EQUITY OWNERSHIP STRUCTURE AND CORPORATE PERFORMANCE USING INDUSTRY-ADJUSTED MEASURES

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Abstract

This paper applies a more robust methodology in industry-adjustment on measuring firm performance as related to ownership structure. We consider insider ownership, institutional ownership, and blockholder ownership. Even after controlling for the endogeneity of insider ownership, we still find positive effect of insider ownership on firm performance, which is conflicting with results found by other recent studies. We find a non-linearity in the relationship between insider ownership and firm performance, but our results do not support a relationship as neat as the inverse U-shape effect found by earlier studies. Our results indicate that the effects of the insider and square of insider on performance are positive, yet the effect of the cubic of insider ownership on firm performance is negative. As no other study based on U.S. data used the cubic of insider ownership and document its effect, our finding is new. We find strong negative effect of blockholder ownership on firm performance, and our results indicate that institutional investors are efficient monitors whose existence helps improving firm value and protecting outside minority shareholders.

Keywords: Ownership, Tobin's Q, Insider, Institutions, Blockholder

Introduction

There is a large body of literature on ownership structure and firm performance. However, many do not address the issue of ownership endogeneity. In addition, while industry-adjustment has been used in many corporate finance studies, other than industry dummy variables, explicit industry-adjustment has not bee applied in the ownership area. This paper attempts to bridge these two areas.

In this paper, we investigate the relationship between firm performance and the structure of different types of equity ownership in publicly listed U.S. companies. We distinguish the roles of different shareholders, and treat firm performance, insider ownership, institutional ownership and blockholder ownership as endogenous.

Previous studies on the relationship between insider ownership and firm performance have produced conflicting theoretical and empirical evidence. On the one side, some argue that ownership structure of a firm affects its performance (Jensen and Meckling 1976, Stulz 1988 and others). Conversely, others argue that the ownership structure of a firm should not affect its performance. Those who take this side argue that either (1) ownership structure is an endogenous outcome reflecting shareholders' influence (Demsetz 1983), or (2) that the proper functioning of outside mechanisms such as the managerial labor market, the product market, and the takeover market, reduces the importance of ownership structure as it relates to a firm's performance.

Most previous empirical studies on ownership structure and firm performance treat ownership as a single-dimensional factor by focusing only on insider ownership, rather than one part of a diverse ownership structure. Although some previous studies consider effects of institutional/blockholder ownership, they do not consider the endogeneity problem of different ownership[1].

In the United States, institutional investors collectively hold a substantial portion of equity capital in stock market[2]. Shleifer and Vishny (1997) point out that concentrated holdings by rich investors are more common than is often believed. Correctly evaluating the roles of institutional investors and blockholders, in addition to the insiders, on firm performance is therefore very important. The ownership structure examined in this paper includes insider ownership, institutional ownership, and blockholder ownership[3], and therefore, is multi-dimensional[4]. Such multi-dimensional ownership structure is what we refer to when ownership structure is used in the following.

Following Morck, Shleifer and Vishny (1988) and many subsequent papers, we use Tobin's q as proxy for firm value or performance. We examine the effects of different stakeholders on firm performance, and firm

[1] In their study on firm performance and mechanisms to control managerial agency problems among Forbes 800 firms in 1987, Agrawal and Knoeber (1996) treat firm performance and six mechanisms (including shareholdings of institutions, and large blockholders) as endogenous by using 2SLS within a simultaneous system. Our study differ with them a lot in sample, simultaneous system, and results.

[2] Brancato (1997) estimates that institutional ownership of domestic equities increased from $1.6 trillion in 1980 to $10.2 trillion in the second quarter of 1995. And institutions accounted for over 50% of the aggregate equity market value in 1995.

[3] Here we assume there are no overlaps between them. If an insider has large stakes in a firm, we consider him or her as an insider, no longer as a block-holder.

[4] Demzsets and Villalonga (2001) treat ownership as multi-dimensional by considering the percentage shareholdings of the largest top 5 shareholders, besides insider ownership. The correlation between their insiders' and blockholders' shareholding is 0.52.

performance on them, using 2-Stage-Least-Square (2SLS) within a panel-data regression. Our study presents robust evidence on (1) whether insider ownership affects firm performance, (2) what kind of roles do institutional investors and blockholders exert in corporate governance, and (3) how firm performance affects different kinds of shareholdings.

Our study avoids certain weaknesses in previous research. Our investigation finds some evidence confirming previous results, and some new evidence.

Consistent with Demsets and Villalonga (2001), we find little evidence that insider ownership affects firm performance, implying that insider shareholding have been chosen optimally to lead to firm value maximization. As a result, there is no cross-sectional effect of insider ownership on firm performance[5]. Our results confirm some previous findings on the role of institutional investors, who positively affect firm performance. In addition, our findings shed new light on the role of blockholders in corporate governance. We find strong evidence that blockholder ownership negatively affects firm performance, indicating that the existence of blockholders neither helps improving firm performance nor helps protecting outside minority shareholders. On the other direction, the results show strong evidence that improvement in firm performance causes insiders and institutional investors to increase their shareholdings, but causes blockholders to decrease their shareholdings. This again highlights the different motives between insiders and institutional holders on the one hand, and blockholders on the other hand.

The paper is organized as follows. Section 2 describes data and variable specifications. Section 3 contains the methodology and presents the empirical results. Finally, Section 6 concludes.

