2.715]	[−1.128]
<i>SIZE</i>	0.138**	0.012***	−0.001	0.101	0.003	0.003	0.067	0.015***	−0.004**
	[2.491]	[8.214]	[−0.821]	[1.472]	[1.128]	[1.123]	[0.856]	[8.883]	[−2.299]
<i>AGE</i>		0.011***	0.014***		0.011**	0.009**		0.011**	0.018***
		[3.423]	[4.535]		[2.448]	[1.986]		[2.423]	[4.003]
<i>CSI300</i>		0.001	0.001		0.001	−0.019***		0.003	0.012***
		[0.264]	[0.228]		[0.145]	[−4.290]		[0.646]	[3.251]
<i>TURNOVER</i>		−0.016***	−0.007		−0.010	0.075***		−0.016***	−0.015***
		[−3.434]	[−1.411]		[−0.648]	[5.161]		[−3.004]	[−2.926]
<i>SIGMA</i>		−0.024***	0.082***		−0.025*	0.053***		−0.017	0.098***
		[−2.636]	[8.247]		[−1.953]	[3.523]		[−1.309]	[7.552]
<i>TBQ</i>		0.006*	−0.024***		0.015**	−0.028***		0.001	−0.019***
		[1.655]	[−5.667]		[2.354]	[−3.910]		[0.140]	[−3.578]
<i>STATE</i>	−0.669***	−0.043***	0.019***	−0.538	−0.045***	0.015***	−0.570***	−0.043***	0.023***
	[−3.991]	[−16.231]	[6.549]	[−1.409]	[−11.156]	[3.213]	[−3.012]	[−12.268]	[6.354]
<i>STRATEGIC</i>	0.581***	−0.016***	−0.017***	0.420*	−0.010*	−0.020***	0.844***	−0.017**	−0.014**
	[4.194]	[−3.717]	[−3.777]	[1.764]	[−1.933]	[−3.159]	[4.225]	[−2.569]	[−1.988]
<i>ROA</i>		0.088***	0.016		0.053**	−0.037		0.123***	0.026
		[5.641]	[1.070]		[2.215]	[−1.510]		[5.756]	[1.237]
<i>LEVERAGE</i>	−1.693***	0.039***	−0.033***	−1.430***	0.046***	−0.031**	−1.936***	0.028**	−0.032***
	[−11.779]	[4.626]	[−3.624]	[−4.592]	[3.825]	[−2.304]	[−10.650]	[2.373]	[−2.640]
<i>SALESGROWTH</i>	0.023	0.000	0.005***	0.153**	0.001	0.000	−0.097*	−0.001	0.009***
	[0.617]	[0.175]	[3.231]	[2.479]	[0.502]	[0.144]	[−1.659]	[−0.277]	[4.725]
<i>CASH</i>		0.006	0.000		−0.011	−0.004		0.016	−0.006
		[0.645]	[0.021]		[−0.842]	[−0.327]		[1.376]	[−0.536]
<i>INDUSTRYQ</i>		1.075***			1.041***			0.992***	
		[11.792]			[5.400]			[9.019]	
<i>TANGIBLE</i>		−0.392***			0.299			−0.745***	
		[−3.134]			[1.260]			[−4.301]	
<i>Constant</i>	−1.408*	−0.112***	0.087***	−0.335	0.006	0.011	−0.381	−0.152***	0.100***
	[−1.948]	[−4.625]	[3.514]	[−0.272]	[0.170]	[0.295]	[−0.409]	[−4.792]	[3.245]
<i>Observations</i>	10,180	10,180	10,180	4267	4267	4267	5913	5913	5913
<i>Pseudo R²</i>	0.068	0.148	0.004	0.067	0.138	0.002	0.068	0.147	0.012

*** $p < .01$, ** $p < .05$, * $p < .1$, z -statistics in brackets.

equations in Table 5.

Table 7 reports results from a three-stage least squares estimation of the system of simultaneous equations for the three periods as in Table 5. The specification allows us to obtain separate estimates for the impact of the two types of private institutional ownership on Tobin's Q. The estimates reported in the first column indicate that private independent institutional ownership is positively and highly significantly associated with firm value, with a coefficient of 7.549 and a t -statistic of 3.252, while private grey institutional

Table 6

Institutional ownership and firm value – Tobin's Q, independent and grey institutions.

The table presents coefficient estimates from systems of three equations where the dependent variables are Tobin's Q (*TBQ*), ownership by independent institutions (*IO_IND*), and ownership by grey institutions (*IO_GREY*) as a percentage of market capitalization. The system of equations is estimated using three-stage least squares. Firm-level explanatory variables are the same as in Table 5, except institutional ownership is partitioned between independent and grey institutions. All equations include year dummies.

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	<i>TBQ</i>	<i>IO_IND</i>	<i>IO_GREY</i>	<i>TBQ</i>	<i>IO_IND</i>	<i>IO_GREY</i>	<i>TBQ</i>	<i>IO_IND</i>	<i>IO_GREY</i>
<i>IO_IND</i>	13.757*** [6.118]			9.081** [2.102]			17.221*** [6.018]		
<i>IO_GREY</i>	–17.349* [–1.689]			–15.093 [–1.222]			–6.405 [–0.522]		
<i>LZINDEX</i>	0.054 [1.178]	–0.014*** [–14.384]	–0.003*** [–13.544]	–0.039 [–0.510]	–0.011*** [–7.201]	–0.003*** [–9.349]	0.197*** [3.268]	–0.016*** [–12.873]	–0.003*** [–9.689]
<i>INDPT</i>	0.344** [2.419]	–0.008 [–1.000]	0.004* [1.736]	0.517* [1.946]	–0.029* [–1.730]	0.016*** [3.996]	0.227 [1.246]	0.001 [0.138]	–0.001 [–0.196]
<i>CHAIRCEO</i>	–0.106 [–1.461]	0.011*** [2.707]	0.001 [0.605]	–0.232** [–2.054]	0.021*** [3.456]	–0.002 [–1.101]	0.026 [0.237]	0.004 [0.670]	0.003* [1.674]
<i>SIZE</i>	0.189** [2.538]	0.004** [2.216]	0.007*** [12.956]	0.146** [2.263]	0.001 [0.367]	0.005*** [6.078]	0.080 [0.831]	0.005** [2.193]	0.008*** [11.182]
<i>AGE</i>		0.022*** [5.703]	0.000 [0.238]		0.018*** [3.071]	0.001 [0.845]		0.027*** [4.721]	–0.001 [–0.360]
<i>CSI300</i>		0.001 [0.275]	–0.001 [–1.200]		–0.019*** [–3.394]	0.002 [1.188]		0.016*** [2.995]	–0.005*** [–2.963]
<i>TURNOVER</i>		–0.020*** [–3.128]	–0.009*** [–5.276]		0.072*** [3.777]	–0.010** [–1.961]		–0.026*** [–3.877]	–0.009*** [–4.120]
<i>SIGMA</i>		0.075*** [6.690]	–0.001 [–0.431]		0.049*** [3.018]	–0.006 [–1.373]		0.092*** [6.115]	0.003 [0.655]
<i>TBQ</i>		–0.014*** [–2.660]	–0.003** [–2.036]		–0.010 [–1.083]	–0.004** [–2.072]		–0.016** [–2.297]	–0.001 [–0.561]
<i>STATE</i>	–0.029 [–0.379]	–0.025*** [–6.816]	0.001 [1.150]	0.014 [0.105]	–0.031*** [–5.253]	–0.000 [–0.068]	–0.078 [–0.771]	–0.022*** [–4.709]	0.003* [1.913]
<i>STRATEGIC</i>	0.677*** [4.874]	–0.037*** [–6.244]	0.004** [2.334]	0.447*** [2.643]	–0.038*** [–4.953]	0.008*** [4.520]	0.839*** [4.106]	–0.029*** [–3.150]	–0.003 [–1.099]
<i>ROA</i>		0.074*** [4.048]	0.006 [1.127]		–0.001 [–0.016]	–0.014* [–1.673]		0.112*** [4.618]	0.020** [2.405]
<i>LEVERAGE</i>	–1.649*** [–12.034]	0.001 [0.077]	0.001 [0.225]	–1.282*** [–5.291]	0.010 [0.579]	–0.003 [–0.621]	–1.891*** [–9.898]	–0.010 [–0.616]	0.005 [1.145]
<i>SALESGROWTH</i>	–0.001 [–0.024]	0.006*** [3.164]	–0.001 [–1.087]	0.069* [1.748]	0.003 [0.800]	–0.000 [–0.359]	–0.089 [–1.493]	0.010*** [3.711]	–0.001 [–0.967]
<i>CASH</i>		0.003 [0.278]	–0.009*** [–2.738]		–0.016 [–0.882]	–0.015*** [–3.222]		0.008 [0.632]	–0.007 [–1.433]
<i>INDUSTRYQ</i>	0.848*** [11.059]			0.690*** [6.158]			0.916*** [8.450]		
<i>TANGIBLE</i>	–0.234** [–2.417]			0.269 [1.607]			–0.604*** [–3.866]		
<i>Constant</i>	–1.931** [–2.052]	0.042 [1.336]	–0.064*** [–7.166]	–0.499 [–0.564]	0.052 [1.068]	–0.035*** [–2.925]	–0.727 [–0.579]	0.021 [0.549]	–0.082*** [–6.540]
<i>Observations</i>	10,180	10,180	10,180	4267	4267	4267	5913	5913	5913
<i>Pseudo R²</i>	0.091	0.030	0.059	0.155	0.044	0.042	0.072	0.029	0.068

