Ownership Structure and Corporate Performance

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Abstract

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Previous studies of ownership structure mainly focus on the relationship between insider ownership and corporate performance. However, empirical results have failed to provide consistent evidence to prove whether the type of ownership does significant affect firm performance. Our paper fills this gap by classifying different types of shareholders (individual shareholders and institutional shareholders) and observes their relationship with corporate value respectively. In addition, we examine quarterly panel data and indirect ownership to address the problem of endogeneity argued Demetz (2001).

Our results show that only institutional ownership has consistent and significant relationship with firm value in both yearly regressions and panel data regression, while the relationship between individual ownership and firm value is not significant. Institutional ownership first decreases then increases firm value as institutional shareholders hold higher stakes in the firm. However, the effect of institutional ownership is counteracted when individuals have unexpectedly high levels of ownership. We also find that if institutional shareholders acquire more shares during a quarter, the change in firm value during this period is positive. Our results support the hypothesis that firm value creation is higher if the largest shareholder is an institutional investor.

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1.   Introduction

It is well understood that ownership structure has important implications for corporate governance and performance. As early as 1932, Berle and Means studied the conflict between managers and shareholders. They argue that outside shareholders are too diffuse to monitor managers, and thus corporate resources are often used to satisfy managers' self-interest rather than to maximize shareholder wealth. One solution to this problem is to give managers equity compensation in the firm. Jensen and Meckling (1976) propose the concept of associating ownership and control to agency costs, and that agency costs can be mitigated by balancing managerial ownership and outsider ownership.

According to Jensen and Meckling (1976), the costs of deviation from value-maximization decline as managerial ownership rises, which is convergence-of-interest hypothesis. However, Morck et al. (1988), McConnell (1990), and Stulz (1988) point out that there exists a level of insider ownership which can maximize the value of a firm. In other words, the positive effect of managerial ownership on corporate value will be wiped out as more ownership is concentrated in managers' hands because they have high enough voting power to influence corporate policy and decision that benefit themselves, which is entrenchment hypothesis [Morck et al. (1988)].

McConnell (1990) uses the sample of 1,173 firms for 1976 and 1,093 firms for 1986 and find that managerial ownership improves firm value until it reaches approximately 40% to 50% and then slopes slightly downward. Morck et al. (1988) find the similar result, where they apply piecewise linear regression and find the break point of managerial ownership at 5%, where managerial ownership is negatively related to firm value after

that. These studies are criticized by Demsetz (2001), and Himmelberg et al. (1999), where they argue that the ownership structure of a corporation should be thought of as an endogenous outcome of decisions that reflect the influence of shareholders and of trading on the market for shares. And both Demsetz (2001), and Himmelberg et al. (1999) find no significant relationship of insider ownership and corporate value.

While considerable work focuses on the relationship between insider ownership and firm performance, few studies, so far, discuss whether the type of ownership significantly affects firm performance. Institutional shareholders, most of which are blockholders, are always seeking investment opportunities and have professional insight. Compared with other outside shareholders, they are more likely to have bargaining power against management team and play an active role in monitoring the corporation.

Pound (1988), in contrast, presents two hypotheses considering institutional shareholders' possible negative contribution to firm performance through conflict-of-interest behavior and Strategic-alliance behavior. He suggests that institutional investors pose their own incentive conflicts and thus deviate from the interest of other shareholders. They also harm the corporation if they are less willing to challenge the management team in order to maintain business relationships with the firm.

The empirical results for the effect of institutional ownership are mixed. The cost-effective monitoring hypothesis is supported by McConnell (1990) and Hand and Suk (1998). McConnell (1990) includes total institutional shareholders share ratio in the ownership-firm value regression and reports a significant positive relationship with firms' Tobin Q. Hand and Suk (1998) use the geometric average return for a five-year period

(1988-1992) to proxy for firm performance and find that the geometric average return is positively related to institutional ownership. However, they cannot conclude a long-term positive effect of institutional ownership on corporate value as they only test the cross-sectional effect. They also ignore the fact that substantially higher concentration of institutional ownership may lead to conflict-of-interest and strategic-alliance with management team.

Few studies have considered the negative effect institutional shareholders may have on the corporation. Chen and Blenman (2008), Iturriaga and Crisotomo (2010) have tested both the efficient-monitoring and conflict-of-interest effects by including a quadratic term in the model and find a nonlinear relationship of ownership concentration in institutional shareholders and firm value. However, they only consider the top institutional shareholder ownership, rather than using total institutional shareholders' equity. This limitation can result from ignoring the possible effect imposed by multiple institutional shareholders on corporate performance.

In this paper, our first goal is to reexamine the theoretical explanations of the link between managerial ownership and firm performance proposed by McConnell (1990). We use the direct ownership sample of firms in June 2003 and June 2005. Consistent with McConnell (1990), our results show that individual ownership first increases firm value then decrease firm value after certain level of ownership is concentrated in individual shareholders. We also modify their model by including the quadratic term of institutional ownership in the model to examine the possible negative effect of institutional ownership. The effect of institutional ownership is significant and is found to be first negatively then positively related to firm value after reaching a threshold.

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The second goal of this paper is to propose an equilibrium interpretation of individual ownership effect and institutional ownership effect on company performance. We examine an indirect ownership sample from 2004 to 2010 and try to mitigate the problem of endogeneity argued by Demsetz (2001). We also apply panel data regression instead of cross-sectional regression to control for any constant and unobservable heterogeneity, which cannot be accurately estimated using OLS.

The indirect ownership, unlike direct ownership, will not be directly affected by the variables that influence the firm. We define indirect ownership if firm A indirectly owns firm C through other direct investment in firm B. Indirect institutional ownership still presents the convex effect on firm value as it does in direct institutional ownership; while indirect individual ownership no longer significantly relates to corporation value when we pool all the quarterly data together. However, the effect of institutional ownership is counteracted when individuals hold unexpectedly high level of ownership.

The categories of institutional investors and families (individuals) investors and whether the firm is individual-owned or institutional-owned have not been widely explored by the current literature. The inclusion of these variables in the model provides us a new picture of how institutional equity and individual equity affect corporate value under certain circumstances. We find that, generally, firm value is higher when it is institutional-owned.

2.   Literature Review

2.1.   Insider Ownership

Agency problems arise from the inherent conflict of interests between managers and shareholders. Managers attempt to pursue the personal interest and goals at the expense of corporate shareholders, thereby maximizing their own utility rather than maximizing shareholder wealth. They may even forgo projects and other decisions that benefit the corporation, thereby decreasing firm value [Berle and Means (1932)].

The concept of associating ownership and control to agency costs is suggested by Jensen and Meckling (1976). A wholly owned firm is operated to maximize owner's pecuniary and non-pecuniary benefits, which includes profits made from operating the firm, and other utility generated by entrepreneurial activities. If the owner only owns a fraction of the firm, he will maximize his utility potentially at a cost to other shareholders. Because in this case, the firm value reduction due to the manager satisfying his self-interest is less than the benefits he could get from expropriating firm resources. As the managerial equity declines, the degree to which a manager can expropriate company resources increases. It is worth noting, however, that as minority shareholders own more shares, they are more willing to spend resources to monitor managerial behavior. Overall, Jensen and Meckling (1976) proposed a theory balancing managerial and outsider ownership to mitigate the agency costs arising from the separation of ownership and control.

Following Jensen and Meckling (1976), many papers have developed models of insider ownership on corporate value. Most studies discuss how the level of insider ownership

affects manager's decision making and thus influence the degree of managerial effort to maximize shareholders' benefits and corporate performance.

One of these influences can be found in takeover event, when the conflict between managers and outside shareholders is obviously intensified. Managers attempt to control voting rights because they can affect the behavior of potential bidders and hence the probability of losing control [Stulz (1988)]. When managers have a substantial fraction of ownership, it harms the outside shareholders' benefits because the tender offer is always opposed by managers in order to maintain control; however, if managers have no shares of the company, a tender offer can succeed, but the premium offered by the bidder is less than the maximum that the bidder is willing to pay. Therefore, consistent with Jensen and Meckling (1967), Stulz points out that there exists a level of insider ownership which can maximize the value of firm. However, Stulz assumes that the conflict of interest between shareholders and managers arises only from the fact that a successful takeover always benefits shareholders but hurt managers, which is limited. In addition he also ignores the positive effect of large managerial ownership on firm value as stressed by Jensen and Meckling (1976).

Morck, Shleifer and Vishny (1988) conduct an empirical test of the managerial ownership-firm value relationship. Unlike Stulz (1988), Morck, Shleifer and Vishny (1988) take into account different level of insider ownership by artificially setting three ranges of managerial ownership: Low level of 0%-5%, Medium level of 25%-50% and significantly high level of over 50%. The results report a positive relation between ownership and Tobin Q in the range of 0% to 5% ownership, then a negative relation between 5% to 25%, and a further positive relation beyond 25%. They apply the

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convergence-of-interests hypothesis and entrenchment hypothesis to extend the theory of ownership structure of Jensen and Meckling (1976). When insider ownership is at a very low level, increasing the ownership of management can align managers' interests with shareholders' interest. As managers own more and more shares, it's possible that they expropriate corporate resources; however, the decrease or increase in firm value depends on which effect, convergence-of-interests or entrenchment, dominates after 25% managerial ownership. The limitation of this paper is the small sample size, using only 371 *Fortune 500* firms in 1980 and the artificial breakpoints of ownership.

Compared to Morck, Shleifer and Vishny (1988), McConell (1990) investigates the relation of ownership structure and corporate value in a more flexible way. Instead of piecewise regression, nonlinear regression is applied to capture the effect of ownership on corporate value changes along the level of ownership. The result is similar to Stulz (1988), they find a curvilinear relation and that managers could maximize the corporate value when almost 50% of the shares are concentrated in their hands, with the inflection point between 40% and 50%. Then McConnell et al.(2008) examine the impact of ownership structure by observing the relation between changes in ownership and changes in stock prices within the 6-day interval after the announcement of share purchases by insiders. Still consistent with many previous studies, they find a positive relation when managers hold small fraction of shares as evidence of incentive alignment, and negative relation when managers hold larger fraction of shares, evidence of managerial self-interest.

2.2. Other Blockholder Ownership

The literature focusing on insider or managerial ownership, in general, assumes that the management team has relatively strong power and freedom in using firm's resources and in influencing policy. Large numbers of shareholders are diffused and these small investors have little incentive to monitor management; as the cost for them to monitor managerial performance outweighs the benefits they could get from increased firm value.