Data and variable descriptions

Data Selection

To be in our sample, a firm must be contained in COMPUSTAT, CRSP and COMPUSTAT Disclosure CD-ROM simultaneously. The final sample firms are constructed through the following procedure:

1. Exclude firms in finance (SIC 6000 to 6999) and utility (SIC 4900 to 4999) industries
2. Exclude firm with missing information on ownership or the percentage ownership exceeds 99.9
3. Exclude firms whose insider ownership, institutional ownership, and blockholder ownership are simultaneously equal to zero[6]
4. Exclude any firms with Tobin's q less than zero or greater than 10[7]
5. Follow MacKie-Mason (1990), we assume a firm's expenditure on advertising, or research & development is zero if they are missing[8], then delete firms with missing information on any other variables used in our analysis

The final sample contains 27,475 firm-year observations of 6,479 firms from 1987 to 1998. Table 1 presents our variable definitions.

(insert Table 1 here)

Variable Descriptions

MSV (1988) begin to use Tobin's q as a measure of firm performance. Most of subsequent studies also use Tobin's q as measure of firm performance. Demsetz and Lehn (1985) instead use accounting rate of return. To make our results comparable to others, we use Tobin's q as measure of firm performance.

Originally, Tobin's q is defined as the ratio of market value of a firm (including intangible assets) to the replacement costs of its tangible assets. Tobin's q and accounting rates of return are correlated, but their focus and constraints are different. Demsetz and Villalonga (2001) discuss conceptual issues on using Tobin's q and accounting rates of return as measures of firm performance. Tobin's q is forward-looking, reflecting investors' anticipation on what the firm is going to achieve. Therefore, it is affected by investors' sentiments. In contrast, accounting rates of return are backward looking, telling people what the firm has accomplished. They are not affected by investors' psychology, but by accounting standards and practices. Since it is often difficult to estimate the replacement costs of tangible assets, many studies simply use the book value of tangible assets to compute the denominator of Tobin's q. Therefore, Tobin's q computed this way is also affected by accounting practices. We follow the methodology in Chung and Pruitt (1994), and Pantzalis (2001) to compute Tobin's q. Tobin's q computed this way is an approximation to the original Tobin's q, but is simpler to compute, and is highly correlated with the original q.

Following the literature, we use BETA to proxy for the market risk of a firm, and we use the standard deviation of the residuals in the following market model to proxy for firm specific risk:

$$RET_{it} = \alpha_0 + BETA_i * RMKT_{it} + \varepsilon_i$$

Where RET_{it} is the weekly stock returns of a firm in 1998, and $RMKT_{it}$ is the NYSE/AMEX/NASDOQ value-weighted index returns. ***sdr*** is the standard deviation of the residuals in the market model, and ε is the residual.

Industry Adjustment

[5] If insider shareholdings are determined cooperatively by a firm's decision-makers, it should reflect all the costs and benefits, and lead to firm value-maximization. The cross-sectional regression reflecting differences in firm's underlying environment should not find relation between firm performance and insider ownership. However, since shareholdings of outsiders like institutional investors and blockholders, are independently determined by those outsiders themselves, which need not maximize firm value and may be related to the underlying environment. There may be cross-sectional evidence of institutional/blockholder ownership on firm performance.

[6] Including such firms does not qualitatively change the results

[7] including firms with q>10 does not qualitatively change the results

[8] Firms usually do not report their R&D (xrd) and advertising expenditures(xad) if their expenses on R&D or advertising are negligible.MacKie-Mason (1990) indicates that assuming xrd/xad equal to zero if they are missing won't lead to any significant bias.

In addition to using raw variable values, we also use industry and size adjusted values. Previous study either did not control for the industry effects, or only used industry dummies as a control for industry-related effect. Dummy variables only affect intercept value, and therefore are insufficient in this context, since the industry difference may affect both the intercept and slope coefficients.

Table 2 reports the mean (median) values of industry-size adjusted Tobin's q, insider ownership, institutional ownership, and blockholder ownership. The industry and size adjusted value is obtained through the following procedure: a firm is assigned to an industry according to its 4-digit primary sic code. If there are less than 10 firms under the 4-digit sic code, we use 3-digit sic code, and so on, until there are at least 10 firms under each industry code. Firms within the same industry are then divided into three groups, small, middle and large according to the book value of total assets (***ta***). The small (large) group in an industry contains the smallest (greatest) 30 percent firms. The middle group contains firms whose sizes (book value of total assets) belong to the middle 30 to 70 percent. A firm's industry-size adjusted value of a variable is equal to the value of the variable minus the **median** value of the variable of firms in the same industry and size group.

Using Welch's t- (Wilcoxon rank-sum z-) statistic as the mean (median) difference test statistic, we find strong evidence of significant differences in firm performance (industry-adjusted Tobin's q, or ***aq***) between firms with different industry adjusted ownership holdings (insider, institutional, and blockholder). In particular, for firms with high industry-adjusted performance (***aq***), mean insider ownership is higher, mean institutional is higher, while mean blockholder ownership is lower.

It is interesting to note that we also find significant different patterns of holding between blockholder ownership on the one hand and insider and institutional holdings on the other hand. There is a general negative relationship between the former and the latter in relationship to high ***aq*** and low ***aq*** firms.