*** $p < .01$, ** $p < .05$, * $p < .1$, z-statistics in brackets.

ownership has a negative but insignificant impact on firm value. This result leads us to conclude that it is the sensitivity to pressure from management, rather than the private nature of the institutional investors, that is important for institutional ownership's effect on firm performance in China. The result extends Yuan et al. (2008)'s evidence of positive effect of mutual fund ownership on firm performance in China to a wider group of pressure insensitive investors, comprising not only mutual funds, but also pension funds, investment advisory, and venture capital investors.

The estimates from the Tobin's Q equation for the 1999–2004 period, presented in the fourth column of Table 7, reveal a negative and highly significant coefficient on private grey institutional ownership, suggesting that ownership by such institutions had a pronounced negative impact on firm performance during that period. Indeed, Lin et al. (2009) report that public firms in China, having banks as the leading shareholders, exhibit relatively poor operating and market performance, over the 1994–2004 period, resulting from inefficient investments. An interesting dynamic is revealed when we compare this result with the estimate on the private grey institutional ownership variable from the Tobin's Q equation for the 2005–2010 period, reported in column seven. Although it still remains negative, the coefficient drops substantially in magnitude (down to –4.828) and loses significance. The

Table 7

Private institutional ownership and firm value – independent and grey institutions.

The table presents coefficient estimates from systems of three equations where the dependent variables are Tobin's Q (*TBQ*), ownership by *private independent* institutions (*IO_PR_IND*), and ownership by *private grey* institutions (*IO_PR_GREY*) as a percentage of market capitalization. The system of equations is estimated using three-stage least squares. Firm-level explanatory variables are the same as in Table 5, except institutional ownership is partitioned between state, private-independent, and private-grey institutions. All equations include year dummies.

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	<i>TBQ</i>	<i>IO_PR_GREY</i>	<i>IO_PR_IND</i>	<i>TBQ</i>	<i>IO_PR_GREY</i>	<i>IO_PR_IND</i>	<i>TBQ</i>	<i>IO_PR_GREY</i>	<i>IO_PR_IND</i>
<i>IO_PR_IND</i>	7.549*** [3.252]			3.060 [0.769]			13.390*** [3.965]		
<i>IO_PR_GREY</i>	-11.392 [-1.576]			-19.364** [-2.007]			-4.828 [-0.553]		
<i>IO_STATE</i>	0.308** [2.116]			0.249 [1.372]			0.306 [1.341]		
<i>LZINDEX</i>	-0.019 [-0.657]	-0.003*** [-12.704]	-0.011*** [-16.496]	-0.105** [-2.030]	-0.003*** [-8.358]	-0.008*** [-8.155]	0.104** [2.395]	-0.003*** [-9.612]	-0.012*** [-14.370]
<i>INDPT</i>	0.248** [2.424]	0.007*** [3.533]	-0.002 [-0.442]	0.395* [1.654]	0.018*** [5.341]	-0.012 [-1.109]	0.186 [1.423]	0.003 [1.287]	0.003 [0.497]
<i>CHAIRCEO</i>	-0.024 [-0.494]	0.001 [0.612]	0.007** [2.426]	-0.059 [-0.902]	-0.001 [-0.899]	0.005 [1.133]	-0.055 [-0.679]	0.002 [1.482]	0.009** [2.408]
<i>SIZE</i>	0.146*** [3.150]	0.006*** [13.997]	0.005*** [4.086]	0.092* [1.943]	0.003*** [4.474]	0.000 [0.089]	0.056 [0.858]	0.008*** [12.595]	0.007*** [4.457]
<i>AGE</i>		-0.000 [-0.188]	0.015*** [5.249]		0.001 [0.573]	0.011*** [2.708]		-0.001 [-0.530]	0.017*** [4.420]
<i>CSI300</i>		-0.002** [-2.332]	0.002 [0.787]		0.002* [1.904]	-0.003 [-0.754]		-0.005*** [-3.566]	0.010*** [2.762]
<i>TURNOVER</i>		-0.008*** [-5.311]	-0.012*** [-2.816]		-0.015*** [-3.779]	0.010 [0.742]		-0.008*** [-4.139]	-0.016*** [-3.542]
<i>SIGMA</i>		-0.008*** [-2.657]	0.010 [1.275]		-0.009*** [-2.597]	-0.008 [-0.631]		-0.002 [-0.476]	0.032*** [3.109]
<i>TBQ</i>		-0.002 [-1.601]	0.007* [1.819]		-0.003* [-1.738]	0.016*** [2.742]		-0.001 [-0.768]	0.001 [0.237]
<i>STATE</i>	0.006 [0.051]	0.001 [0.665]	-0.044*** [-17.671]	-0.074 [-0.356]	0.001 [0.866]	-0.047*** [-12.010]	0.200 [1.217]	0.001 [0.601]	-0.044*** [-13.372]
<i>STRATEGIC</i>	0.231*** [2.870]	0.002 [1.093]	-0.017*** [-4.244]	0.102 [0.988]	0.004*** [2.707]	-0.015*** [-2.835]	0.477*** [3.447]	-0.002 [-0.760]	-0.015** [-2.423]
<i>ROA</i>		0.011** [2.166]	0.080*** [5.696]		-0.007 [-0.980]	0.054** [2.354]		0.030*** [4.001]	0.100*** [5.370]
<i>LEVERAGE</i>	-1.497*** [-16.549]	0.004 [1.372]	0.030*** [3.854]	-0.968*** [-5.777]	0.003 [0.961]	0.038*** [3.341]	-1.828*** [-13.694]	0.006 [1.353]	0.019* [1.687]
<i>SALESGROWTH</i>	0.064** [2.561]	-0.001* [-1.813]	0.001 [0.894]	0.069** [2.039]	-0.000 [-0.523]	0.002 [0.830]	0.051 [1.334]	-0.001* [-1.862]	0.001 [0.365]
<i>CASH</i>		-0.007** [-2.528]	0.011 [1.343]		-0.010*** [-2.635]	-0.006 [-0.451]		-0.005 [-1.150]	0.014 [1.448]
<i>INDUSTRYQ</i>	0.699*** [13.586]			0.615*** [8.079]			0.711*** [9.524]		
<i>TANGIBLE</i>	-0.181** [-2.340]			0.285*** [2.692]			-0.479*** [-3.626]		
<i>Constant</i>	-0.281 [-0.458]	-0.067*** [-8.464]	-0.054** [-2.448]	1.005* [1.664]	-0.014 [-1.387]	0.012 [0.366]	0.675 [0.783]	-0.086*** [-7.668]	-0.069** [-2.515]
<i>Observations</i>	10,180	10,180	10,180	4267	4267	4267	5913	5913	5913
<i>Pseudo R²</i>	0.226	0.066	0.134	0.268	0.040	0.132	0.150	0.077	0.126