Giving the increasingly active participation in firm management by different types of shareholders these days, recent literature has extended the area of insider or managerial ownership to include large shareholders ownership [Thomsen and Pedersen (2000)]. While most outside shareholders cannot exercise real power to oversee managerial performance in modern corporation[Demsetz and Lehn (1985)], they still can discipline managers' behavior in other ways. Edmans and Manso (2011) argue that blockholders are able to lead managers to act in line with other shareholders' interest.

A blockholder is defined as a shareholder with an exceptionally large amount or value of stock. There's still no strict definition of how many shares should be defined as a block, however it's often used for holdings of more than 10,000 shares or shares worth more than $200,000. Blockholders with high concentrated ownership have more power and have sufficient incentives to bear the cost of monitoring, and if necessary, to intervene to correct value-destructive actions.

Edmans and Manso (2011) suggest that blockholders govern management team in a corporation through trading and intervention. Once the large shareholders find evidence of manager shirking and perquisite-taking, they can sell their shares to other traders and

drive down the stock price, thereby reducing the value of the manager's equity compensation, and consequently forcing managers to take corrective actions to improve firm value. Admati, Pfleiderer and Zechner (1994), Chen, Harford and Li (2007), and Starks (2003) provide evidence of governance through trading. Alternatively, if several large blockholders have a high concentration of shares in their hands, they may have the voting rights and power needed to directly intervene in the management team.

The effect of blockholder ownership has also studied in the takeover context, where it implies that block trades benefit both target and acquirer firms. [Mikkelson and Rudback (1985)] find positive abnormal returns associated with initial announcements when the target firm receives 5% or more investment prior a takeover. Barclay and Holderness (1990) report the similar results, where they find positive excess returns around announcement date when outsiders acquire large equity positions and they also find the stock-price increases are larger as control passes to new blockholders when management does not resist the blockholder's effort to influence corporate policy.

Prior literature has shown that large shareholders improve firm's market performance, because compared to small shareholders; they monitor and control managers to act in the interest of outside shareholders. However, whether the positive effect is consistent for all levels of large shareholder ownership still needs discussion. La Porta et al. (1997) argue that the influence of ownership structure depends on the institutional and legal setting. Minority shareholders' benefits may not be protected if ownership is too concentrated in the hands of several large blockholders.

This theory is derived from Jensen and Meckling (1976) and the combination of alignment and entrenchment effect [Morck et al. (1988)] still can be applied to analyzing the effect of blockholders and institutional investors. When large shareholders do not have a high enough percentage of shares, they cannot extract private benefits and would like to co-operate with other shareholders to discipline management team; however, the possibility of entrenchment arises after the threshold of ownership is reached, and they can now pursue their self-interest at the cost of minority shareholders. And thus Iturriaga and Crisotomo (2010) test the effect of blockholder ownership on corporate value with sample of Brazilian companies where ownership concentration is measured as the percentage of ownership owned by the largest shareholder. The results support the theory discussed above: blockholders' ownership structure has a nonlinear effect. Ownership concentration initially improves the value of firm; but after a certain threshold, firm value decreases as the risk that large shareholders will expropriate corporate wealth increases.

2.3. Institutional Shareholders

In North America most of the blockholders are institutional investors, which have large funds and expertise and are always seeking investment opportunities. The Federal Reserve Financial Economists Roundtable (1998) concludes that increased institutional ownership can benefit corporate governance and mitigate the conflict of interest arising from separation of ownership and control. They summarize three positive advantages: 1. Institutional owners with higher ownership concentration are able to perform oversight activities applying their professional insight; 2. They monitor management behavior and decisions and mitigate the conflict of management and other owners at a lower cost than minority shareholders; 3. Institutional investors, after owning a large shares of company,

find it more costly to sell their position than to intervene if they feel the managers are not maximizing shareholder value.

Apart from the advantages of increasing institutional ownership, Pound (1988) presents two hypotheses against the efficient-monitoring theory. According to the strategic-alliances hypothesis, institutional investors feel that they benefit more if they align their interests with the incumbent management than if they compete with the management team. The conflict-of-interest hypothesis suggests that institutional investors are inclined to vote for management because they have certain business relationship with the company and voting against management may lead to a detriment of this relationship. The second hypothesis is supported by Cornett et al. (2004), where he shows that in order to obtain new or maintain existing business relationships with firms, institutional investors are less willing to challenge management decisions.

Many empirical tests have been carried out to verify the different hypotheses and theory about whether an increase in institutional ownership can benefit or harm firms. McConnell (1990) includes total institutional shareholders share ratio in the ownership-firm value regression and reports a significant positive relationship with firms' Tobin Q, which is contrary to Pound (1988). Other literature, including Clay (2001) and Hand and Suk (1998), also find a positive relationship between institutional ownership and firm value, which further suggests that such a relationship reveals efficient monitoring by institutional investors. Clay (2001) examines the 8,951 firms between 1988 and 1999 and finds significant results not only in the Ordinary Least Square (OLS) model but also in a Two-stage Least Square (2SLS) model. Hand and Suk (1998), instead of using Tobin Q to measure corporate value, use the geometric average return for a five-year period

(1988-1992) to proxy for firm performance. However, both McConnell (1990) and Clay (2001) cannot conclude the long-term positive effect of institutional ownership on improving corporate performance as they only test the cross-sectional effect. The limitation in most of the literature also arises because they ignore the negative effect that higher concentration of large shareholders ownership might impose on firm.

Considering the possibility that the manager of a top institution seeks to establish a special relationship with the management in the invested firm thereby harming firm performance, Chen and Blenman (2008) hypothesize that the top ownership is negatively related to firm value. However, multiple institutional shareholders could benefit the firm because they can monitor each other to prevent the possibility that one of them expropriates firm resources at a cost to others, and also they can monitor managerial behavior more efficiently since they have enough power to influence managerial behavior and force them to act in the interest of shareholders. In their test, Chen and Blenman (2008) use two institutional ownership variables; the percentage of shares owned by the largest institutional investor, and the total of top 5 institution's share ratio. The results indicate that while a dominant institution might hurt firm value, the concentration of ownership of the top 5 institutions is positively related to Tobin Q. Chen and Blenman (2008) use a sample of firms from 2000-2003 but they didn't address the autoregressive problem in panel data regression. However, they run yearly regression and find that all significant variables in the yearly results have the same sign in the all-years results.

Iturriaga and Crisotomo (2010) take into account both the efficient-monitoring and conflict-of-interest effect of institutional ownership by including quadratic term in the model. Same as Chen and Blenman (2008), Iturriaga and Crisotomo (2010) use the

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proportion of shares owned by the largest shareholder to measure ownership concentration and square it to test a possible nonlinear relationship of ownership concentration. The results confirms this curvilinear effect: increasing largest ownership benefits the firm value, but this effect level off when largest shareholder owns high enough shares in a firm and they extract benefits to the detriment of small shareholders. The result is partially consistent with Chen and Blenman (2008) on the negative effect of largest shareholders.

However, there are studies that appear to challenge the significant role that institutional ownership plays in invested firms. Chaganti and Damanpour (1991), Lowenstein (1991) and Charfeddine and Elmarzougui (2010) find little evidence that institutional ownership is related with firm performance.

All in all, tests on ownership – performance types typically are done on ownership concentration [starting from Berle and Means (1932)]. Normally, blockholder ownership concentration is measured either by the largest shareholder's stockholding [Iturriaga and Crisotomo (2010)] or by the top five shareholders' equity [Chen and Blenman (2008), Cornett et al. (2004)]. Insider ownership is measured by the total share ratio owned by managers and executives in the firm [McConnell (1990), Morck et al. (1988)].

The two relationships, insider ownership via corporate performance, and institutional ownership via corporate performance, have been broadly explored in many papers; however, the results are mixed. Besides, scholars tend to examine these two relationships separately. Even though McConnell (1990) includes institutional ownership into the regression of insider ownership on corporate value and finds a positive impact of

institutional shareholders, they tend to ignore the negative effect imposed by the blockholders with sufficiently high shares ratio. According to the conflict-of-interest and efficient-monitoring hypotheses, it's believed that blockholder ownership, institutional ownership and insider ownership can interact together to influence corporate value and it's worth studying mutual effect of these ownership. Chaganti and Damanpour (1991) also cast doubt on whether the stock holding of family owners and corporate executives modify the relationship between institutional shareholdings and firm performance.

While a considerable body of research analyzing ownership structure has focused on insider ownership and blockholder ownership, less literature has paid attention to blockholder identity. It's important to note that the identity of owners has implications for their objectives and the way they exercise their power; this is reflected in company strategy with regard to profit goals, dividends, capital structure and growth rates [Thomsen and Pedersen (2000)].

3.   Research Design and Hypotheses Development

The generally accepted view in the literature is that insider ownership has two opposite effects on corporate performance depending on the level of share holding that managers own [Jensen and Meckling (1976), Morck et al. (1988) and Stulz (1988)]. Following their theory, we propose a "concave" relationship between insider ownership and corporate performance. When managers own a small fraction of shares, increasing their shareholdings helps mitigate conflict of interests and give managers an incentive to act in line with shareholders' interests; in contract, when they have a high level of ownership, managers have more freedom and power to influence the corporation and can satisfy their self-interest without being sufficiently monitored by outside shareholders.

We also test the effect of institutional ownership on corporate performance. As suggested by Pound (1988), we consider the types of incentives confronted by institutional investors: efficient-monitoring, strategic-alliances, and conflict-of-interest. These incentives are expected to exist at all levels of institutional ownership and the effects of these incentives will "compete" and determine which effect dominates at certain levels of ownership. Our hypothesis is that increasing institutional share holding first decreases firm value because institutional shareholders follow the "exit policy" when they disagree with management or when they sell the shares just for capital earning [Coffee (1991)]. Sometimes, institutional shareholders may even become involved in strategic-alliance with the management team and thus expropriate corporate resources at the expense of other shareholders, thereby harming firm value. However, sufficiently high ownership concentration makes them tightly connect to the corporation and more costly to sell their

shares due to the liquidity impact of selling a large stake. Normally, these institutional shareholders can be regarded as long-term strategic investors, and they have a motive to govern managers and vote for any decision that benefits outside shareholders.