(Insert Table 2 here)

Methodology

Many theoretical studies predict that ownership affects firm performance[9]. Conversely, other studies have found that firm performance affects insider ownership [Loderer and Martin (1997), Cho (1998) and others]. Different types of ownership may affect each other also. Leland and Pyle (1977) argue that insiders' shareholding is a signal of the quality of a firm. Consequently, insider ownership may affect institutional and blockholder ownership. On the other side, if we assume institutional investors and blockholders are effective monitors and share common interests with atomistic shareholders, then less shareholdings by insiders are needed to align insiders interests with those of outside shareholders. And managers may have less incentives to hold more stakes since chances and benefits of shirking are decreased as the result of effective monitoring by institutional investors and blockholders. It is also possible that institutional investors or blockholders, or both, are not good monitors in other ways. Even though they monitor well, they might act for themselves or collude with insiders. In the latter case, minority shareholders are in a disadvantaged situation, and firm performance/market valuation on such firm may go down. In any case, it is highly likely that different types of ownership and firm performance affect each other.

In equation (2) to (6), we follow MSV (1988) and other studies to use ***ltdta***, ***xrdta*** and ***xadta*** as explanatory variables in examining effect of insider ownership on firm performance. Follow Pantzalis et. al. (2002), we use earnings before interests and taxes as another control variable. Different form them, we use ***ta*** to standardize those variables. We follow Himmelberg, Hubbard, and, Palia (HHP) (1999) to use the investment rate, ***cape***, the ratio of capital expenditure to the net stock of plant, property, and equipment, to control for effect of capital expenditure on firm performance. Previous studies document significant non-linear effect of insider owneron firm performance (see McConnell, and Servaes, 1990; Morck et al 1988, Hermalin and Weisbach 1991 and others), We follow Short and Keasey (1999) to use the cubic model of insider to control for the non-linearity. Follow HHP (1999), in some regressions we also consider effects of market risk (***beta***) and firm-specific risk (***sdr***) on firm performance.

[9] Insider ownership on firm performance see Jensne & Meckling (1976), Stulz (1988) and others; Institutional ownership on firm performance see Gorton and Kahl (1999), Pound (1988) and others, blockholder ownership on firm performance see Shleifer and Vishny (1986) and (1997) and others

$$q_i = f(ins_i, ins\text{^}2_i, ins\text{^}3_i, \text{int}_i, blo_i, ta, xrdta_i, xrdta_i, ltdta_i, cape_i, ebita_i, beta_i, sdr_i) + \varepsilon_{qi}$$
(2)

$$own_i = f(q_i, otherown_i, ta, xrdta_i, xrdta_i, ltdta_i, cape_i, ebita_i, beta_i, sdr_i, tat_i, cr_i, trat_i) + \varepsilon_{oi}$$ (3), (4), (5), and (6)

where
$own_i = ins_i$, int_i, or blo_i, and
$otherown_i$ = other kinds of ownership except own_i

Following HHP (1999), we use ***xrdta***, ***xadta***, ***ltdta***, ***cape***, ***beta***, ***sdr***, and ***ebita*** to explain insider ownership. Different from them, we use book value of total assets instead of sales to proxy for size, and we use total assets to standardize those variables, except for ***beta*** and ***sdr***.

Gompers and Metrick (2001) show that large institutions may prefer larger and more liquid stocks. We use ***trat***, or trading volume turnover, the ratio of calendar year trading volume to shares outstanding at the end of a year, as a proxy for liquidity to measure its effect on institutional ownership. McConnell and Wahal (1998) document a positive effect of R&D expenditure on institutional share ownership, therefore we also include the ratio of R&D expenditure to book value of total assets as an explanatory variable on institutional ownership. We expect a positive effect if, by their monitoring, institutional investors prevent managers from making myopic cuts in R&D expenditures.[10] In their test of the prudent investment hypothesis in institutional portfolio composition, Eakins, Stansell, and Wertheim (1998) document significantly positive effects of market risk (***beta***), current ratio (***cr***), profitability (ROA, we use ***ebita***) and trading volume turnover on institutional ownerships. We expect these variables to affect blockholder ownership in a similar way. Crutchley et. al. (1999) find a U-shape effect of insider ownership on institutional ownership. We anticipate that different kinds of ownership affect each other. T better compare the determinants of different kinds of ownership, we use equations (3) to (6) to endogenously explain the interactions among the various types of ownership.

Empirical Estimation

We follow HHP (1999) in using the fixed effects model to control for the effects of unobserved factors on firm performance and shareholdings. Without controlling for this effect, the relationships among firm performance and shareholdings may be spurious owing to some common unobserved firm characteristics. We also use two-stage fixed effects to control for the endogeneity of firm performance and insider ownership.

Control for Potential Overlap in Different Ownerships

To control for potential overlaps between different kinds of ownership, we use residual ownerships to run the same analyses again.

Residual insider ownership, residual institutional ownership, and residual blockholder ownership (***reins***, ***reint***, and ***reblo***) are residuals from the following regressions:

$$\boldsymbol{ins_{it}} = \alpha_0 + \alpha_1 \boldsymbol{int_{it}} + \alpha_2 \boldsymbol{blo_{it}} + \boldsymbol{\varepsilon_{it}}. \quad (7)$$

$$\boldsymbol{int_{it}} = \beta_0 + \beta_1 \boldsymbol{ins_{it}} + \beta_2 \boldsymbol{blo_{it}} + \boldsymbol{\mu_{it}}. \quad (8)$$

$$\boldsymbol{blo_{it}} = \delta_0 + \delta_1 \boldsymbol{ins_{it}} + \delta_2 \boldsymbol{int_{it}} + \boldsymbol{\nu_{it}}. \quad (9)$$

Most of our results are robust to all the different methods.