*** $p < .01$, ** $p < .05$, * $p < .1$, z-statistics in brackets.

results suggest that the initially strong negative association between private *grey* institutional ownership and firm value weakened over time and almost disappeared in the second half of the sample period. Possible explanation for this trend is the strengthening of the role of the capital markets as a source of financing in China over time, as well as the growing demands for accountability to shareholders, both of which have the potential to mitigate inefficient investment and value destruction on behalf of managers. These results support Hypothesis 5 which states that the enhanced external legal and corporate governance environment in China after 2005 improved the monitoring role of institutional investors.

In contrast, private *independent* institutional ownership has a positive but insignificant impact on firm value in the first half of the sample period. The result suggests that *independent* institutions' ability to monitor and influence management was insufficient to produce significant positive effect on firm value during the first half of the sample period. Comparing the estimate from the 1999–2004 period with the one from the second half of the period reveals another interesting dynamic - the coefficient on private *independent* institutional ownership increases in magnitude (from 3.060 to 13.390) and becomes highly significant (with a *t*-statistic

of 3.965) in the 2005–2010 period. These results suggest that private *independent* investors' ability to monitor and influence management towards value creation grew over the sample period, turning eventually into an influential factor for superior market performance in the second half of the sample period. The development of the equity market and its institutions, as well as the growth in size and importance of the private *independent* institutional investors seems to have enabled the latter to play an increasingly effective role in the governance of public companies in China. Herd et al. (2010) report that since 2005 a significant progress has been made in strengthening the legal and institutional foundation of China's capital markets. As one of the major achievements, they cite the completion of a modernized legal framework, especially the adopted *Securities Investments Funds Law*, which has taken effect in 2004, as well as the *Company Law* and *Securities Law*, both of which have taken effect in 2006. These pieces of legislation, together with the accompanying regulations issued by the regulatory bodies, have provided a comprehensive framework for the capital markets, their supporting institutions, and institutional investors. Specifically, these laws codified and clarified the rules and regulations for investment funds, the governance structure of listed companies, the scope and terms of entry for securities companies, as well as accounting and disclosure requirements. As a result of these reforms, Herd et al. (2010) point out that institutional investors have grown rapidly and gained a significant presence on China's capital markets.

The results in Table 7 indicate that the effect of private institutional ownership on firm value is very different depending on whether the investor is an independent (pressure-insensitive), or a grey (pressure-sensitive) institution. Together with the results reported in Tables 5 and 6, this suggests that pressure sensitivity might also be important to state institutional investors, and a potential difference in the effect of their ownership on firm value with respect to this criterion needs to be examined.

Table 8 reports estimation results from a system of three equations, where Tobin's Q is the dependent variable in one of the equations, while the percentage ownerships by state independent and state grey institutional investors are the dependent variables of the remaining two ownership equations. In the first column, the estimate associated with state *independent* institutional ownership is positive (21.316) and highly significant, while the estimate associated with state *grey* institutional ownership is negative and statistically indistinguishable from zero. Private institutional ownership continues to exhibit a positive and significant effect on firm value. Interestingly, similar to the effect of private *independent* institutional ownership, the effect of state *independent* institutional ownership is positive and highly significant in the entire sample period estimation. It is positive, but insignificant in the first half of the sample period, while it becomes highly significant in the second half of the sample period – e.g. an estimate of 25.535 with a t -statistic of 5.097, reported in column seven in Table 8. As discussed earlier, this result corroborates Hypothesis 5 that the role of independent investors, both private and state, as effective monitors and guardians of proper corporate governance was strengthened with the evolution of the legal environment and shareholder rights' protection in China. The results in Table 8 indicate that the strong positive effect of state institutional ownership on firm performance, documented in Table 5, is actually driven by the state independent institutions, which despite being state-owned, have the incentives to exercise effective monitoring over the public companies in their portfolios. The ownership by state grey institutions however, e.g. banks, insurance companies, or credit unions, has had a negative effect on firm performance in the first half of the sample period, as indicated by a negative and significant estimate (–110.311). This negative effect seems to have weakened over time, which is indicated by the only marginally significant negative estimate for the second half of the sample period. The results for the effect of the state grey institutional ownership on firm performance are consistent with the hypothesis that grey institutions find it difficult to perform effective monitoring role as shareholders, and that sometimes they even have incentives to influence management away from optimal value enhancing decisions, in order to promote and protect their relations with the company. The results in Table 8 confirm that the institutional investors' sensitivity to pressure from management, rather than their private or state ownership, is the criterion important for their ownership's effect on firms' market performance in China.

4.3. Robustness tests

This section presents several robustness checks of the relationship between institutional ownership and firm market performance, as measured by Tobin's Q . The Tobin's Q measure is known to be susceptible to potential measurement error, and variable transformations have been proposed in the literature to alleviate any concerns that measurement error might be affecting the estimates, as well as to demonstrate their robustness. We follow Gompers et al. (2010) and Ferreira and Matos (2008) and re-estimate the specifications, reported in Tables 7 and 8, using a natural log transformation of Tobin's Q ($\ln(TBQ)$). The log transformation is also a natural way of reducing the influence of outliers.