However, it's argued that the relation between ownership structure and corporate value is spurious because of the potential endogeneity which arises when external pressures push firms toward optimal ownership structures that jointly optimize over ownership and value [Demsetz (2001)]. According to his point, the ownership structure of a corporation is an endogenous outcome of decisions that reflect the influence of shareholders and of trading on the market for shares. In an effort to address this alleged endogeneity problem, we investigate the indirect share holding of individual and institutional investors. We define indirect ownership if firm A indirectly owns firm C through other direct investment in firm B. Following example shows firm A indirectly owns firm C:
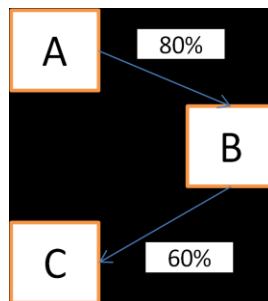
Figure 1 Indirect Ownership of Entity A in Entity B

The reason we use indirect ownership to mitigate the endogeneity problem is that the ownership structure of company C will not be directly affected by firm A and firm A's investment will not be directly influenced by company C's characters. However, firm A will still have an indirect effect on firm C through the holding and voting power in firm B. If firm A owns a high enough percentage of shares in firm B, it has right to govern firm

B's investment decisions and policy. Suppose that management team in firm B, under the governance of firm A, takes right action to maximize shareholders' value, firm B should play an active role in monitoring firm C in order to satisfy its shareholders (including firm A). Therefore, we can say that the effect of A's ownership in B can be transferred to C, and the theory of efficient-monitoring and conflict-of interest can still be applied to indirectly ownership.

We test the effect of indirect institutional ownership versus individual ownership. For indirect institutional ownership, we still hypothesize a non-linear effect on corporate value as we suggested that the effect of efficient-monitoring and conflict-of interest can be transferred through indirect shareholding. Similar to direct ownership, we expect a negative relationship between indirect institutional ownership and corporate value when ownership concentration is at a low level; a positive relationship after reaching a threshold of ownership. For indirect individual ownership, which includes both outside individual shareholders and managers, we still hypothesize the concave effect of individual ownership. But we expect that the effect might be mixed because we measure the individual ownership as the shares owned by normal families (or individuals) and managers. In comparison to institutional investors who have expertise and prudence in managing funds and whose investment is part of a much larger portfolio, individual investors may have very different levels of expertise and risk aversion.

Unlike cross-sectional studies, we combine cross-sectional information with times series to build a panel with 18,876 firm-quarter observations, which provides more efficient estimations. In addition, we use quarterly data instead of annual data to track the impact

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of changes in ownership on changes in corporate value. We expect that change of institutional holding has a positive relationship on corporate value.

We also investigate the interaction between institutional ownership and individual ownership, since no studies has been done to explore this area. Giving the hypotheses we mentioned above, institutional ownership and individual ownership have completely opposite effects on corporate value, one with convex effect and the one with concave effect. We don't expect that institutional ownership and individual ownership to be independent. In contrast, we would expect to find a negative relationship; firms with very high levels of individual ownership are more likely to have low levels of institutional ownership. Therefore, if we plan to include both institutional and individual equity into one regression, the problem of collinearity may arise and cause estimation error of variables. In order to resolve this problem, rather than using individual holding, we include unexpected individual holding in the regression. We then test the interacted effect of unexpected individual ownership and institutional ownership on corporate performance. We also test the impact on corporate value imposed by the fact that whether individual ownership is higher than we expect. We expect that when individuals hold unexpectedly high levels of ownership, it may counteract the role of the institutional shareholders.

In our paper, we also focus on the categories of institutional investors and families (individuals) investors because of the large distinction in investment behavior between them. In the case of individual-owned companies, financial problems due to capital rationing, short-time horizons and risk aversion are particularly likely to influence the company [Fama and Jensen, (1985)]. Contrary to individual-owned companies,

institutional-owned companies have low risk aversion and a relatively long-time investment horizon. Therefore, in the test including the investors' identity, we include a dummy variable if largest shareholder is an institutional investor or an individual investor. We hypothesize that corporate value will be higher if the largest owner is an institutional investor.

4. Data Collection

The ownership data used in this paper is from OSIRIS, which is a fully integrated public company database and analytical information solution produced by Bureau van Dijk Electronic Publishing, SA (BvD). OSIRIS provides financials, ownership, news, ratings, earnings and stock data for the publicly quoted companies in over 120 countries. All financial information is released by quarter and complemented with data from the following sources:

- Bureau van Dijk—Ownership Database

- Edgar Online —SEC Filings

- Dow Jones—Dow Jones Global Indexes

- Finifo—Stock data

- Fitch Ratings—Ratings

- JCF Group—Earnings Estimates

- Moody's—Ratings

- Standard and Poor's—Ratings

- Reuters—News

Specially, ownership and shareholder information in OSIRIS comes from Edgar online and Bureau van Dijk (BVD). Edgar online provides filings from US SEC going back as far as 1999 to OSIRS. The Bureau van Dijk ownership research team primarily collects ownership information from annual reports and regulatory statements, direct contact with concerned institutions, press and additional published sources. In addition, Bureau van Dijk constantly monitors company websites to retrieve reports and collects US SEC

filings for updating to ensure highest quality of data [BvDEP Ownership Database (2008)].According to the newest version of OSIRIS instruction, its database has covered over 30,000 worldwide companies, 19,198 of them contain at least one shareholder.

We choose US firms and filter the ones that are in "Active" status, ruling out the ones that are active but no longer with accounts on OSIRIS, bankruptcy, in liquidation and inactive.[1] These firms are further screened out from which are traded in main stock exchange(s) and are listed. The reason that we choose active firms with their shares traded in secondary market is that it provides us a more accurate picture of relationship between ownership structure and firm value.

In our test, we use quarterly data on ownership, including shareholder direct ownership and indirect ownership, types of shareholder. We focus on direct ownership using only June 2003 and June 2005 to maintain comparatively to McConnell (1990);[2] indirect ownership using panel data from March 2004 to June 2010. The advantage of quarterly data versus annual data is that ownership structure can change several times in a year as long as there are share-purchase announcements. Therefore, quarterly data captures the change of ownership by updating ownership information in a short time, which helps us to observe the effect of ownership structure more accurately than using annual data.

As OSIRIS indentifies each entity with International Securities Identification number (ISIN), it needs to be transferred to NCUSIP in order to merge with Center for Research in Security Prices (CRSP). ISIN uniquely identifies a security and it is a 12-character

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[1] As we are downloading data from each quarterly update of Osiris, we are, in effect, only requiring that a firm be "active" for that one quarter to be included in the sample.

[2] From April 2003, SEC mandates electronic filing of ownership reports filed by officers, directors and principle security holders. This will result in earlier public notification of insiders' transaction and wider public availability of information about those transactions.

alpha-numerical code consisting of three parts: a two-letter country code, a nine-character national security identifier, and a single check digit. The nine-digit numeric part is the main body of ISIN, representing the original CUSIP, which is also named NCUSIP.

OSIRIS data are then merged with Center for Research in Security Prices (CRSP) monthly data base using NCUSIP. From CRSP, we get the PERMNO for each firm, company closing prices and number of shares outstanding corresponding to the quarterly data in OSIRIS. According to CRSP, negative sign is designated to price indicating that it is a bid/ask average when the closing price is not available on trading day. We assume that the negative-signed price is the closing price of that company and make it an absolute value. Companies with zero- price are deleted from the sample.

In order to merge with COMPUSTAT, where GVKEY is the main identifier, we use the CRSP-COMPUSTAT linking table to find out GVKEY for each PERMNO. After getting GVKEY for sample firms in OSIRIS-CRSP data, we merge it with COMPUSTAT to obtain other control variables by quarters: Total Liabilities, Current Liabilities, Long-Term Debt, Current Assets, Net Income, and Total Assets. Firms missing valid value in these variables are deleted from sample. Table 1 summarizes the number of firms in each quarter as we merge OSIRIS with CRSP, then with COMPUSTAT.

4.1. Direct Ownership and Indirect Ownership

Ownership provided in OSIRIS comes from SEC filings and Bureau van Dijk ownership database. In order to check whether the direct ownership in OSIRIS is consistent with ownership information in SEC filings, we randomly check 50 firms on Edgar online by searching the form of DEF 14A, which is Definitive Proxy Statement, and 13D. Direct

ownership of insider shareholder and outside investors in OSIRIS shows approximately same percentage of interest shown in DEF 14A. The small difference may caused by several reasons: 1) DEF 14A does not report exact number of shares ratio owned by insider shareholders with less than 1% ownership; 2) DEF 14A does not include outsider shareholders with shareholdings less than 5%; 3) DEF 14A includes stock options, however, it is unknown whether OSIRIS take the options into considerations; 4) DEF 14A combines direct beneficial ownership and indirect beneficial ownership together and shows it as beneficial ownership, while OSIRIS reports direct ownership and total ownership (sum of direct and indirect ownership) separately.

In OSIRIS, direct ownership indicates that entity A owns a certain percentage of Company C. For conducting the test of direct ownership sample, we can simply use this direct ownership data from OSIRIS. Where signs like "+/-", ">", or "<"can be found before the numeric value, we delete these firms because we are not sure the exact percentage of interest. These firms occupies roughly 0.8%-1.2% in each quarter.

If one shareholder indirectly owns a stake in company, a sign of "-" appears in direct ownership, but numeric value of ownership percentage appears in "Total Ownership" column. According to OSIRIS, BvDEP makes the summation of the direct and indirect percentage and notes it as Total ownership. In this case, even though indirect figures are not recorded in the BvDEP ownership database, we can still infer indirect percentage through Total Ownership. In other words, Direct Ownership with missing number together with Total Ownership with numeric value implies that this shareholder holds indirect ownership in invested firm. In the cases where both Direct Ownership and Total Ownership have valid value, we infer indirect ownership as Total Ownership minus

Direct Ownership. Similar to Direct Ownership, we filter the firms with Total Ownership embracing the signs of "+/-", ">", or "<".

4.2. Types of Shareholders' Equity

Types of shareholders have been identified in OSIRIS since 2004. Based on our hypotheses and test, we classify four general types of shareholders:

A. Institutional Shareholders

Bank, financial company, insurance company, mutual & pension fund / Nominee / trust / trustee and private equity firms are classified as Institutional Shareholders. The reason we include them in this category is that these entities are expected to have expertise in managing funds and investment, which distinct from individual and family investment behavior.

B. Individual or families

OSIRIS already identifies the shareholder as individual or families. Besides single private individuals or family, shareholders designated by more than one named individual or families are included this category. As suggested in OSIRIS, the idea behind this is that they would probably exert their voting power together.