Empirical Results and Discussions

Because our interests are in the relationship among firm performance and different types of ownership, we do not discuss effects of other control variables unless necessary.

3.1 Panel-data Regressions

Table 3 reports panel-data regressions without industry adjustment, and Table 4 reports panel-data regressions with industry adjustment. Without considering the non-linearity issue, the 2 sets of results are similar and confirm earlier findings.

When the squared and cubit insider holding terms are included, the industry adjustments yield a more reasonable outcome, with insider holding having a positive and significant effect on firm performance, the squared insider holding term also having a positive and significant coefficient, and the cubic term having a negative and significant coefficient. Without the industry adjustment (Table 3), the insider holding term carries a negative and significant coefficient, contrary to expectation and earlier findings. The squared term carries a positive and significant coefficient, and the cubic term has a negative and significant coefficient. The negative coefficient for insider holding is opposite to all the findings from earlier studies.

(insert Table 3 here)
(insert Table 4 here)

3.2 Fixed-effect Two-stage Least Square Regressions

Table 5 reports the results from fixed-effect two-stage least square regressions, testing the effects of other variables on firm performance (*q* and *aq*) and on insider holding (*ins*). Panel A contains results without industry adjustment, and Panel B contains results with industry adjustment. The results between firm performance and various ownership types are similar to before. In addition, the different patterns in non-linearity also exist between the results with (Panel A) and without industry adjustment (Panel B), with the industry adjustment generating more reasonable results.

[10] The previous findings on effect of R&D expenditure on institutional ownership is mixed.

(insert Table 5 here)

3.3 Panel-data Regressions with Residual Ownership

Table 6 reports the results from panel-data regressions with residual ownership as estimated by equations (7) through (9). Panel A contains results without industry adjustment, and Panel B contains results with industry adjustment. Similar to ealier results, using residual ownership eliminate spurious variations in insider holding. We observe similar non-linearity for results both with and without industry adjustment. The only different result from the panel-data regression is that in the case with industry adjustment, the effect of firm performance (*aq*) on industry-adjusted blockholder ownership (*areblo*) is negative and insignificant. All the other results confirm our earlier findings.

(insert Table 6 here)

Summary and Conclusions

It is clear from the analyses above that our results confirm and strengthen earlier findings and are robust to different methodologies. We use residual ownership to correct for potential overlap in various ownership types. In addition, we apply industry-size adjustment and test our hypotheses both with and without such adjustment. The results with our procedure of industry adjustments are consistently stronger.

In general, we find firm performance, as measured by Tobin's q (with or without industry adjustment), positively affects both insider and institutional ownership, but negatively affects blockholder ownership. From the opposite direction, both insider and institutional ownership are associated with higher firm performance, while blockholder ownership is negatively associated with firm performance.

Among the various ownerships, we find that insider and institutional ownership are negatively related to each other, and thus function as substitutes. On the other hand, they are both positively related to blockholder ownership, signally the endogenous optimal ownership requires higher insider or institutional ownership when there is high blockholder ownership. As high blockholder ownership tends to be associated with lower firm performance, it is logical that more insider or institutional monitoring is required.

As a methodological note, we find that using residual ownership reduces/eliminates spurious variations in the non-linear relationship between firm performance and insider ownership. In the same estimation for the non-linear relationship, we also have evidence that industry adjustment generates more reliable estimates.

We note that, even after controlling for the endogeneity of insider ownership, we still find positive effect of insider ownership on firm performance, which is conflicting with results found by other recent studies controlling for endogeneity.

While we do find non-linearity in the relationship between insider ownership and firm performance, our results do not support a relationship as neat as the inverse U-shape effect predicted by Stulz (1988) and supported by many previous studies. Inconsistent with Short and Keasey (1999) who documented positive effects on firm performance of managerial shareholdings and the cubic of managerial shareholdings, and negative effect of the square of managerial ownership based on U.K. data. Our results indicate that the effects of the insider and square of insider on performance are positive, yet the effect of the cubic of insider ownership on firm performance is negative. As no other study based on U.S. data used the cubic of insider ownership and document its effect, our finding is new.

We find strong negative effect of blockholder ownership on firm performance, which was discussed by Shleifer and Vishny (1997) but not documented.

Our results indicate that institutional investors are efficient monitors and their existence helps improving firm value and protecting outside minority shareholders.

The strong negative effect of blockholder ownership on firm performance needs more attention, since market often expects blockholders to be efficient monitors, and their existence helps enhance firm value. Shleifer and Vishny (1986), Gorton and Kahl (1999) suggest that blockholders play positive roles in corporate governance, and previous studies document positive roles of blockholders in corporate governance in most cases either in the United states and in other countries like Germany and Japan, [Shome and Sinch (1995), Shivdasani (1993), Shleifer and Vishny (1997)]. In some cases blockholders have insignifcant roles [MS (1990), Lorderer & Martin (1997)]. However, Shleifer and Vishny (1997) acknowledge that "large investors represent their own interests, which need not coincide with the interests of other investors in the firm, or with the interests of employees and managers". Therefore, "large investors might try to treat themselves preferentially at the expense of other investors and employees", "They can do so by paying themselves special dividends or by exploiting other business relationships with the companies they control"[11]. As a result, firm value or performance will be hurt. Burkart and Panunzi (2001) argue the presence of a blockholder can both protect and hurt minority shareholders. In cases when there are several blockholders in a firm, Gomes (2000) show that the bargaining problems led by the presence of multiple controlling shareholders protect minority shareholders, however, the same bargaining problems prevent efficient decisions.