Table 9 reports estimates from a system of three equations, specified in the same way as the system in Table 7, partitioning private institutional ownership into private independent and private grey segments, and having Tobin's Q replaced by its logarithm. The first column reports estimates for the Tobin's Q equation, which indicate that private *independent* institutional ownership is significantly positively related to firm value, with a coefficient of 1.999 and a corresponding t -statistic of 2.574, while private *grey* institutional ownership is significantly negatively related to firm value, having a coefficient of –9.232 (with a t -static of –3.820). The ownership effect of these two types of private institutional investors on firm's market performance is consistent with the results in Table 7, confirming the importance of pressure sensitivity for the effect of institutional ownership on firm market performance for Chinese companies. The sub-period coefficient estimates for the two private ownership variables reveal a qualitatively equivalent pattern. Ownership by private *independent* institutions has positive but insignificant impact on firm value in the first half of the sample period, while in the second half of the period its impact is positive (an estimate of 3.020) and highly significant (with a t -statistic of 3.245). Ownership by private *grey* institutions exhibits a significantly negative effect on firm value in the two sub-sample estimations. The estimates on the remaining determinants of firm value, as well as those from the two ownership equations are roughly similar to those reported in Table 7. The results in Table 9 reinforce our previous findings and demonstrate their robustness to transformations of

Table 8
 State institutional ownership and firm value – independent and grey institutions.
 The table presents coefficient estimates from systems of three equations where the dependent variables are Tobin's Q (TBQ), ownership by state independent institutions (IO_STATE_IND), and ownership by state grey institutions (IO_STATE_GREY) as a percentage of market capitalization. The system of equations is estimated using three-stage least squares. Firm-level explanatory variables are the same as in Table 5, except institutional ownership is partitioned between private, state-independent and state-grey institutions. All equations include year dummies.

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	TBQ	IO_STATE_GREY	IO_STATE_IND	TBQ	IO_STATE_GREY	IO_STATE_IND	TBQ	IO_STATE_GREY	IO_STATE_IND
IO_STATE_IND	21.316*** [5.646]			12.697 [1.436]			25.535*** [5.097]		
IO_STATE_GREY	-65.562 [-1.550]			-110.311** [-1.998]			-102.517* [-1.784]		
IO_PR	1.455*** [4.289]			1.237** [2.327]			1.282*** [3.261]		
LZINDEX	-0.051 [-1.499]	-0.001*** [-5.831]	-0.003** [-4.278]	-0.147*** [-2.605]	-0.001*** [-5.070]	-0.002** [-2.143]	0.000 [0.003]	-0.000*** [-2.692]	-0.004*** [-4.085]
INDPT	0.131	-0.003** [-2.546]	-0.006 [-0.879]	-0.054 [-0.127]	-0.003 [-1.319]	-0.018 [-1.389]	-0.025 [-0.087]	-0.003*** [-2.723]	-0.001 [-1.182]
CHAIRCEO	-0.058 [-0.698]	0.000 [0.139]	0.005 [1.476]	-0.295 [-1.630]	-0.001 [-0.755]	0.017*** [3.442]	0.267* [0.869]	0.001 [0.869]	-0.005 [-1.219]
SIZE	0.230*** [6.081]	0.001** [2.111]	-0.002 [-1.317]	0.237*** [2.769]	0.001* [1.922]	-0.002 [-0.647]	0.245*** [5.364]	0.000 [0.718]	-0.004** [-2.229]
AGE		-0.001 [-1.120]	0.014*** [4.456]		-0.001* [-1.791]	0.005 [1.118]		-0.000 [-0.162]	0.019*** [4.337]
CS1300		0.001 [1.527]	0.002 [0.592]		0.002** [2.448]	-0.011** [-2.124]		-0.000 [-0.207]	0.012*** [3.254]
TURNOVER		-0.001 [-0.990]	-0.009** [-2.043]		-0.005*** [-2.610]	0.045*** [2.824]		-0.001 [-0.612]	-0.019*** [-3.800]
SIGMA		0.003* [1.747]	0.081*** [8.395]		-0.000 [-0.053]	0.056*** [3.876]		0.004* [1.719]	0.098*** [7.602]
TBQ		-0.002*** [-2.621]	-0.024*** [-6.140]		-0.002 [-1.753]	-0.024*** [-3.754]		-0.001 [-0.601]	-0.022*** [-4.317]
STATE	-0.796*** [-6.934]	0.000 [0.351]	0.018*** [6.451]	-0.578*** [-2.928]	-0.001* [-1.783]	0.017*** [3.752]	-0.865*** [-5.533]	0.001** [2.424]	0.020*** [5.568]
STRATEGIC	0.704*** [4.194]	0.002*** [2.743]	-0.019*** [-4.280]	0.732*** [2.870]	0.004*** [3.988]	-0.024*** [-3.890]	0.646*** [2.719]	-0.001 [-0.781]	-0.012* [-1.722]
ROA		-0.007*** [-2.643]	0.015 [0.956]		0.002 [0.604]	-0.013 [-0.475]		-0.011*** [-2.844]	0.033 [1.515]
LEVERAGE	-1.1678*** [-11.436]	-0.004*** [-2.967]	-0.033*** [-3.786]	-1.551*** [-6.158]	-0.004* [-1.896]	-0.020 [-1.586]	-1.744*** [-7.734]	-0.002 [-0.71]	-0.038*** [-3.191]
SALESGROWTH	0.041 [0.999]	0.000 [1.568]	0.005*** [3.225]	0.109* [1.649]	-0.000 [-0.172]	-0.000 [-0.128]	-0.071 [-0.971]	0.001* [1.744]	0.009*** [4.590]
CASH		-0.002 [-1.132]	-0.001 [-0.073]		-0.002 [-0.970]	-0.010 [-0.641]		-0.001 [-0.297]	-0.002 [-0.185]
INDUSTRYQ	1.008*** [10.011]			0.736*** [3.031]			1.058*** [7.897]		
TANGIBLE	-0.354*** [-2.622]			0.150 [0.448]			-0.806*** [-4.112]		

(continued on next page)

Table 8 (continued)

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	TBQ	IO_STATE_GREY	IO_STATE_IND	TBQ	IO_STATE_GREY	IO_STATE_IND	TBQ	IO_STATE_GREY	IO_STATE_IND
Constant	-1.804*** [-2.679]	0.007 [1.545]	0.095*** [3.867]	-0.907 [-0.718]	0.002 [0.402]	0.074* [1.860]	-1.812** [-2.022]	0.004 [0.697]	0.104*** [3.366]
Observations	10,180	10,180	10,180	4267	4267	4267	5913	5913	5913
Pseudo R ²	0.054	0.003	0.003	0.060	0.010	0.003	0.035	0.007	0.008

***p < .01, **p < .05, *p < .1, z-statistics in brackets.

Table 9

Robustness test for private institutional ownership and firm value – $\ln(\text{Tobin's } Q)$.

The table presents coefficient estimates from systems of three equations where the dependent variables are the logarithm of Tobin's Q ($\ln(\text{TBQ})$), ownership by *private independent* institutions (IO_PR_IND), and ownership by *private grey* institutions (IO_PR_GREY) as a percentage of market capitalization. The system of equations is estimated using three-stage least squares. Firm-level explanatory variables are the same as in Table 7, where institutional ownership is partitioned between state, private-independent, and private-grey institutions. All equations include year dummies.