C. Industrial companies

OSIRIS includes all companies that are not banks or financial companies nor insurance companies into this category. Industrial companies can be involved in manufacturing activities but also in trading activities (wholesalers, retailers, brokers, etc.) Industrial

companies, unlike institutional investors and individual investors, are expected to focus more on the vertical ties between them and invested firms. A large block acquired by an industrial company may imply either a business relationship or a potential future acquisition.

D. Other types

We classify the remained of shareholder types in OSIRIS as "Others", which includes foundation/research institute, public authorities, self ownership, public and unnamed private shareholders. The investment behavior of this shareholder type is not obviousand the effect they have on corporate value is obscure.

It is noted that OSIRIS does not provide types of shareholders in data prior year 2004; therefore, we manually check each shareholder through websites and designate the shareholder types for sample before 2004.

4.3. Ownership Data Description

After merging OSIRIS, CRSP and COMPUSTAT data together, we get two samples: one is a direct ownership sample using cross-sectional data in June 2003 and June 2005 separately; the other is indirect ownership sample using panel data from March 2004 to June 2010. For direct ownership sample, each institutional investor owns an average of 3.47% and 3.52% shares in the invested firms in June 2003 and June 2005 respectively; individual investor owns an average of 7.25% and 7.39% respectively; while industrial company owns an average of 11.28% and 11.51% respectively.

For the indirect ownership sample, we report the number of firms and summarize average indirect equity owned by each type of shareholders in Table 2. As we can see, from March 2004 to September 2005, institutional investor's indirect equity is around 8.5% and every firm has an average of 1-2 institutional shareholders. However, average indirect equity owned by institutional shareholders decreases sharply after December 2005 and further decreases to around1%- 1.3% since September 2007. The big difference mainly arises from the fact that the information sources used by BvDEP have changed over with time. Before December 2005, most of ownership information is from US SEC filings and NASDAQ website under the entry of "Beneficial Owner". This procedure limits the records to mainly 5% or more ownership. From 2006, BvDEP has enlarged its information sources to company web-sites, Factset Research Systems and private correspondence. The broad range of sources makes BvDEP collect ownership even below 5% and consequently, from September 2005, we find that average number of institutional investors within one firm has increased to 16 and further increases to 40 after 2007. Because more shareholders with lower than 5% equity are included in the ownership data, average institutional equity has been dragged down.

The same situation is observed in the industrial company's ownership: in the early years, average indirect ownership is 17%-20% and we find that there is, on average, zero industrial company shareholders in a firm. After 2006, as BvDEP collects more ownership data from other sources and includes ownership less than 5%, the average number of industrial company shareholders in one firm has increased to 2 or 3, and thus decreases the average indirect ownership to 1%-2%. In Table 3, it also shows that the median level of institutional ownership drops to 1.28% at the end of 2005 and further

decreases to around 0.48% after June 2006. The minimum value of institutional ownership confirms the fact that BvDEP includes ownership less than 5% and even 1% after 2006.

However, indirect equity of individuals remains consistent for all quarters and years: individual shareholders own, on average, 11%-12% of the firm and average one individual shareholder per firm. This is because most of the individual ownership data comes from the proxy statement in the SEC filings and BvDEP keep this source as the main collection for individual shareholding. This is observed by the minimum value of individual ownership shown in Table 3, which, as expected, is always above 5%.

4.4. Panel Data

We use panel data to test the relationship between indirect ownership and corporate performance, and the relationship between the change of ownership and change of corporate performance. However, as the number of sample firms in each quarter varies dramatically between quarters so that calculating the change of ownership and of performance will lead to a very unbalanced panel. Moreover, we will be able to form a dynamic picture to observe the continuous effect of ownership structure. Given the reasons mentioned above, we choose the firms that survived all quarters, which forms a balanced panel data of 18876 firm-quarter observations--726 firms with 26 quarters.

5. Methodology

5.1. Ownership Structure

We measure institutional ownership as the sum of the fraction of shares owned by all institutional shareholders, individual ownership as the sum of fraction of shares owned by all individuals or families, and industrial company ownership as the sum of fraction of shares owned by all industrial companies. The largest shareholder is defined as the shareholder that holds the most shares in one company. We adopt two dummy variables to identify the type of the largest shareholder: "IND_MAX" equals 1 if the largest shareholder is an individual investor; "IO_MAX" equals 1 if the largest shareholder is an institutional investor.

5.2. Corporate Performance and Control Variables

We measure corporate performance using Tobin's Q, as widely used by most previous studies [McConnell (1990), Himmelberg (1999) and Morck(1988)]. By definition it is the ratio between market value of the firm's assets and replacement value of those assets:

$$Q = \frac{MVS + MVD}{RVA}$$

where MVS= market value of all outstanding stock, MVD= market value of all debt, and RVA= replacement value of all production capacity. However, we use the version of Tobin Q developed by Wolfe and Sauaia (2005), where they modify the approximation of q by Chung and Pruitt (1994) and this modified version closely approximates Tobin's original statistic and produces a 96.6% approximation of the original formulation used by Lindenberg and Ross (1981):

$$Q = \frac{MVS + D}{TA}$$

where MVS= market value of all outstanding shares, firm's stock price × shares outstanding; TA= firm's total assets; D= debt defined as following:

$$Debt = (current\ liability - current\ asset) + long\ term\ debt$$

Several control variables are chosen for this study, including: a) firm size, measured as the natural logarithm of total assets. Firm size is used to account for the possibility that firm performance is related to the size of firm; b) financial leverage, measured as the ratio of debt to equity, is adopted to take into account the possible influence of firm's capital structure on its investment decisions [Harris and Raviv, (1991)]; c) ROA, defined as return on assets, to measure the profitability of the company.

5.3. Regression Model

5.3.1. Cross-Sectional Regression

We investigate the effect of ownership structure upon corporate performance by conducting two lines of study. Firstly, we run cross-sectional regression of Tobin's Q on direct ownership as the preliminary test to see whether we can replicate the results of McConnell (1990), where they use annual data 1976 and 1986 while we use quarterly data June 2003 and June 2005. We also include institutional equity and squared equity in the model to test a possible curvilinear effect of institutional ownership. The equation (1) as follows is the cross-sectional test using ordinary least-squares analysis (OLS):

$$Tobin\ Q_{it} = \beta_0 + \beta_1 * IND_{it} + \beta_2 * IND_{it}^2 + \beta_3 * LEV_{it} + \beta_4 * Size_{it} + \beta_5 *$$
$$ROA_{it} + \varepsilon_{it} \tag{1}$$

$$Tobin\ Q_{it} = \beta_0 + \beta_1 * IO_{it} + \beta_2 * IO_{it}^2 + \beta_3 * LEV_{it} + \beta_4 * Size_{it} + \beta_5 * ROA_{it} + \varepsilon_{it} \tag{2}$$

where IND is the fraction of shares owned by individual shareholders, IO is the fraction of shares owned by institutional shareholders, LEV is leverage ratio, Size is firm size and ROA is return on assets. i refers to the firm, and t refers to time.

Considering the collinearity problem arising from institutional shareholding and individual shareholding, we first run the regression of individual equity on institutional equity and take the residuals:

$$IND_{it} = \beta_0 + \beta_1 * IO_{it} + \varepsilon_{it} \tag{3}$$

We regard the residuals of individual ownership as the unexpected individual equity which cannot be explained or perfectly predicted by institutional ownership. We adopt a dummy variable RES_IND as unexpected individual ownership: RES_IND=1 if unexpected individual ownership is larger than 0; RES_IND=0 if unexpected individual ownership is less than 0. Interaction term of $IO * RES\_IND(dummy)$ is contained in the model since we believe the effect of institutional ownership depends on the unexpected individual shareholding. Therefore, the following model tests the interaction effect of institutional ownership and individual ownership on firm value:

$$Tobin\ Q_{it} = \beta_0 + \beta_1 * IO_{it} + \beta_2 * IO_{it}^2 + \beta_3 * RES\_IND_{it}(dummy) + \beta_4 *$$
$$[IO_{it} * RES\_IND_{it}(dummy)] + \beta_5 * [IO_{it} * RES\_IND_{it}(dummy)]^2 + \beta *$$
$$control\ variables + \eta_{it} + v_{it} \tag{4}$$

5.3.2. Panel Data Regression

Secondly, we run the panel data regression of indirect ownership on Tobin's Q to extend existing models proposed by previous studies. We use indirect ownership to address the alleged problem of endogeneity [Demsetz and Villalonga (2001), Himmelberg et al. (1999)], because the variables that affect firm value will not directly influence the indirect beneficial ownership. The application of panel data allows us to control for any constant and unobservable heterogeneity [Arellano (2003); Hsiao (2004)] as well as fixed effects where the specific features of each firm that remain fixed over time; OLS cannot achieve this since it assumes that the average values of the variables and the relationships between them are constant across all the cross-sectional units and over time.

Therefore, we rewrite equation (1) and equation (2) by decomposing the error term ε_{it} into an individual specific effect η_{it}, and the "remainder disturbance" v_{it}, that varies over time and entities (capturing everything that is left unexplained about Tobin's Q):

$$Tobin\ Q_{it} = \beta_0 + \beta_1 * IND_{it} + \beta_2 * IND_{it}^2 + \beta * Control\ Variables_{it} + \eta_{it} + v_{it} \quad (5)$$

$$Tobin\ Q_{it} = \beta_0 + \beta_1 * IO_{it} + \beta_2 * IO_{it}^2 + \beta * Control\ Variables_{it} + \eta_{it} + v_{it} \quad (6)$$

In equation (5) and equation (6), IO and IND represent the indirect ownership owned by institutional shareholders and individual shareholders separately; Control Variables includes LEV, Size and ROA. As suggested by Himmelberg et al. (1999) and Iturriaga and Crisotomo (2010) that the unobserved heterogeneity is a "firm-fixed effect" and under this assumption, the panel data model can be modified as follows using dummy variables [the least squares dummy variable (LSDV) approach]:

$$Tobin\ Q_{it} = \beta_1 * IND_{it} + \beta_2 * IND_{it}^2 + \beta * Control\ Variables_{it} + \eta_1 D_{1i} +$$

$$\eta_2 D_{2i} + \cdots + \eta_n D_{ni} + v_{it} \qquad (7)$$

$$Tobin\ Q_{it} = \beta_1 * IO_{it} + \beta_2 * IO_{it}^2 + \beta * Control\ Variables_{it} + \eta_1 D_{1i} + \eta_2 D_{2i} + \cdots +$$

$$\eta_n D_{ni} + v_{it} \qquad (8)$$

In equation (7) and (8), the error term η_i captures all of the variables that affect $Tobin\ Q_{it}$ cross-sectionally but do not vary over time. Dummy variables interacted with η_i identify the firm-specific effect, where D_{1i} is a dummy variable that takes the value of 1 for all the observations on the first firm and zero otherwise, D_{2i} is a dummy variable that takes the value of 1 for all the observations on the second firm and zero otherwise, and so on. Therefore, the firm-fixed effect model examines entity difference in intercepts, assuming the same slopes and constant variance across entities. We will see whether the panel data approach is really necessary by testing the hypothesis H_0: $\eta_1 = \eta_2 = \cdots = \eta_n$. If this null is rejected, then it is not appropriate to impose the restriction that the intercepts are the same over cross-sectional units and a panel approach must be employed.