To summarize, blockholder(s) can positively or negatively affect a firm's performance, we cannot predict which role will dominate in a cross-sectional analysis. Our finding of the predominantly negative role of blockholders is consistent with the hypothesis that blockholders represent their own interests, and treat themselves preferentially at the expenses of others.

[11] Dann and DeAngelo (1983) indicate that greenmail and targeted share repurchases are examples of special deals for large investors.

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Table 1. Variable descriptions

A variable name with "a" as the initial character means that the variable value is adjusted by the mean value of samples within the same industry and size group. The industry and size adjusted value is obtained through the following procedure: we first assign a firm to an industry according to its 4-digit primary sic code at the end of calendar year (from CRSP), if there are less than 10 firms under the 4-digit sic code, we then use 3-digit sic code or even 1-digit sic code, until there are at least 10 firms under each industry code. Then we divide firms within the same industry into three groups, small, middle and large according to the book value of total assets. The small (large) group under an industry

contains the smallest (greatest) 30 percent firms, and the middle group contains firms whose sizes (book value of total assets) belong to the middle 30 to 70 percent. Then a firm's industry-size adjusted value of a variable is equal to the value of the variable minus the medianvalue of the variable of firms in the same industry and size group.

variable	Definition	source
q	Tobin's Q=[Market value of equity + Preferred stock liquidating value + Long term debt – (Short term assets – Short term liabilities)] / (Total assets)	Compustat
ins	% of common shares held by insiders	Compustat Disclosure CD-ROM
ins^2	The square of insider ownership	Compustat Disclosure CD-ROM
ins^3	The cubic of insider ownership	Compustat Disclosure CD-ROM
int	% of common shares held by institutional investors	Compustat Disclosure CD-ROM
blo	% of common shares held by blockholders	Compustat Disclosure CD-ROM
ta	Book value of total assets	Compustat
ltdta	The ratio of long-term debt to total assets	Compustat
xrdta	The ratio of research and development expenditures to book value of total assets	Compustat
xadta	The ratio of advertising expenditures to TA	Compustat
cape	The ratio of capital expenditures to the stock of property, plant and equipment. CAPX-capital expenditures, PPENT-the total net value of property, plant and equipment	Compustat
ebita	The ratio of earnings before interests and taxes (ebit) to book value of total assets, TA.	Compustat
beta	Market risk, measured by the coefficient of a firm's weekly stock return regressed on weekly NYSE/AMEX/NASDOQ value-weighted return in 1998	CRSP
sdr	Firm specific risk, measured by the standard error of the residuals of the above regression	CRSP
trat	Total trading volume turnover, the ratio of calendar year end trading volume to common shares outstanding at the end of a calender year	Compustat
tat	Total assets turnover, measured by net sales divided by book value of total assets	Compustat
cr	Current ratio, measured by total current assets divided by total current liability	Compustat

Table 2. Industry-adjusted Tobin's Q and Ownership Variables

The mean (median) values of industry-size adjusted Tobin's q, insider ownership, institutional ownership and blockholder ownership, which are denoted by aq, ains, aint, ablo respectively. The industry and size adjusted value is obtained through the following procedure: we first assign a firm to an industry according to its 4-digit primary sic code, if there are less than 10 firms under the 4-digit sic code, we then use 3-digit sic code or even 1-digit sic code, until there are at least 10 firms under each industry code. Then we divide firms within the same industry into three groups, small, middle and large according to the book value of total assets. The small (large) group under an industry contains the smallest (greatest) 30 percent firms, and the middle group contains firms whose sizes (book value of total assets) belong to the middle 30 to 70 percent. Then a firm's industry-size adjusted value of a variable is equal to the value of the variable minus the **median** value of the variable of firms in the same industry and size group. The mean (median) difference test statistic is the Welch's t- (Wilcoxon rank-sum z-) statistic

Panel A: the total samples are divided according to industry-size adjusted q, aq

	Whole sample (N=27475)	Firms with aq ≤ 0 (N=14848)	Firms with aq > 0 (N=12627)	Mean difference tests: t-statistic
ains mean (median)	0.04286	0.0394 (0)	0.0470 (0)	-3.177[a] (-2.492[b])
aint mean (median)	0.0091	-0.0094 (-0.0008)	0.0309 (0.00335)	-18.939[a] (-18.247[a])
ablo mean (median)	0.0173	0.0255 (0)	0.0082 (0)	6.305[a] (7.000[a])

Panel B: the total samples are divided according to industry-size adjusted insider ownership, ains

	Whole sample (N=27475)	Firms with ains ≤ 0 (N=14733	Firms with ains > 0 (N=12742)	Mean difference tests: t-statistic
aq mean (median)	0.2749	0.2465 (0)	0.3078 (0)	-4.002[a] (-2.642[a])
aint mean (median)	0.0091	0.0327 (0.0062)	-0.0181 (-0.0113)	24.145[a] (25.896[a])
ablo mean (median)	0.0175	-0.0248 (-0.0126)	0.0664 (0.0274)	-33.652[a] (-35.135[a])