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$\ln(\text{TBQ})$	IO_PR_GREY	IO_PR_IND	$\ln(\text{TBQ})$	IO_PR_GREY	IO_PR_IND	$\ln(\text{TBQ})$	IO_PR_GREY	IO_PR_IND
IO_PR_IND	1.999** [2.574]			2.257 [1.636]			3.020*** [3.245]		
IO_PR_GREY	–9.232*** [–3.820]			–9.052*** [–2.708]			–4.918** [–2.045]		
IO_STATE	0.109** [2.501]			0.099* [1.878]			0.112* [1.727]		
LZINDEX	–0.029*** [–3.060]	–0.003*** [–13.003]	–0.011*** [–16.322]	–0.030* [–1.675]	–0.003*** [–8.306]	–0.008*** [–7.942]	0.003 [0.217]	–0.003*** [–9.529]	–0.013*** [–14.174]
INDPT	0.097*** [2.839]	0.007*** [3.584]	–0.002 [–0.341]	0.171** [2.062]	0.018*** [5.250]	–0.010 [–0.936]	0.057 [1.594]	0.003 [1.346]	0.003 [0.543]
CHAIRCEO	0.012 [0.752]	0.001 [0.564]	0.006** [2.306]	–0.030 [–1.303]	–0.001 [–0.933]	0.005 [1.197]	0.026 [1.153]	0.002 [1.462]	0.009** [2.464]
SIZE	0.087*** [5.585]	0.006*** [13.617]	0.005*** [4.105]	0.040** [2.479]	0.003*** [4.138]	0.002 [0.807]	0.060*** [3.327]	0.008*** [12.545]	0.008*** [4.828]
AGE		–0.002** [–1.986]	0.014*** [4.794]		0.000 [0.401]	0.013*** [3.236]		–0.002 [–1.442]	0.019*** [4.578]
CSI300		–0.001 [–1.135]	0.001 [0.483]		0.003** [2.400]	–0.007* [–1.661]		–0.006*** [–3.840]	0.008** [2.021]
TURNOVER		–0.008*** [–5.629]	–0.011** [–2.479]		–0.018*** [–4.215]	0.023 [1.629]		–0.008*** [–4.237]	–0.012** [–2.543]
SIGMA		–0.014*** [–5.634]	0.001 [0.086]		–0.009*** [–2.892]	–0.002 [–0.222]		–0.011** [–2.576]	0.030*** [2.718]
$\ln(\text{TBQ})$		–0.006* [–1.658]	0.020* [1.837]		–0.010* [–1.713]	0.047*** [2.587]		–0.004 [–0.744]	–0.000 [–0.007]
STATE	–0.003 [–0.066]	0.001 [0.720]	–0.045*** [–18.509]	0.062 [0.860]	0.001 [1.056]	–0.048*** [–12.806]	0.016 [0.350]	0.001 [0.623]	–0.044*** [–13.986]
STRATEGIC	0.094*** [3.499]	0.002 [1.113]	–0.017*** [–4.338]	0.079** [2.207]	0.004*** [2.795]	–0.015*** [–2.973]	0.154*** [4.052]	–0.002 [–0.731]	–0.015** [–2.347]
ROA		0.007 [1.588]	0.083*** [5.765]		–0.004 [–0.540]	0.035 [1.615]		0.025*** [3.540]	0.107*** [5.691]
LEVERAGE	–0.482*** [–15.888]	0.004 [1.411]	0.031*** [3.928]	–0.364*** [–6.264]	0.004 [1.029]	0.035*** [2.981]	–0.587*** [–15.972]	0.006 [1.365]	0.018 [1.630]
SALESGROWTH	0.015* [1.779]	–0.001* [–1.754]	0.001 [0.934]	0.012 [0.986]	–0.000 [–0.708]	0.002 [1.182]	0.016 [1.526]	–0.001* [–1.778]	0.001 [0.374]
CASH		–0.006** [–2.183]	0.010 [1.255]		–0.009** [–2.448]	–0.010 [–0.863]		–0.004 [–0.998]	0.020* [1.901]
INDUSTRYQ	0.231*** [13.402]			0.182*** [6.942]			0.257*** [12.235]		
TANGIBLE	–0.038* [–1.688]			0.072** [2.425]			–0.114*** [–3.063]		
Constant	–0.591*** [–2.882]	–0.057*** [–7.931]	–0.052** [–2.365]	0.164 [0.782]	–0.009 [–0.956]	–0.015 [–0.447]	–0.316 [–1.327]	–0.082*** [–7.777]	–0.088*** [–3.173]
Observations	10,180	10,180	10,180	4267	4267	4267	5913	5913	5913
$\text{Pseudo } R^2$	0.244	0.064	0.138	0.265	0.041	0.138	0.272	0.075	0.125

*** $p < .01$, ** $p < .05$, * $p < .1$, z-statistics in brackets.

Tobin's Q .

Table 10 reports estimates from a system of three equations, specified in the same way as the system in Table 8, partitioning state institutional ownership into state independent and state grey segments, and having Tobin's Q replaced by its logarithm. The first column reports estimates for the Tobin's Q equation, which indicate that state *independent* institutional ownership is significantly positively related to firm value, with a coefficient of 6.929 and a corresponding t -statistic of 5.777, while state *grey* institutional ownership is negatively related to firm value, having a coefficient of –22.032, but the estimate is statistically indistinguishable from zero. The sub-period estimates for the effect of state independent ownership on firm value is qualitatively similar to the results reported in Table 8. Ownership by state independent institutions has a positive, but insignificant effect on firm value in the first half of the sample period, while its effect remains positive and becomes highly significant in the second half of the sample period. The sub-period results for the effect of state grey ownership on firm value in Table 10 also confirms the results reported in Table 8. Ownership by state grey institutions has a significant negative effect on firm value in the first half of the sample period, while it remains negative

Table 10

Robustness test for state institutional ownership and firm value – $\ln(\text{Tobin's } Q)$.

The table presents coefficient estimates from systems of three equations where the dependent variables are the logarithm of Tobin's Q ($\ln(\text{TBOQ})$), ownership by state independent institutions (IO_STATE_IND), and ownership by state grey institutions (IO_STATE_GREY) as a percentage of market capitalization. The system of equations is estimated using three-stage least squares. Firm-level explanatory variables are the same as in Table 8, where institutional ownership is partitioned between private, state-independent, and state-grey institutions. All equations include year dummies.