The panel approach is also applied to equation (4), the regression testing for the interaction effect of unexpected individual ownership and institutional ownership, and is applied to following models for testing the relationship between the largest shareholder's equity (with its identity, institutional or individual) and corporate performance:

$$Tobin\ Q_{it} = \beta_0 + \beta_1 * IO_{it} + \beta_2 * IO_{it}^2 + \beta_3 * [IO_{it} * IND\_MAX(dummy)_{it}] + \beta *$$

$$Control\ Variables_{it} + \eta_{it} + v_{it} \qquad (9)$$

$$Tobin\ Q_{it} = \beta_0 + \beta_1 * IND_{it} + \beta_2 * IND_{it}^2 + \beta_3 * [IND_{it} * IO\_MAX(dummy)_{it}] +$$

$$\beta * Control\ Variables_{it} + \eta_{it} + v_{it} \tag{10}$$

IND_MAX is dummy variable which equals 1 if the identity of largest shareholder is individual and 0 other wise; IO_MAX is dummy variable which equals 1 if the identity of largest shareholder is institutional shareholder and 0 other wise. The interaction term $(IO_{it} * IND\_MAX_{it})$ and ($Insider_{it} * IO\_MAX_{it}$) are used to detect whether the identity of largest shareholder (individual or institutional investor) influence the actual effect imposed by the ownership of the other side (institutional ownership or individual ownership).

5.3.3. Change of Ownership and Change of Firm Value

The regression of the change in firm value on change in ownership is conducted to observe the relationship between them in a more dynamic way for each firm. We measure changes in ownership and in value over the quarter. Therefore, the change in firm value is the difference between Tobin Q in quarter T and Tobin Q in quarter $(T-1)$. Change in ownership is the difference between ownership in quarter T and Tobin Q in quarter $(T-1)$. Dummy variable IO_POSITIVE takes value 1 if institutional shareholders increase their shareholding at quarter T; and value equals 0 if institutional shareholders decrease their shareholding at quarter T. Panel data approach is applied to following model:

$$\Delta Q = \beta_0 + \beta_1 * \Delta IO_{it} + \beta_2 * IO\_POS_{it} + \beta_3 * [\Delta IO_{it} * IO\_POS_{it}] + \beta *$$

$$Control\ Variables + \eta_{it} + v_{it} \tag{11}$$

5.3.4. Autocorrelation

A common problem in the panel data regression is autocorrelation of residuals, which affects statistical inferences. For all the panel data regressions, we use the Durbin Watson test to detect the first-order autocorrelation problem and we also run the regression of residual against its lag one and lag two values: $\varepsilon_t = \rho_1 \varepsilon_{t-1} + \rho_2 \varepsilon_{t-2} + \tau_t$ to confirm that there is no second-order autocorrelation.

To solve the first-order autocorrelation, we take the first difference.

$$Y_t = \beta_0 + \beta_1 * X_t + \varepsilon_t$$

and
$$\varepsilon_t = \rho \varepsilon_{t-1} + \tau_t$$

6.   Empirical Result

6.1.   Direct Ownership

Table 4 shows preliminary results examining the relationship between direct ownership and corporate value, in which Tobin Q is regressed against individual ownership (IND) and institutional investors' ownership (IO) respectively. We use quarterly data in June 2003 and June 2005. As is shown in Table 1 regressions (1) and (3), there is strong evidence of a concave relation between individual ownership and Tobin Q – firm value first increases, then decreases, as ownership concentration increases. Both individual ownership and its squared term are statistically significant at 1% level. This curvilinear relation between individual equity and corporate value is consistent with Stulz (1988) and McConnell (1990).

Figure 1 provides us a clear vision of how the individual equity affects corporate value at different levels of ownership. The graph is drawn according to the regression results in Table 4, where control variables are taken at their mean value.

For low levels of individual ownership, its positive effect on firm value dominates the negative effect. A 10% increase in individual shareholdings increases the firm value by about 2% in 2003 and by about 3.5% in 2005. Tobin Q is maximized at 0.55-0.6 when individuals own approximately 37% of firm shares. After individual equity reaches the threshold, it drives down the firm value by 3%-5% with a 10% increase in individual equity. Compared to 2003, 2005 shows a more significant negative effect of individual equity because the same percentage increase in individual ownership is associated with a sharper decrease in firm value. In addition, we find that the inflection point of individual

ownership is similar to the inflection point of insider ownership calculated in McConnell (1990), 37% versus 37.6%.

Table 4 regressions (2) and (4) are the results of the regression of corporate value on institutional ownership. A convex relation is found between institutional ownership and corporate value. Both institutional ownership and its squared term are significant at the 1% level: firm value first decreases and then increases as institutional shareholders own larger fractions of firm shares. Figure 2 draws this relationship according to equation (2) and (4) in Table 4. Unlike individual ownership, the graph shows a more symmetric shape of institutional shareholding versus Tobin Q, with the inflection point at 50% in 2003 and 53% in 2005, and the minimum value of firm at a Tobin Q of approximately 0.48. At low levels of ownership, a 10% increase in institutional equity decreases firm value by 5%. After reaching its threshold, a 10% increase in institutional equity increases Tobin Q by approximately 4.5%.The effects of institutional shareholdings are similar in 2003 and 2005, as we find that two lines of ownership basically coincide together. The result of convex relation is consistent with our hypothesis. At lower level of ownership, institutional investors actively trade shares for capital-gaining objective, which makes them follow "exit policy" and thus decrease firm value when they sell their shares. But institutional shareholders are tightly connected to invested firm when they acquire a large fraction of shares, thus they become harder to exit by selling large stake of shares and become long-term focus, which makes them have motive to monitor govern management team and monitor the operation of the invested firm.

We expect there to be a relationship between the level of institutional and individual ownership. Both types of investors may be attracted to similar good investment

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opportunities (positive relationship) or institutions and individuals may dominate firms at different stage of their development (negative relationship). We run the regression of individual ownership against institutional ownership and the result confirms a negative relationship. Therefore, we take the residuals of this model and regard it as unexpected individual shareholding, which is not explained by institutional ownership.

Table 5 shows the results of regression equations including institutional ownership and unexpected individual shareholding. Regressions (1) and (2) are for the subsample of June 2003 and June 2005. As we can see, institutional ownership and its squared term are still significant at 1% level. The results indicate that institutional ownership still negatively relates to corporate value at low levels and then positively relates to it after ownership reaches high level, even when we include the unexpected individual ownership into model. Both 2003 and 2005 have similar coefficients of level of institutional ownership and its squared terms.

When we look at the relationship between corporate value and unexpected individual shareholding, the coefficient of unexpected individual shareholding is positive, although in 2003 the coefficient is not significant at 10% level; and the coefficient of its squared term is significantly negative in both 2003 and 2005. This result indicates that when unexpected individual ownership is at low level, especially when negative, an increase in it may have positive influence on corporate value; if unexpected individual ownership is at high level, especially when positive, an increase in it will lead to decrease in firm value. The effect of unexpected individual shareholding has a similar pattern to that of individual shareholding. It makes sense because when more-than-expected shares are concentrated in individual shareholders' hands, it implies that one or several individual

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investors hold substantially high level of ownership, which means that they might expropriate firm resources to maximize their own utility and cause conflict of interest.

The combined effect of institutional ownership and unexpected individual ownership is illustrated in Figure 3 for 2003 and Figure 4 for 2005.Institutional ownership and corporate value comprise a convex relationship with the inflection point still around 50%. However, the introduction of variable "unexpected individual ownership" (RES_IND) changes the effect of institutional equity on corporate value. For example, the firm value based on the standard point of 20% institutional ownership and (-20%) RES_IND is 0.5. If RES_IND increases to positive 10%, then firm value with same institutional ownership increases to about 0.6, because RES_IND is still in the lower range and it positively affects firm value; if RES_IND increase to extremely high level, say 90%, the firm value with same institutional ownership decreases to 0.35-0.4, because RES_IND is in the high range and it now negatively affects firm value.

6.2. Indirect Ownership

Indirect ownership is examined to address the alleged spurious relationship with corporate value caused by the potential endogeneity problem. We replicate the regressions of firm value on indirect individual ownership and indirect institutional ownership respectively and run it annually to examine that whether our results are still consistent with the results we get from direct ownership.

Table 6 shows the results of seven yearly regressions and a pooled sample regression for indirect individual ownership. A panel data approach is applied to control for any unobservable heterogeneity and firm fixed effects. We perform redundant fixed effect test

(EViews 6 User's Guide, p672) to check that whether it is necessary to use the fixed-effect panel data approach. In addition, we find the evidence of first-order autocorrelation of residuals but not of second-order autocorrelation, therefore, we add AR (1) term into the model to adjust the autocorrelation problem.

We observe mixed effects of individual ownership, either concave or convex, in these 7 years [Table 6 column (2) to column (8)].Thus we cannot generalize its effect on corporate performance. However, the results still support our hypothesis: unlike direct individual ownership which is primarily owned by managers and executives of the firm, indirect individual ownership is held by both normal individuals (outsider) and corporate managers (insider). Their investment objectives, power over corporate policy and the conflict-of-interest that exists between them, make their effects on corporate performance different. For example, when insiders hold a large fraction of shares in company, there are chances that they will use corporate resources to satisfy their self-interest. But outsiders may play a role in monitoring firm management team if they own a large fraction of the firms. The effect of individual ownership depends on how these two forces compete with each other and depends on which force dominates the other.

Regression (1) in Table 6 indicates an insignificant relationship between individual ownership and corporate performance. The results further support the findings from yearly regressions. Individual ownership imposes a mixed influence on corporate value over time, and of course when we pool all the data together, we cannot conclude a consistent effect of individual shareholding. Another reason for their insignificant relationship is that individuals may lack professional knowledge and the funds needed to make a significant investment in the firm. In the long run, individual investors of firm B

may not have much power and time to influence firm C's (owned by firm B) performance and operating decisions.