Panel C: the total samples are divided according to industry-size adjusted institutional ownership, aint

	Whole sample (N=27475	Firms with aint ≤ 0 (N=14669)	Firms with aint> 0 (N=12806)	Mean difference tests: t-statistic
aq mean (median)	0.2749	0.2074 (-0.0119)	0.3523 (0.0080)	-9.513[a] (-14.403[a])
ains mean (median)	0.0429	0.0734 (0.005)	0.0079 (-0.006)	28.309[a] (25.915[a])
ablo mean (median)	0.0175	0.0110 (0)	0.0250 (0)	-5.170[a] (-7.260[a])

Panel D: the total samples are divided according to industry-size adjusted blockholder ownership, ablo

	Whole sample (N=27475)	Firms with ablo ≤ 0 (N=14616)	Firms with ablo> 0 (N=12859)	Mean difference tests: t-statistic
aq mean (median)	0.2749	0.3130 (0)	0.2317 (-0.0102)	5.346[a] (8.518[a])
ains mean (median)	0.0429	0.0036 (-0.0069)	0.0875 (0.0256)	-35.627[a] (-35.235[a])
aint mean (median)	0.0091	0.0036 (0)	0.0154 (0)	-5.518[a] (-4.342[a])

a: significant at 1%
b: significant at 5%
c: significant at 10%

Table 3. Panel-data Regressions without Industry-size Adjustments

	dependent variable								
independent variable	Q (1)	q (2)	q (3)	ins (4)	ins (5)	int (6)	int (7)	blo (8)	blo (9)
intercept	1.03[a]	1.06[a]	1.08[a]	.252[a]	.236[a]	.264[a]	.309[a]	.230[a]	.201[a]
Q				.0059[a]	.0064[a]	.0047[a]	.0047[a]	-.009[a]	-.0067[a]
Ins	.230[a]	-.101	-.866[a]			-.109[a]	-.107[a]	.102[a]	.099[a]
ins^2		.485[a]	3.173[a]						
ins^3			-2.237[a]						
int	.517[a]	.517[a]	.535[a]	-.203[a]	-.187[a]			.257[a]	.283[a]
blo	-.163[a]	-.163[a]	-.164[a]	.054[a]	.052[a]	.084[a]	.086[a]		
ta	4.47 e-05[a]	4.41 e-05[a]	4.34 e-05[a]	-4.77 e-06[a]	-4.41 e-06[a]	7.96 e-06[a]	7.42 e-06[a]	4.51 e-06[a]	4.02 e-06[a]
ltdta	-.466[a]	-.465[a]	-.466[a]	.011	.016[c]		-.037[a]		.143[a]
xrdta	2.685[a]	2.679[a]	2.683[a]		-.0033	-.033[a]	.002		.005
xadta	-.122[a]	-.122[a]	-.122[a]		.0007		-.003		-.002
ebita	1.009[a]	1.010[a]	1.010[a]	.026[a]	.023[a]		.024[a]		-.035[a]
cape	.183[a]	.182[a]	.182[a]		.0006		.003		-.016[a]
tat					.011[a]		-.031[a]		.013[a]
cr					8.67 e-04[b]		-6.39 e-04[b]		-1.34 e-03[a]
trat					-.007[a]	.037[a]	.036[a]		-.010[a]
beta				-1.58 e-04[a]	-1.57 e-04[a]	-4.20 e-05	-4.12 e-05	-1.30 e-04[b]	-1.33 e-04[b]
sdr				-2.57 e-03[a]	-2.59 e-03[a]	-3.20 e-03[a]	-3.17 e-03[a]	-5.65 e-03[a]	-5.60 e-03[a]
Firm effects F-value	7.01[a]	7.02[a]	7.02[a]	5.88[a]	5.85[a]	16.15[a]	14.89[a]	4.46[a]	4.48[a]
R^2 (within)	.045	.045	.046	.032	.034	.126	.132	0.031	.041
Model F-stat	109.3[a]	99.39[a]	91.85[a]	27475	53.23[a]	377.6[a]	228.5[a]	111.8[a]	63.93[a]
Hausman χ^2	570.2[a]	575.2[a]	583.6[a]	6479	429.8[a]	272.5[a]	930.5[a]	470.4[a]	531.0[a]
Total N	27475	27475	27475	27475	27475	27475	27475	27475	27475
# of firms	6479	6479	6479	6479	6479	6479	6479	6479	6479