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IO_STATE_IND	6.929** [5.777]			4.016 [1.256]			8.102*** [5.685]		
IO_STATE_GREY	-22.032 [-1.641]			-43.865** [-2.197]			-23.650 [-1.448]		
IO_PR	0.511*** [4.842]			0.391** [2.089]			0.484*** [4.275]		
LZINDEX	-0.019* [-1.760]	-0.001*** [-5.817]	-0.003*** [-4.485]	-0.056*** [-2.752]	-0.001*** [-5.071]	-0.003** [-2.280]	0.001 [0.109]	-0.000*** [-2.680]	-0.004*** [-4.388]
INDPT	0.023 [0.345]	-0.003*** [-2.658]	-0.007 [-1.158]	-0.063 [-0.414]	-0.003 [-1.380]	-0.020 [-1.544]	0.007 [0.083]	-0.003*** [-2.746]	-0.003 [-0.426]
CHAIRCEO	-0.005 [-0.197]	0.000 [0.254]	0.006* [1.849]	-0.100 [-1.535]	-0.001 [-0.771]	0.017*** [3.426]	0.104** [2.559]	0.001 [0.894]	-0.003 [-0.753]
SIZE	0.073*** [6.100]	0.000* [1.812]	-0.001 [-0.499]	0.088*** [2.840]	2.043* [2.043]	-0.002 [0.690]	0.078*** [5.975]	0.000 [0.381]	-0.002 [-1.396]
AGE		-0.001 [-1.231]	0.015*** [4.912]		-0.001* [-1.770]	0.006 [1.199]		-0.000 [-0.246]	0.020*** [4.957]
CS1300		0.001 [1.643]	-0.000 [-0.011]		0.002** [2.230]	-0.011** [-2.079]		0.000 [0.119]	0.010*** [3.105]
TURNOVER		-0.001 [-1.526]	0.003 [0.809]		-0.005*** [-2.746]	-0.009*** [2.946]		-0.001 [-1.185]	-0.007 [-1.615]
SIGMA		0.003 [1.615]	0.082*** [8.717]		0.000 [0.041]	0.056*** [3.892]		0.004* [1.648]	0.101*** [8.011]
$\ln(\text{TBOQ})$		-0.005*** [-2.618]	-0.070*** [-6.234]		-0.006* [-1.847]	-0.074*** [-3.822]		-0.002 [-0.688]	-0.063*** [-4.505]
STATE	-0.246*** [-6.750]	0.000 [0.566]	0.019*** [7.216]	-0.177** [-2.472]	-0.001* [-1.735]	0.018*** [4.147]	-0.283*** [-6.346]	0.001** [2.528]	0.021*** [6.125]
STRATEGIC	0.252*** [4.731]	0.002*** [2.880]	-0.018*** [-4.062]	0.282*** [3.061]	0.004*** [4.093]	-0.023*** [-3.755]	0.247*** [3.650]	-0.001 [-0.726]	-0.011 [-1.562]
ROA		-0.007*** [-2.585]	0.009 [0.561]		0.001 [0.362]	0.001 [0.041]		-0.011** [-2.821]	0.022 [1.070]
LEVERAGE	-0.580*** [-12.458]	-0.004*** [-2.939]	-0.034*** [-3.948]	-0.570*** [-6.256]	-0.004** [-2.051]	-0.023* [-1.701]	-0.591*** [-9.210]	-0.002 [0.001*]	-0.039*** [0.009***]
SALESGROWTH	0.011 [0.832]	0.000 [1.474]	0.005*** [3.211]	0.030 [1.275]	-0.000 [-0.153]	-0.001 [-0.343]	0.026 [-1.268]	0.001* [1.719]	0.009*** [4.731]
CASH		-0.002 [-1.262]	0.001 [0.091]		-0.001 [-0.900]	-0.008 [-0.509]		-0.001 [-0.581]	0.001 [0.065]
INDUSTRYQ	0.341*** [10.718]			0.227*** [2.587]			0.377*** [9.722]		
TANGIBLE	-0.085** [-2.107]			0.033 [0.277]			-0.195*** [-3.582]		

(continued on next page)

Table 10 (continued)

Variables	1999-2010			1999-2004			2005-2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	<i>ln(TBQ)</i>	<i>IO_STATE_GREY</i>	<i>IO_STATE_IND</i>	<i>ln(TBQ)</i>	<i>IO_STATE_GREY</i>	<i>IO_STATE_IND</i>	<i>ln(TBQ)</i>	<i>IO_STATE_GREY</i>	<i>IO_STATE_IND</i>
Constant	-0.617*** [-2.891]	0.008* [1.841]	0.062*** [2.635]	-0.344 [-0.753]	0.002 [0.388]	0.076* [1.930]	-0.728*** [-2.845]	0.006 [1.112]	0.066** [2.345]
Observations	10,180	10,180	10,180	4267	4267	4267	5913	5913	5913
Pseudo R ²	0.086	0.004	0.004	0.070	0.011	0.003	0.072	0.007	0.001

***p < .01, **p < .05, *p < .1, z-statistics in brackets.

Table 11

Robustness results for private institutional ownership and firm value – future Tobin's Q .

The table presents coefficient estimates from systems of three equations where the dependent variables are the one-year-ahead Tobin's Q , ($Tobin's Q_{t+1}$), ownership by *private independent* institutions (IO_PR_IND), and ownership by *private grey* institutions (IO_PR_GREY) as a percentage of market capitalization. The system of equations is estimated using three-stage least squares. Firm-level explanatory variables are the same as in [Table 7](#), where institutional ownership is partitioned between state, private-independent, and private-grey institutions. All equations include year dummies.

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	TBQ_{t+1}	IO_PR_GREY	IO_PR_IND	TBQ_{t+1}	IO_PR_GREY	IO_PR_IND	TBQ_{t+1}	IO_PR_GREY	IO_PR_IND
IO_PR_IND	65.188*** [8.343]			72.592*** [6.219]			66.107*** [5.797]		
IO_PR_GREY	–132.184*** [–4.367]			27.390 [0.600]			–145.358*** [–4.608]		
IO_STATE	0.007 [0.023]			0.107 [0.337]			–0.213 [–0.421]		
$LZINDEX$	0.359*** [2.766]	–0.003*** [–11.869]	–0.011*** [–16.887]	0.732*** [3.882]	–0.002*** [–8.114]	–0.009*** [–10.880]	0.415** [2.225]	–0.003*** [–8.288]	–0.013*** [–13.162]
$INDPT$	1.164** [2.030]	0.006*** [2.783]	–0.004 [–0.537]	0.277 [0.245]	0.018*** [4.932]	–0.010 [–0.926]	0.206 [0.288]	0.002 [0.680]	0.003 [0.368]
$CHAIRCEO$	–0.379 [–1.523]	–0.000 [–0.212]	0.005* [1.816]	–0.285 [–0.890]	–0.001 [–0.777]	0.004 [0.958]	–0.344 [–0.918]	0.001 [0.442]	0.007 [1.588]
$SIZE$	0.182 [0.807]	0.006*** [12.912]	0.007*** [5.211]	–0.246 [–1.091]	0.004*** [6.050]	0.001 [0.414]	0.163 [0.548]	0.007*** [11.419]	0.010*** [5.699]
AGE		0.002** [2.216]	0.005*** [2.643]		0.002* [1.705]	–0.000 [–0.102]		0.001 [0.589]	0.004 [1.262]
$CSI300$		–0.002** [–2.199]	0.001 [0.533]		–0.000 [–0.359]	0.001 [1.421]		–0.004*** [–2.700]	0.001 [0.223]
$TURNOVER$		–0.009*** [–5.203]	–0.016*** [–3.485]		–0.007* [–1.816]	0.007 [1.462]		–0.009*** [–4.391]	–0.018*** [–3.485]
$SIGMA$		–0.006** [–2.444]	–0.010* [–1.821]		–0.005 [–1.401]	0.003 [0.499]		–0.004 [–1.064]	–0.006 [–0.664]
TBQ		–0.001*** [–5.374]	0.008*** [12.785]		–0.000 [–0.757]	0.010*** [10.805]		–0.002*** [–5.254]	0.007*** [8.030]
$STATE$	3.147*** [7.254]	0.002** [2.181]	–0.047*** [–20.069]	3.483*** [5.477]	0.002 [1.611]	–0.049*** [–13.644]	3.072*** [4.991]	0.002 [1.553]	–0.045*** [–14.773]
$STRATEGIC$	1.303*** [3.418]	0.001 [0.607]	–0.017*** [–3.784]	1.118** [2.502]	0.005*** [2.800]	–0.016*** [–3.120]	0.500 [0.703]	–0.005* [–1.736]	–0.016** [–2.018]
ROA		0.022*** [4.508]	0.030** [2.528]		–0.023*** [–2.983]	–0.004 [–0.289]		0.038*** [5.260]	0.066*** [3.589]
$LEVERAGE$	–1.683*** [–3.613]	0.005*** [2.659]	0.027*** [4.791]	–2.298*** [–3.056]	0.003 [1.254]	0.030*** [3.640]	–2.318*** [–3.694]	0.004 [1.382]	0.028*** [3.516]
$SALESGROWTH$	–0.265** [–2.051]	–0.001** [–2.387]	0.002 [1.024]	–0.264 [–1.567]	–0.001 [–0.910]	0.004* [1.751]	–0.099 [–0.524]	–0.001* [–1.682]	–0.001 [–0.469]
$CASH$		–0.004 [–1.555]	–0.009 [–1.522]		–0.012*** [–2.909]	0.003 [0.356]		–0.001 [–0.316]	–0.002 [–0.292]
$INDUSTRYQ$	0.226*** [3.475]			0.132 [1.000]			0.272*** [2.922]		
$TANGIBLE$	–0.009 [–0.098]			–0.056 [–0.393]			0.109 [0.706]		
<i>Constant</i>	–4.228 [–1.482]		–0.046** [–2.321]	0.123 [0.045]	–0.047*** [–4.274]	0.053* [1.808]	–3.894 [–1.059]	–0.092*** [–8.700]	–0.075*** [–2.702]
<i>Observations</i>	8457	8457	8457	3918	3918	3918	4539	4539	4539
<i>Pseudo R²</i>	0.015	0.062	0.138	0.024	0.053	0.140	0.012	0.076	0.134