For institutional ownership, a convex relation with corporate value is basically consistent over years. Table 7 gives the results for every year and pooled data and the inflection point is also calculated. Although in 2006, 2008 and 2009, there are no inflection points and the model shows a linear positive relationship, it still consistent with the theory and results of previous studies, which have showed that institutional ownership is positively related to corporate performance [McConnell (1990), Clay (2001), Hand and Suk (1998)].

There is strong evidence to support our hypothesis that effect of indirect institutional equity on company B can be transferred to company C, which is owned by company B. We find significant coefficients of institutional equity and its squared terms in every year and even the pooled data regression. It can be explained by the fact that compared to individual investors, institutional investors are expert at managing funds and they have more bargaining power to influence the management team's decision and firm policy, even if they just indirectly own the firm. Therefore, institutional investors are more likely than individual investors to exert their effect of efficient-monitoring and conflict-of-interest on indirectly owned companies.

Given the situation that more institutional shareholders' equity with less than 5% are included in ownership data since year 2006, we add a year dummy indicating the year after 2006 to take into account the possible increase in reported institutional ownership within one firm. We also include the interaction term of institutional equity and the year dummy in the model. We find that year dummy is significantly positively relative to

corporate value, while the interaction term is not significant. This implicates that year dummy only influences the intercept of regression but does not influence the relationship between institutional equity and firm value.

Unexpected individual ownership is taken as the residual from the regression of individual ownership against institutional ownership. We do not report the regression that examines the level of unexpected individual ownership because its result is insignificant. However, we find that the sign of unexpected individual ownership does matter in influencing firm performance. Table 8 regression (1) reports the result which includes the interaction terms of $[IO * RES\_IND(dummy)]$ and its squared term. Variable RES_IND (dummy) takes value 1 if unexpected individual ownership is larger than 0, meaning more shares are owned by individuals than we expect; and it takes 0 if unexpected individual ownership is less than 0.

Institutional ownership still has a negative and then positive effect on corporate value. However, both the negative effect and positive effect are wiped out when unexpected individual holdings are positive. We interpret that the effect of institutional ownership will be counteracted by the existence of unexpected individual ownership. But institutional effect still dominates the individual equity effect.

The test results for the identity of the largest shareholder are also provided in Table 8 regressions (2) through regression (5), where IND_MAX equals 1 if the largest shareholder is an individual and IO_MAX equals 1 if the largest shareholder is an institution investor. Although no significant effect of identity of largest shareholders is found in the AR (1) regressions for both individual ownership and institutional ownership,

we still find their significant effect in the regression without AR (1) term. A significantly negative coefficient of IND_MAX means that if an individual shareholder owns most shares in the firm, it may decrease the firm value. Significant positive coefficient of IO_MAX and ($IND * IO\_MAX$) supports our hypothesis: corporate value will be higher if the largest owner is an institutional investor. This result is consistent with Thomsen and Pedersen (2000), who also find that shareholder value creation will be higher if the largest owner is financial institution. In an institutional-owned company, the management team is efficiently monitored by institutional investors who have long-term horizon and rational investment behavior, thus this kind of firm has advantage over the firm that is mainly individual-owned.

The regression using the change in value, rather than the level value, provides us more details on how a change in ownership relates to a change in firm value. We introduce another dummy variable IO_POS, indicating whether institutional ownership change is positive (dummy value equals 1). Table 9 shows that if institutional investors acquire more shares at this quarter, it is positively related to a change in firm value. The result seems to be different from the test results for the level of institutional ownership. Under the level of ownership regression, we assume that other variables affecting firm value do not change, thus, whether firm value increase or not depends on how shareholders change their ownership. The change in firm value moves along the line in Figure 1 and Figure 2. However, when we use the change of ownership by calculating the difference between two quarters, the assumption that other variables affecting firm value do not change is not appropriate. The change of ownership is not affecting firm value along the line in Figure 1 and Figure 2, instead, it actually shifts the line. Table 9 supports this explanation

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because we find that the change of institutional ownership (ΔIO) does not really affect firm value, what matters here is the fact that whether institutional shareholders acquires more shares of the firm, denoted by *IO_POS*, which is significant positive. The positive coefficient of this dummy variable suggests that the change of ownership affects firm value by shifting the line up and down because the intercept has changed ($\beta_0 + IO\_POS$).

Assuming that institutional shareholding and firm value reaches equilibrium at some point and time, the reasons that institutional shareholders are willing to break this equilibrium may be as follows: their expectation of firm performance will increase in the future and thus they take actions to buy more shares in order to get more benefit from the expected increase in value. Although we are not sure about the causal relationship between the change in institutional ownership and change in firm value, one thing worth noting is that institutional shareholders care about the indirectly invested firm and they have an incentive to monitor the firm operation and policy.

7. Conclusion

This study is primarily motivated by the relatively few studies regarding the relationship of both institutional ownership and individual ownership to firm performance. We find that institutional ownership first decreases firm value and then increases firm value after it reaches a certain threshold in both samples of direct ownership and indirect ownership. This suggests that while institutional shareholders can make a positive contribution by effectively monitoring, they can still create a new type of agency problem by pursuing their own interests. We find that individual ownership has a concave effect on corporate performance only in the sample of direct ownership. However, no significant relationship between individual ownership and corporate value can be found in the sample of indirect ownership. This may indicate that direct individual ownership has the problem of endogeneity.

When we include both institutional ownership and unexpected individual ownership in the model, we find that the role institutional ownership plays in the corporation is counteracted when individuals hold unexpectedly high levels of ownership. We also find that if institutional shareholders acquire more shares between time (T-1) and time T, the change in firm value during this period is positive. We interpret this result by considering the willingness that institutional shareholders break the ownership structure equilibrium: they might have expected that the firm performance would increase in the future and thus purchase more shares in the expectation of future capital gains. But we cannot assure the increase in institutional ownership improve corporate performance.

Our paper provides evidence that the classification of the largest shareholder is also important in influencing firm performance. Firm value is lower if the company is majority owned by individuals (or families). But firm value creation is higher if the largest shareholder is an institutional investor and it also strengthens the positive effect of individual ownership imposed on firm value when individual ownership is at a low level.

One limitation in this paper is the possible sample bias in the panel data of indirect ownership. We create the balanced panel data by choosing the firms that show up from March 2004 to June 2010. These firms may perform better than other firms so that they survive over this long period. In addition, to improve the study in ownership structure and corporate performance in the future, it is suggested that different measures of firm performance and specific firm risk should be applied. Further studies also could be done to identify the types of institutional investors, banks, mutual funds, pension funds, insurance company or government. Their investment horizons and investment goals are various and may affect the roles they are playing in influencing corporate decision.

Appendixes

Figure I Tobin's Q as a function of individual ownership

Individual ownership as a fraction of total shares owned by individual shareholders for the sample of 3901 firms in June 2003 and 3724 firms in June 2005
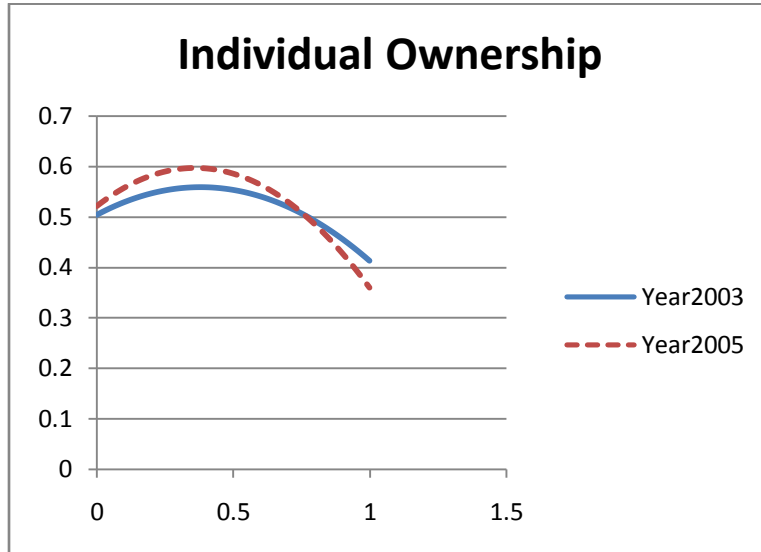
Figure II Tobin's Q as a function of institutional ownership

Institutional ownership as a fraction of total shares owned by institutional shareholders for the sample of 3901 firms in June 2003 and 3724 firms in June 2005
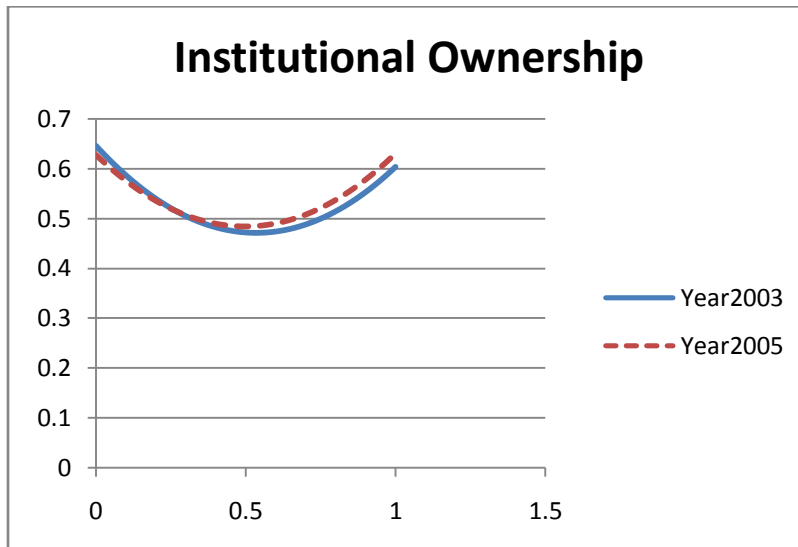
Figure III Tobin's Q as a function of unexpected individual ownership and institutional ownership in 2003