a: significant at 1%
b: significant at 5%
c: significant at 10%

Table 4. Panel-data Regressions with Industry-size Adjustments

independent variable	dependent variable								
	aq (1)	aq (2)	aq (3)	ains (4)	ains (5)	aint (6)	aint (7)	ablo (8)	ablo (9)
intercept	.252[a]	.248[a]	.240[a]	.041[a]	.040[a]	.008[a]	.011[a]	.012[a]	.011[a]
aq				.0075[a]	.0075[a]	.0071[a]	.0058[a]	-.0036[a]	-.0017[b]
ains	.284[a]	.242[a]	.334[a]			-.128[a]	-.128[a]	.196[a]	.195[a]
ains^2		.158	.490[a]						
ains^3			-.795[a]						
aint	.447[a]	.444[a]	.445[a]	-.191[a]	-.190[a]			.125[a]	.138[a]
ablo	-.079[b]	-.077[b]	-..078[b]	.140[a]	.140[a]	.065[a]	.067[a]		
ta	5.86 e-06	6.13 e-06	6.69 e-06	-4.37 e-07	-3.92 e-07	1.50 e-07	2.71 e-07	-2.72 e-06[b]	-2.89 e-06[b]
altdta	-.290[a]	-.291[a]	-.293[a]	.007	.010		-.033[a]		.069[a]
axrdta	2.576[a]	2.572[a]	2.573[a]		-.003	.036[b]	.099[a]		-.007
axadta	-.106[a]	-.106[a]	-.106[a]		-.001		-.003		-.0009
aebita	.852[a]	.851[a]	.850[a]	.024[a]	.020[b]		.063[a]		-.017[c]
acape	.223[a]	.248[a]	.224[a]		.006[c]		.0008		-.015[a]
atat					.006[b]		-.005[b]		.003
acr					.0006[c]		-.0004		-.00001
atrat					-.0008	.024[a]	.023[a]		-.010[a]
abeta				-1.62 e-04[a]	-1.63 e-04[a]	-7.65 e-05[a]	-7.39 e-05[c]	-2.39 e-05	-2.25 e-05
asdr				-2.45 e-03[a]	-2.46 e-03[a]	-2.00 e-03[a]	-2.02 e-03[a]	-4.07 e-03[a]	-4.09 e-03[a]
Firm effects F-value	5.50[a]	5.50[a]	5.50[a]	4.69[a]	4.68[a]	6.35[a]	6.18[a]	4.65[a]	4.63[a]
R^2 (within)	.040	.040	.041	.052	.052	.058	.063	.035	.059
Model F-stat	97.52[a]	87.98[a]	80.89[a]	142.5[a]	82.23[a]	161.6[a]	101.2[a]	126.3[a]	62.4[a]
Hausman χ^2	273.1[a]	273.6[a]	273.8[a]	119.3[a]	122.5[a]	39.8[a]	72.0[a]	91.4[a]	96.0[a]
Total N	27475	27475	27475	27475	27475	27475	27475	27475	27475
# of firms	6479	6479	6479	6479	6479	6479	6479	6479	6479

a: significant at 1%
b: significant at 5%
c: significant at 10%

Table 5. Fixed Effects Two-stage Least Square Regressions

Panel A: results of variables not adjusted by industry and size

independent variable	dependent variable					
	(1) 1st-order		(2) 2nd-order		(3) 3rd-order	
	q	ins	q	ins	q	ins
intercept	1.019[a]	-4.288[a]	1.044[a]	-3.247[a]	1.068[a]	-2.248[a]
q		4.209[a]		3.245[a]		2.320[a]
ins	0.238[a]		-0.080		-0.832[a]	
ins^2			0.465[a]		3.105[a]	
ins^3					-2.197[a]	
int	0.531[a]	-2.237[a]	0.531[a]	-1.770[a]	0.548[a]	-1.323[a]
blo	-0.155[a]	0.654[a]	-0.155[a]	0.516[a]	-0.157[a]	0.384[a]
ta	4.48[e]-05[a]	-1.89[e]-04[a]	4.42e-05[a]	-1.46e-04[a]	4.36e-05[a]	-1.06e-04[a]
ltdta	-0.470[a]	1.978[a]	-0.468[a]	1.527[a]	-0.469[a]	1.094[a]
xrdta	2.693[a]	-11.334[a]	2.687[a]	-8.736[a]	2.690[a]	-6.242[a]
xadta	-0.122[a]	0.513[a]	-0.122[a]	0.395[a]	-0.122[a]	0.282[a]
cape	0.181[a]	-0.763[a]	0.181[a]	-0.588[a]	0.180[a]	-0.420[a]
ebita	1.007[a]	-4.240[a]	1.009[a]	-3.262[b]	1.009[a]	-2.324[a]
beta	0.0006[b]	-0.003[c]	0.0006[b]	-0.002[b]	0.0006[b]	-0.001[b]
sdr	0.012[a]	-0.050[a]	0.012[a]	-0.039[a]	0.011[a]	-0.029[a]
N	27475	27475	27475	27475	27475	27475

Panel B: results of variables adjusted by industry and size

independent variable	dependent variable					
	(1) 1st-order		(2) 2nd-order		(3) 3rd-order	
	aq	ains	aq	ains	aq	ains
intercept	0.249[a]	-0.859[a]	0.245[a]	-0.822[a]	0.237[a]	-0.677[a]
aq		3.440[a]		3.299[a]		2.746[a]
ains	0.291[a]		0.250[a]		0.342[a]	
ains^2			0.153		0.483[a]	
ains^3					-0.792[a]	
aint	0.454[a]	-1.563[a]	0.452[a]	-1.506[a]	0.453[a]	-1.285[a]
ablo	-0.072[b]	0.248[b]	-0.070[c]	0.244[b]	-0.072[b]	0.226[b]
ta	6.10[e]-06	-2.10[e]-05	6.36[e]-06	-2.01[e]-05	6.91[e]-06	-1.68[e]-04
altdta	-0.293[a]	1.009[a]	-0.294[a]	0.968[a]	-0.296[a]	0.807[a]
axrdta	2.579[a]	-8.873[a]	2.576[a]	-8.509[a]	2.577[a]	-7.079[a]
axadta	-.106[a]	0.363[a]	-0.106[a]	0.348[a]	-0.106[a]	0.290[a]
acape	0.222[a]	-0.764[a]	0.222[a]	-0.733[a]	0.223[a]	-0.809[a]
aebita	0.848[a]	-2.918[a]	0.848[a]	-2.797[a]	0.847[a]	-2.323[a]
abeta	0.0004	-0.001	0.0004	-0.001	0.0004	-0.001
asdr	0.011[a]	-0.038[a]	0.011[a]	-0.037[a]	0.011[a]	-0.031[a]
N	27475	27475	27475	27475	27475	27475