*** $p < .01$, ** $p < .05$, * $p < .1$, z-statistics in brackets.

but loses its significance in the second half of the sample period. The results in [Table 10](#), corroborate our previous findings regarding the role of pressure sensitivity for the effect of state institutional ownership on firm market performance in China, and demonstrate the robustness of our findings to transformations of Tobin's Q . Moreover, the results reported in the sub-period estimations, e.g. columns four and seven in [Tables 9 and 10](#), confirm our previous findings that the fundamental legal and institutional reforms enacted in 2004 and 2005, focused on regulating investment businesses and strengthening shareholder rights, enabled independent institutional investors to provide more effective monitoring and to grow into an essential pillar of corporate governance in China.

Next, we examine the robustness of our results by estimating the effect of institutional ownership on firm's next year Tobin's Q . The results reported in [Table 11](#) are from a system of three equations, specified in the same way as the system in [Table 7](#), partitioning private institutional ownership into private independent and private grey segments, and having next year's Tobin's Q as the dependent variable in the performance equation. The estimation results indicate that private independent institutional ownership has a strong positive effect on next year's firm value, in the entire sample, as well as in the sub-period estimations. The effect of private grey

Table 12

Robustness results for state institutional ownership and firm value – future Tobin's Q.

The table presents coefficient estimates from systems of three equations where the dependent variables are the one-year-ahead Tobin's Q (TBQ_{t+1}), ownership by state independent institutions (IO_STATE_IND), and ownership by state grey institutions (IO_STATE_GREY) as a percentage of market capitalization. The system of equations is estimated using three-stage least squares. Firm-level explanatory variables are the same as in Table 8, where institutional ownership is partitioned between private, state-independent, and state-grey institutions. All equations include year dummies.

Variables	1999–2010			1999–2004			2005–2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	TBQ_{t+1}	IO_STATE_GREY	IO_STATE_IND	TBQ_{t+1}	IO_STATE_GREY	IO_STATE_IND	TBQ_{t+1}	IO_STATE_GREY	IO_STATE_IND
IO_STATE_IND	63.426*** [5.797]			80.795*** [4.139]			60.014*** [4.539]		
IO_STATE_GREY	-271.033*** [-2.597]			-6.089 [-0.045]			-378.494*** [-2.810]		
IO_PR	0.422 [0.570]			0.599 [0.469]			0.361 [0.608]		
$LZINDEX$	-0.106 [-1.187]	-0.001*** [-5.210]	-0.001 [-1.141]	-0.020 [-0.134]	-0.001*** [-4.896]	0.001 [0.525]	0.007 [0.074]	-0.000* [-1.899]	-0.002** [-2.046]
$INDPT$	0.030 [0.048]	-0.003** [-2.432]	-0.012* [-1.647]	1.733 [1.538]	-0.003 [-1.112]	-0.021* [-1.648]	-0.706 [-1.112]	-0.003** [-2.500]	-0.008 [-0.986]
$CHAIRCEO$	-0.318 [-1.279]	0.000 [0.289]	0.006* [1.739]	-1.548*** [-3.285]	-0.001 [-0.737]	0.019*** [3.854]	0.711* [1.934]	0.001 [1.414]	-0.006 [-1.284]
$SIZE$	0.382*** [3.478]	0.001** [2.496]	-0.006*** [-4.454]	0.363 [1.601]	0.001*** [3.249]	-0.005** [-2.239]	0.214* [1.787]	0.000 [0.860]	-0.006*** [-3.645]
AGE		-0.000 [-0.020]	0.001 [0.268]		-0.001 [-1.196]	0.000 [0.101]		0.001 [1.157]	0.006 [1.457]
$CS1300$		0.000 [0.453]	0.006*** [2.683]		0.001* [1.785]	0.001 [0.415]		-0.000 [-0.614]	0.008** [2.437]
$TURNOVER$		-0.001* [-1.692]	-0.004 [-1.013]		0.000 [0.013]	0.005* [1.839]		-0.002* [-1.830]	-0.008* [-1.693]
$SIGMA$		0.004*** [2.658]	0.017** [2.055]		-0.002 [-1.006]	-0.007 [-0.630]		0.006*** [3.136]	0.039*** [3.225]
TBQ		-0.001*** [-8.907]	0.007*** [12.635]		-0.000 [-1.106]	0.010*** [16.704]		-0.001*** [-7.744]	0.007*** [8.247]
$STATE$	-1.924** [-5.543]	0.000 [0.955]	0.031*** [12.378]	-2.076*** [-4.624]	-0.001 [-1.096]	0.026*** [6.467]	-1.603*** [-3.652]	0.001*** [2.630]	0.033*** [10.663]
$STRATEGIC$	2.330*** [4.877]	0.002*** [3.021]	-0.024*** [-5.182]	2.015*** [3.171]	0.004*** [4.015]	-0.023*** [-3.947]	1.092 [1.565]	-0.001 [-1.138]	-0.025*** [-3.127]
ROA		-0.004 [-1.596]	-0.040*** [-2.674]		-0.007 [-1.426]	-0.020 [-1.427]		-0.005 [-1.519]	-0.060*** [-2.888]
$LEVERAGE$	-2.608*** [-5.880]	-0.004*** [-3.746]	0.015* [2.417]	-2.216*** [-3.297]	-0.004** [-1.115]	0.028*** [3.113]	-2.794*** [-0.261]	-0.004*** [2.728]	0.007 [0.896]
$SALESROWTH$	-0.060 [-0.482]	0.000 [1.369]	0.003 [1.612]	0.383** [2.051]	-0.000 [-0.170]	-0.005** [-2.075]		0.001** [2.211]	0.010*** [4.323]
$CASH$		-0.002 [-1.627]	-0.013** [-2.014]		-0.004 [-1.520]	-0.003 [-0.408]		-0.001 [-0.655]	-0.011 [-1.080]
$INDUSTRYQ$	0.331 [1.495]			0.450 [0.812]			0.366* [1.907]		
$TANGIBLE$	-0.069 [-0.256]			-0.279 [-0.348]			-0.027 [-0.102]		

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Table 12 (continued)

Variables	1999–2010		1999–2004		2005–2010				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	TBQ_{t+1}	IO_STATE_GREY	IO_STATE_IND	TBQ_{t+1}	IO_STATE_GREY	IO_STATE_IND	TBQ_{t+1}	IO_STATE_GREY	IO_STATE_IND
Constant		-0.002 [-0.475]	0.049** [2.240]	-0.533 [-0.174]	-0.013* [-1.838]	0.025 [0.717]			
Observations	8457	8457	8457	3918	3918	3918	4539	4539	4539
Pseudo R ²	0.006	0.006	0.019	0.008	0.020	0.016	0.004	0.005	0.029

***p < .01, **p < .05, *p < .1, z-statistics in brackets.

institutional ownership on next year's Tobin's Q is negative and highly significant in the estimation encompassing the entire sample period. Turning to the sub-period estimation results, this negative effect seems to be driven by the highly significant negative association between private grey ownership and future firm value in the second half of the sample period, since the estimate for the first half of the sample period is not significantly different from zero.