Unexpected individual ownership (RES_IND) and institutional ownership (IO) versus Tobin's Q for a sample of 3901 firms in June 2003
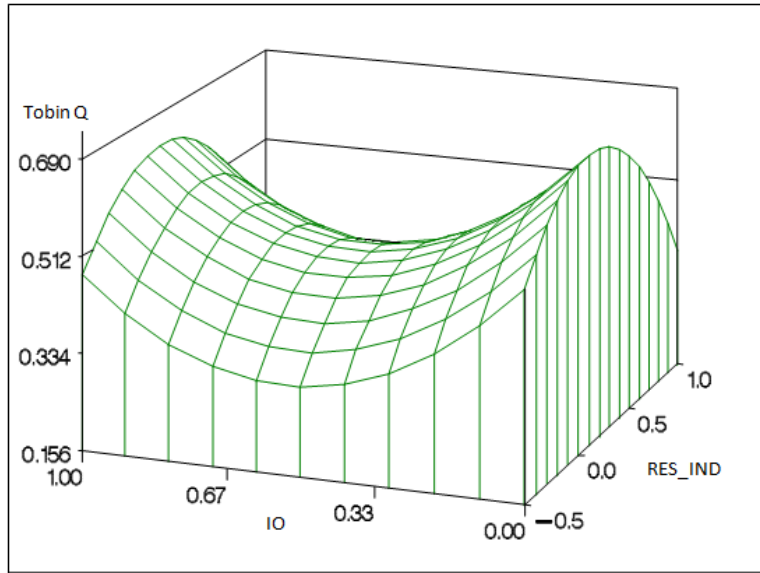
Figure IV Tobin's Q as a function of unexpected individual ownership and institutional ownership in 2005

Unexpected individual ownership (RES_IND) and institutional ownership (IO) versus Tobin's Q for a sample of 3724 firms in June 2005
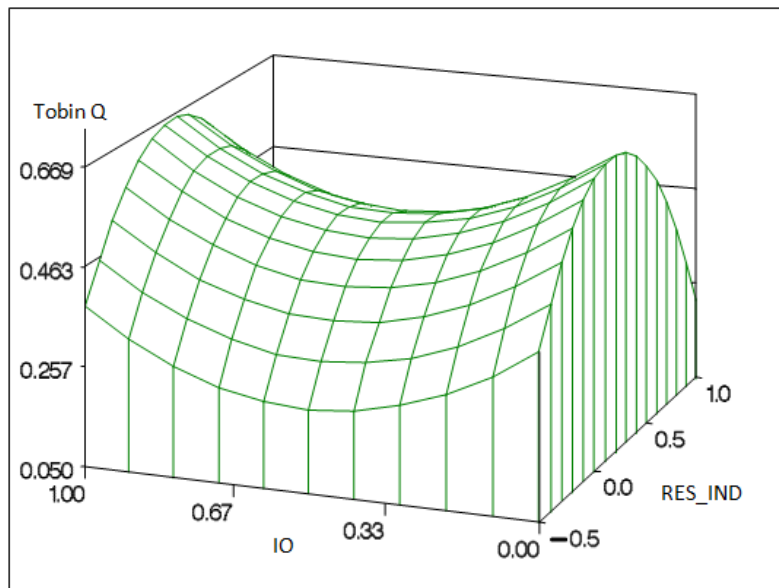
Table 1 Number of firms

Number of firms in each quarter as we merge OSIRIS with CRSP, then with COMPUSTAT. Column "OSIRS" shows total number of firms downloaded from OSIRIS. Column "OSIRIS-CRSP" shows the number of firms after we merge OSIRIS with CRSP. Column "OSIRIS-CRSP-COM" shows the number of firms after we merge OSIRIS-CRSP with COMPUSTAT. Firms with missing valid value in COMPUSTAT have been deleted from the sample.

Quarter	OSIRIS	OSIRIS-CRSP	OSIRIS-CRSP-COM
2004Q1	4215	3484	2840
2004Q2	4154	3443	2807
2004Q3	4157	3424	2824
2004Q4	4114	3369	2778
2005Q1	4124	3378	2791
2005Q2	4095	3348	2748
2005Q3	4157	3424	2848
2005Q4	5471	4562	3416
2006Q1	5507	4577	3481
2006Q2	5317	4554	3481
2006Q3	4893	3953	3309
2006Q4	4555	3739	3097
2007Q1	3897	3166	2629
2007Q2	3967	3223	2673
2007Q3	5564	4639	3907
2007Q4	5438	4522	3866
2008Q1	5466	4564	3882
2008Q2	5522	4553	3875
2008Q3	5448	4483	3883
2008Q4	5458	4456	3766
2009Q1	5422	4356	3692
2009Q2	5386	4262	3628
2009Q3	5378	4183	3556
2009Q4	5345	4131	3514
2010Q1	5146	4068	3485
2010Q2	5126	4038	3465

Table 2 Data description

Average number and ownership of each shareholder type by quarter. For each shareholder type, we calculate its average number by using N_i as the number of corresponding shareholders invested in firm i and n as total number of firms in that quarter, where $(N_1 + N_2 + \cdots + N_n)/n$, measures the aggregate cross-sectional number of shareholders in a quarter. Average ownership per shareholder of each type is calculated by using percentage O_i as corresponding ownership of shareholder i and m as total number of corresponding shareholders in that quarter, where $(O_1 + O_2 + \cdots + O_m)/m$, measures the average shareholding owned by each shareholder.

Quarter	Types of Shareholders					
	Institutional Ownership%	Number of Institutions	Individual Ownership%	Number of Individuals	Industrial Ownership%	Number of Companies
2004Q1	8.49	1	11.47	1	12.52	0
2004Q2	8.58	1	11.93	1	20.28	0
2004Q3	8.48	1	11.16	1	17.9	0
2004Q4	8.42	1	11.1	1	18.22	0
2005Q1	8.5	1	11.02	1	17.48	0
2005Q2	8.7	1	11.05	1	19.84	0
2005Q3	8.46	1	10.91	1	14.82	0
2005Q4	2.68	7	10.69	1	2.61	2
2006Q1	2.66	7	10.6	1	2.74	2
2006Q2	1.29	17[3]	10.76	1	1.58	2
2006Q3	1.24	16	11.34	1	1.77	2
2006Q4	1.14	16	11.53	1	1.67	2
2007Q1	1.07	16	11.27	1	1.42	2
2007Q2	0.95	19	11.34	1	1.13	3
2007Q3	1.21	42	11.07	1	1.19	2
2007Q4	1.24	42	11.31	1	1.39	2
2008Q1	1.28	42	10.98	1	1.24	2
2008Q2	1.28	42	11.93	1	1.31	2
2008Q3	1.27	43	12.89	1	1.47	2
2008Q4	1.27	42	12.67	1	1.45	2
2009Q1	1.3	42	12.47	1	1.49	2
2009Q2	1.37	42	12.46	1	1.7	2
2009Q3	1.36	42	12.03	1	1.74	2
2009Q4	1.19	42	11.54	1	1.22	2
2010Q1	1.26	42	11.35	1	1.3	2
2010Q2	1.26	42	11.61	1	1.21	2

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[3] The number of institutional shareholders and the number of company shareholders has sharply increases as more information sources are used by BvDEP from 2005. Therefore, BvDEP report more shareholders with lower than 5% equity in the ownership data.

Table 3[4] Institutional ownership and individual ownership

Median, minimum and maximum value for both institutional ownership and individual ownership from March 2004 and June 2010.

Quarter	Types of Shareholders					
	Institutional Ownership%			Individual Ownership%		
	Median	Min	Max	Median	Min	Max
2004Q1	6.93	4.00	90.09	5.92	1.00	98.98
2004Q2	7.00	4.00	90.09	6.32	1.00	100.00
2004Q3	7.06	4.00	98.66	5.75	1.00	98.74
2004Q4	6.86	4.00	90.09	5.75	1.00	98.74
2005Q1	7.00	4.00	90.65	5.64	1.00	97.21
2005Q2	6.72	4.01	90.09	5.60	1.00	97.21
2005Q3	6.98	1.00	90.65	5.50	1.00	97.21
2005Q4	1.28	0.30	90.65	5.40	0.22	97.21
2006Q1	1.27	0.30	90.65	5.28	0.22	97.21
2006Q2	0.46	0.10	90.65	5.33	0.30	100.00
2006Q3	0.42	0.10	90.65	5.90	0.12	99.6
2006Q4	0.39	0.10	99.06	5.93	0.12	99.6
2007Q1	0.36	0.10	99.06	5.94	0.11	99.60
2007Q2	0.34	0.10	97.00	5.77	0.11	96.02
2007Q3	0.45	0.10	97.00	5.20	0.11	96.02
2007Q4	0.38	0.10	96.28	5.41	0.11	97.65
2008Q1	0.39	0.10	96. 28	5.30	0.11	96.02
2008Q2	0.46	0.03	99.13	6.01	0.10	96.69
2008Q3	0.45	0.03	98.00	6.74	0.10	96.17
2008Q4	0.43	0.01	98.00	6.36	0.10	96.17
2009Q1	0.46	0.01	98.00	7.04	0.10	96.17
2009Q2	0.50	0.10	99.34	7.60	0.10	96.17
2009Q3	0.50	0.10	93.49	7.69	0.10	96.17
2009Q4	0.44	0.10	95.59	6.79	0.10	96.17
2010Q1	0.43	0.10	98.00	6.45	0.10	96.17
2010Q2	0.43	0.10	97.33	6.53	0.10	96.17

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[4] We do not include industrial company ownership because our study focuses on individual and institutional ownership.

Table 4 Regression of Tobin's Q on equity ownership in direct ownership sample

Regression of Tobin Q on equity ownership for 3901 firms in June 2003 and 3742 firms in June 2005 (t-statistics in parentheses). IND is individual ownership owned by total individual shareholders within one company; IO is institutional ownership owned by total institutional shareholders within one company; LEV is the leverage ratio; Size is the natural logarithm of total assets; ROA is return on asset.

Variable	2003 Sample			2005 Sample	
	(1)	(2)		(3)	(4)
C	0.221***	0.299***		0.174***	0.249***
	(14.61)	(22.82)		(10.60)	(17.46)
IND	0.239***			0.418***	
	(3.46)			(4.73)	
$(IND)^2$	-0.381***			-0.580***	
	(-2.78)			(-4.05)	
IO		-0.652***			-0.577***
		(-10.21)			(-8.85)
$(IO)^2$		0.610***			0.580***
		(7.01)			(6.87)
LEV	0.011***	0.009***		0.011***	0.010***
	(16.07)	(14.31)		(14.80)	(13.62)
SIZE	0.048***	0.055***		0.052***	0.058***
	(21.10)	(24.90)		(22.05)	(24.34)
ROA	-0.477***	-0.486***		-0.492***	-0.494***
	(-13.24)	(-13.75)		(-10.93)	(-11.08)
Adj. R^2	0.211	0.239		0.203	0.218
Inflection point	38%	53%		36%	50%

*0.1 significant level; **0.05 significant level; ***0.01 significant level

Table 5 Unexpected individual ownership

Regression of Tobin Q on equity ownership for 3901 firms in June 2003 and 3742 firms in June 2005 (t-statistics in parentheses). IO is institutional ownership owned by total institutional shareholders within one company; RES_IND is the residual taken from the regression of individual ownership on institutional ownership; LEV is the leverage ratio; Size is the natural logarithm of total assets; ROA is return on asset.