a: significant at 1%
b: significant at 5%
c: significant at 10%

Table 6. Panel-data Regressions

--variables with industry-size adjustments, controlling for overlaps between different kinds of ownership by using the residual ownership, reins, reint, reblo. The residual insider ownership, reins, is the residual of regression (1) $ins_{it} = \alpha_0 + \alpha_1 int_{it} + \alpha_2 blo_{it} + \varepsilon_{it.}$ reins^2 is the square of reins. The residual institutional ownership, reint, is the residual of regression (2) $int_{it} = \beta_0 + \beta_1 ins_{it} + \beta_2 blo_{it} + \mu_{it.}$ The residual blockholder ownership, reblo, is the residual of regression (3) $blo_{it} = \delta_0 + \delta_1 ins_{it} + \delta_2 int_{it} + \nu_{it}$. Other variables are described in table 1. The industry and size adjusted value is obtained through the following procedure: we first assign a firm to an industry according to its 4-digit primary sic code, if there are less than 10 firms under the 4-digit sic code, we then use 3-digit sic code or even 1-digit sic code, until there are at least 10 firms under each industry code. Then we divide firms within the same industry into three groups, small, middle and large according to the book value of total assets. The small (large) group under an industry contains the smallest (greatest) 30 percent firms, and the middle group contains firms whose sizes (book value of total assets) belong to the middle 30 to 70 percent. Then a firm's industry-size adjusted value of a variable is equal to the value of the variable minus the mean value of the variable of firms in the same industry and size group. areins^2 is the square of areins, areins is the cubic of reins.

Independent variable	Dependent variables			
	q	reins	reint	reblo
intercept	1.158[a]	-.015[a]	-.011[b]	-.009
q		.0076[a]	.0062[a]	-.0073[a]
reins	.0159			
reins^2	1.156[a]			
reins^3	-1.678[a]			
reint	.574[a]			
reblo	-.150[a]			
ta	4.53e-05[a]	-4.45e-06[a]	5.87e-06[a]	6.89e-06[a]
ltdta	-.466[a]	.008[c]	-.028[a]	.132[a]
xrdta	2.681[a]	-.0033	.001	.005
xadta	-.122[a]	.0008	-.002	-.003
ebita	1.007[a]	.030[a]	.029[a]	-.036[a]
cape	.181[a]	.003	.003	-.016[a]
tat		.007[b]	-.026[a]	.002
cr		9.933e-04[a]	-3.94e-04	-1.71e-03[a]
trat		-.003[b]	.032[a]	-.00004
beta		-1.36e-04[a]	-8.49e-05[b]	-1.02e-04
sdr		-1.91e-03[a]	-3.82e-03[a]	-5.71e-03[a]
Firm effects F-value	7.01[a]	5.44[a]	12.80[a]	4.16[a]
R^2 (within)	.0458	.006	.071	.014
Model F-stat	91.61[a]	11.01[a]	132.8[a]	24.8[a]
Hausman χ^2	580.7[a]	38.21[a]	614.2[a]	109.5[a]
Total N	27475	27450	27450	27475
# of firms	6479	6485	6485	6485

a: significant at 1% b: significant at 5% c: significant at 10%

Panel B: variables are adjusted by industry and size

Independent variable	Dependent variables			
	aq	Areins	areint	areblo
intercept	.247[a]	.0227	-.002	.015[a]
aq		.0077[a]	.0076[a]	-.002
areins	.178[a]			
areins^2	.660[a]			
areins^3	-1.015[a]			
areint	.442[a]			
areblo	-.029			
ta	6.72e-06	-1.01e-06	2.47e-07	-2.32e-06[c]
altdta	-.289[a]	.0008	-.031[a]	.064[a]

axrdta	2.566[a]	.016	.095[a]	-.005
axadta	-.106[a]	-.002	-.003	.0009
aebita	.848[a]	.029[a]	.063[a]	-.020[b]
acape	.223[a]	.001[a]	.003	-.015[a]
atat		.005[c]	-.0028[a]	.0028
acr		.0007[c]	-1.99e-04[a]	-.0002
atrat		.0015	.021[a]	-.008[a]
abeta		-1.45e-04[a]	-9.19e-05[b]	-6.58e-06
asdr		-2.18e-03[a]	-2.75e-03[a]	-3.92e-03[a]
Firm effects F-value	5.50[a]	4.75[a]	5.97[a]	4.70[a]
R^2 (within)	.0411	.0057	.0334	.0075
Model F-stat	81.85[a]	10.04[a]	60.51[a]	13.17[a]
Hausman χ^2	276.44[a]	28.3[a]	41.78[a]	25.35[b]
Total N	27475	27475	27475	27475
# of firms	6479	6479	6479	6479

a: significant at 1%
b: significant at 5%
c: significant at 10%