The results reported in Table 12 are from a system of three equations, specified in the same way as the system in Table 8, partitioning state institutional ownership into state independent and state grey segments, and having next year's Tobin's Q as the dependent variable in the performance equation. The positive and highly significant estimates for the parameters on the state independent institutional ownership variable, in all three estimations, confirm the findings for its positive effect on firm value, reported in Tables 8 and 10. Ownership by state independent institutions has a significantly positive effect on future firm value both in the first and the second half of the sample period. The parameter estimates on the state grey institutional ownership variable are negative in all three system estimations, confirming the results reported in Tables 8 and 10. In particular, the estimated coefficient for the entire sample period, as well as the coefficient for the second half of the period, are negative and highly significant, while the coefficient for the first half of the period is statistically indistinguishable from zero. In summary, the results reported in Tables 11 and 12 corroborate our previous findings regarding the role of pressure sensitivity for the effect of both private and state institutional ownership on firm market performance in China, and demonstrate the robustness of these findings to using one-year-ahead Tobin's Q as the performance measure.

5. Conclusion

We use information on the identity and percentage ownership of the ten largest shareholders in Chinese nonfinancial firms to examine institutional investors' preferences for specific firm characteristics and institutional ownership's impact on firm value. From the names and types of the ten largest investors in each publicly-traded Chinese firm each year, we manually identify the financial institutions among them, to determine if they are state-owned or privately-owned, as well as to classify each financial institution into one of the following categories: banks, bank-managed investment funds, credit cooperatives, insurance companies, investment advisors, asset management companies, pension funds, and venture capital companies. Banks, insurance companies, and credit cooperatives, labeled *grey* institutions, are pressure-sensitive due to their significant non-equity business relations with the firms they invest in, while pension funds, asset management, investment advisory, and venture capital firms, labeled *independent* institutions, are much less sensitive to pressures on behalf of management or other dominant shareholders. We then partition the institutional ownership into the following categories: ownership by state institutions, private institutions, *independent* institutions, *grey* institutions, *independent* state institutions, *grey* state institutions, *independent* private institutions, and *grey* private institutions.

Our findings suggest that, while institutional investors invest less in companies with weaker corporate governance, the effect of their ownership on firm performance depends on whether they are *grey* or *independent* institutions. *Independent* institutions in China have become effective monitors of the firms they hold equity in. These institutions are able to influence management and enhance shareholder value in an economically significant way - one percentage point increase in *independent* institutional ownership results in a 5.5 percentage point increase in Tobin's Q for the average firm in the sample.

Further analysis suggests that the positive relation between Tobin's Q and institutional ownership is mainly driven by the ownership of independent institutions, rather than driven by the ownership of privately-owned institutions. Moreover, this positive relation gets stronger after 2005, when significant progress has been made in strengthening the legal and institutional foundation of the capital markets in China (Herd et al., 2010). In contrast, ownership by *grey* institutions is either negatively or insignificantly associated with firm performance, suggesting the value-destructive consequences of the conflicts of interest these investors cultivate by being also business partners to the companies they hold equity in. The significant change after 2005 suggests that the enhanced external legal and corporate governance environment is critical for *independent* institutions' monitoring role to strengthen. These results are robust to potential endogeneity of institutional ownership, to transformations of the dependent variable, and to alternative estimation methods.

As independent institutional investors are growing in importance in China, it would be worth investigating the particular ways these investors are able to influence management. One line of future research could be the examination of their roles in particular corporate decisions - e.g. CEO turnover and compensation, the commitment to large capital expenditures, or research and development projects. Another interesting venue of exploration is the differentiation among independent institutional investors with respect to their investment horizons. Unlike short-term investors, institutions investing for the long run would be more likely to engage in costly monitoring and to benefit from taking an activist stance.

Appendix A. A system of equations estimated with a 3SLS

The three-stage least squares estimator can be thought of as producing estimates from a three-step process.

Step one develops instrumented values for all endogenous variables in the system. These instrumented values can simply be considered as the predicted values resulting from a regression of each endogenous variable on all exogenous variables in the system.

To illustrate with a concise example, the system of equations for 3SLS can be written as if the individual equations and their associated data are stacked. Although this example is for a system of three equations, it can easily be extended to a system of any number of equations.

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} Z_1 & 0 & 0 \\ 0 & Z_2 & 0 \\ 0 & 0 & Z_3 \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \epsilon_3 \end{bmatrix}$$

or

$$y = ZB + \epsilon$$

in matrix form.

The Z elements in these matrices represent both the endogenous and the exogenous right-hand-side variables in the equations. Also, since the equations in the system are simultaneous, there might be nontrivial correlation between the disturbances of the equations, so that

$$E(\epsilon'\epsilon) = \Sigma,$$

where the disturbances are further assumed to have an expected value of 0, e.g. $E(\epsilon) = 0$.

As noted, the first stage of the 3SLS regression requires developing instrumented values for the endogenous variables in the system. These values can be derived as the predictions from a linear regression of each endogenous regressor on all exogenous variables in the system. Designating the set of all exogenous variables as X results in

$$\hat{z}_i = X(X'X)^{-1}X'z_i,$$

for each regressor i .

Collectively, the set of regressors \hat{Z} contains the instrumented values for all the regressors. They take on the actual values for the exogenous variables and the first-stage predictions for the endogenous variables.

Step two obtains a consistent estimate for the covariance matrix of the equation disturbances. These estimates are based on the residuals from a 2SLS estimation of each structural equation.

Let's denote the covariance matrix of the equation disturbances with Σ . A consistent estimate of Σ can be formed from the residuals of 2SLS estimates of each equation in the system. If we take E to be the matrix of residuals from these estimates, a consistent estimate of Σ is

$$\hat{\Sigma} = \frac{E'E}{n},$$

where n is the number of observations in the sample.

Step three performs a GLS-type estimation using the covariance matrix, estimated in the second stage, and the instrumented values, estimated in the first stage, in place of the right-hand-side endogenous variables.

Given the covariance matrix estimate ($\hat{\Sigma}$) and the instrumented variables (\hat{Z}), a generalized least squares (GLS) estimator can be formed for the parameters of the system:

$$\hat{B} = \{\hat{Z}'(\hat{\Sigma}^{-1} \otimes I)\hat{Z}\}^{-1}\hat{Z}'(\hat{\Sigma}^{-1} \otimes I)y,$$

where \hat{B} is the vector of 3SLS estimates of the system parameters.

The asymptotic variance-covariance matrix of the estimator is just the standard formulation for a GLS estimator

$$V_{\hat{B}} = \{\hat{Z}'(\hat{\Sigma}^{-1} \otimes I)\hat{Z}\}^{-1}.$$

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