Variable	2003 Sample	2005 Sample
	(1)	(2)
C	0.315***	0.283***
	(21.16)	(17.14)
IO	-0.699***	-0.668***
	(-10.40)	(-9.71)
$(IO)^2$	0.652***	0.659***
	(7.73)	(7.61)
RES_IND	0.062	0.205***
	(1.10)	(3.33)
$(RES\_IND)^2$	-0.320**	-0.639***
	(-2.26)	(-4.07)
LEV	0.009***	0.010***
	(14.16)	(13.37)
SIZE	0.054***	0.056***
	(24.63)	(23.70)
ROA	-0.480***	-0.476***
	(-13.55)	(-10.64)
Adj. R^2	0.240	0.222

*0.1 significant level; **0.05 significant level; ***0.01 significant level

Table 6[5] Regression of Tobin's Q on individual ownership in indirect ownership sample

Regression of Tobin Q on indirect individual ownership for subsamples of yearly data from 2004 to 2010 and a pooled data using all firm-quarterly observations. IND is individual ownership owned by total individual shareholders within one company; LEV is the leverage ratio; Size is the natural logarithm of total assets; ROA is return on asset. AR term is included in every regression, except for year 2010, to take into account the autocorrelation problem arising from time series data.

Variable	Pooled	2004	2005	2006	2007	2008	2009	2010
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C	0.253***	0.076***	-0.43***	-0.63***	0.273***	0.746***	0.639***	0.780***
	(23.59)	(4.90)	(-27.91)	(-26.65)	(34.61)	(32.49)	(22.68)	(117.42)
IND	0.002	-0.013**	0.068***	-0.037**	-0.024**	0.095***	0.084***	0.383***
	(0.75)	(-1.65)	(16.88)	(-5.15)	(-13.67)	(3.19)	(4.12)	(55.97)
$(IND)^2$	-0.000	0.023***	-0.05***	0.084***	0.023***	-0.155**	-0.029	-0.647**
	(-0.04)	(2.61)	(-4.35)	(5.77)	(6.39)	(-2.56)	(-0.44)	(-5.22)
LEV	0.003***	0.006***	0.001***	0.002***	0.016***	0.004***	0.004***	0.001***
	(42.49)	(73.85)	(4.58)	(7.100)	(76.59)	(13.69)	(15.57)	(7.89)
SIZE	0.041***	0.069***	0.154***	0.183***	0.033***	-0.035**	-0.02***	-0.04***
	(24.45)	(26.36)	(60.51)	(48.47)	(27.16)	(-9.79)	(-4.49)	(-45.43)
ROA	-0.21***	0.161***	-0.48***	-0.372**	-0.167**	-0.281**	-0.518**	-0.237**
	(-33.36)	(-13.36)	(-36.12)	(-30.42)	(-60.46)	(-31.59)	(-41.12)	(-73.36)
AR(1)	0.882***	0.200***	0.107***	0.312***	0.014***	0.295***	0.272***	
	(248.72)	(16.87)	(21.78)	(27.82)	(6.44)	(15.99)	(27.22)	
Auto(2) p-value	0.366	0.526	0.498	0.374	0.296	0.741	0.599	
Firm Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.99[6]	0.99	0.99	0.99	0.99	0.99	0.99	0.99
N	18876	2904	2904	2904	2904	2904	2904	1452

*0.1 significant level; **0.05 significant level; ***0.01 significant level.
Firm fixed effect is tested for every regression to make sure it is necessary to apply panel data approach. If the test confirms the existence of firm specific effect, then we mark "Yes". We also report the p-value of second-order residual autocorrelation.

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[5] We tested effect of number of firms by considering the concentration ratio of ownership, but the result is not significant and we do not report it in the table.
[6] The high R^2 results from the panel data firm-fixed effect approach, which adds a dummy variable for each firm and creates 726 dummy variables in the model. In *Introduction Econometrics: a Modern Approach*, Jeffrey Wooldridge also confirms that panel data firm-fixed effect approach may cause high R^2.

Table 7 Regression of Tobin's Q on institutional ownership in indirect ownership sample

Regression of Tobin Q on indirect institutional ownership for subsamples of yearly data from 2004 to 2010 and a pooled data using all firm-quarterly observations. IO is institutional ownership owned by total institutional shareholders within one company; LEV is the leverage ratio; Size is the natural logarithm of total assets; ROA is return on asset. AR term is included in every regression, except for year 2010, to take into account the autocorrelation problem arising from time series data.

Variable	Pooled	2004	2005	2006	2007	2008	2009	2010
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C	0.253***	0.085***	-0.416**	-0.623**	0.249***	0.754***	0.594***	0.771***
	(23.61)	(5.22)	(-17.41)	(-28.84)	(25.64)	(34.31)	(22.25)	(70.51)
IO	-0.003**	-0.025**	-0.025**	0.003***	-0.023**	0.000	-0.000	-0.038**
	(-1.78)	(-3.60)	(-12.75)	(4.03)	(-47.76)	(0.05)	(-0.05)	(-11.30)
$(IO)^2$	0.003***	0.058***	0.028***	-0.001**	0.026***	-0.009	0.042***	0.055***
	(1.74)	(2.50)	(8.63)	(-3.36)	(53.50)	(-1.18)	(5.10)	(22.08)
LEV	0.003***	0.006***	0.001***	0.002***	0.016***	0.003***	0.004***	0.002***
	(42.61)	(71.074)	(5.215)	(7.27)	(101.92)	(14.14)	(15.54)	(7.84)
SIZE	0.041***	0.068***	0.152***	0.182***	0.037***	-0.036**	-0.014**	-0.04***
	(24.57)	(24.85)	(38.61)	(52.44)	(23.77)	(-10.50)	(-3.36)	(-22.76)
ROA	-0.208***	-0.16***	-0.45***	-0.37***	-0.17***	-0.28***	-0.49***	0.242***
	(-33.37)	(-13.34)	(-30.87)	(-33.08)	(-71.74)	(-30.52)	(-37.99)	(-66.96)
AR(1)	0.882***	0.199***	0.120***	0.309***	0.014***	0.295***	0.253***	
	(248.75)	(16.73)	(17.01)	(32.27)	(6.42)	(16.05)	(23.30)	
Auto(2) p-value	0.366	0.671	0.458	0.253	0.318	0.765	0.625	
Firm Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Inflection point	49%	13%	44%	/	45%	/	/	34%
N	18876	2904	2904	2904	2904	2904	2904	1452

*0.1 significant level; **0.05 significant level; ***0.01 significant level.
Firm fixed effect is tested for every regression to make sure it is necessary to apply panel data approach. If the test confirms the existence of firm specific effect, then we mark "Yes". We also report the p-value of second-order residual autocorrelation.

Table 8 Unexpected individual ownership and identity of the largest shareholder

Regression of Tobin Q on equity and other variables. RES_IND is the dummy variable which takes 1 if unexpected individual ownership is larger than 0 and vice versa; IND_MAX is the dummy variable which takes 1 if the largest shareholder is individual; IO_MAX is the dummy variable which takes 1 if the largest shareholder is institutional. LEV is the leverage ratio; Size is the natural logarithm of total assets; ROA is return on asset. AR term is included in every regression (1), (2) and (3), and regression (4) and (5) exclude the AR term.

Variable		AR term		Without AR term	
	(1)	(2)	(3)	(4)	(5)
C	0.253***	0.249***	0.250***	0.558***	0.547***
	(23.59)	(22.90)	(23.14)	(96.12)	(99.35)
IO	-0.010***	-0.003		0.001***	
	(-3.88)	(-1.32)		(0.59)	
$(IO)^2$	0.013***	0.003		0.007***	
	(3.86)	(1.53)		(2.52)	
IND			0.002		-0.004***
			(0.65)		(-1.19)
$(IND)^2$			-0.000		0.003***
			(-0.07)		(0.87)
RES_IND(dummy)	-0.000				
	(-0.40)				
IO*RES_IND(dummy)	0.009***				
	(3.06)				
$[IO*RES\_IND(dummy)]^2$	-0.012***				
	(-3.36)				
IND_MAX		0.000		-0.001***	
		(0.64)		(-2.74)	
IO*IND_MAX		-0.001		0.002	
		(-0.42)		(0.99)	
IO_MAX			0.000		0.001**
			(0.18)		(1.86)
IND*IO_MAX			0.005		0.016**
			(1.04)		(2.36)
AR(1)	0.882***	0.882***	0.882***		
	(247.74)	(248.62)	(248.94)		
Auto(2) p-value	0.346	0.389	0.390		
Firm Effect	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.99	0.99	0.99	0.99	0.99

*0.1 significant level; **0.05 significant level; ***0.01 significant level.
Firm fixed effect is tested for every regression to make sure it is necessary to apply panel data approach. If the test confirms the existence of firm specific effect, then we mark "Yes". We also report the p-value of second-order residual autocorrelation.

Table 9 Relationship between change in Tobin's Q and change in institutional ownership

Regression of change in Tobin Q on change in institutional ownership. ΔTobin Q is calculated as difference between Tobin Q at time T and Tobin Q at time (T-1); ΔIO is calculated as difference between IO at time T and IO at time (T-1); IO_POS is dummy variable which takes 1 if the change in institutional equity is larger than 0 and vice versa; LEV is the leverage ratio; Size is the natural logarithm of total assets; ROA is return on asset. AR term is included in regression.

Variable	Coefficient	t-statistics
C	-0.009**	(-2.47)
ΔIO	0.000	(0.03)
IO_POS(dummy)	0.0004**	(1.77)
ΔIO*IO_POS(dummy)	0.004	(1.56)
LEV	0.001***	(10.37)
SIZE	0.001**	(2.41)
ROA	-0.387***	(-53.66)
AR(1)	-0.074***	(-8.55)
Auto(2) p-value	0.297	
Firm Effect	Yes	
Adj. R^2	0.27	

* 0.1 significant level; ** 0.05 significant level; *** 0.01 significant level.
Firm fixed effect is tested to make sure it is necessary to apply panel data approach. If the test confirms the existence of firm specific effect, then we mark "Yes". We also report the p-value of second-order residual autocorrelation.

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