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Shareholder Rights, Managerial Incentives, and Firm Value

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Final Report of the Project Funded by The Canadian Foundation for Governance Research Robert Bertram Doctoral Research Awards

Feng Zhang
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First of all, I thank the Canadian Foundation for Governance Research for the Robert Bertram Doctoral Research Awards. The awards have motivated me to work hard on this project and to contribute to our understanding of corporate governance.

I have been working on this project since early 2010. The output of this project is a paper titled "*Shareholder Rights, Managerial Incentives, and Firm Value*," which served as my job market while I was on the job market from late 2010 to early 2011. The paper helped me win the position of an assistant professor of finance at the Eccles School of Business, the University of Utah. It has been presented at the University of British Columbia, the University of Utah, the University of Toronto, the 2010 Northern Finance Association conference, and the 2011 China International Conference in Finance. I briefly summarize the paper in the following.

One important task of the board of directors is to decide the top managers' compensation. The board usually grants stocks and options to the managers to alleviate the agency problem between the managers and the shareholders, which stems from the fact that the managers usually do not own the firm. Managerial ownership is supposed to incentivize the managers to work for the shareholders' interest and has been shown to enhance firm value, at least at low levels of managerial ownership. Too much managerial ownership, however, will damage firm value because it helps entrench the managers with the associated voting power.

In this project, I find that managerial ownership enhances firm value in firms with strong shareholder rights, but damages firm value in those with weak shareholder rights. Shareholder rights are measured with antitakeover provisions, which protect the managers from takeovers. There are two reasons why the effect of managerial ownership on firm value depends on the strength of antitakeover provisions. First, antitakeover provisions intensify the entrenchment effect of managerial ownership. For example, with a staggered board, the managers can use their voting power in more than one year to prevent the raider from replacing the directors who do not agree with the acquisition. Second, antitakeover provisions weaken the incentive effect of managerial ownership. Antitakeover provisions increase the target firm's bargaining position against the acquirer and thus increase the proportion of the synergy gains that accrues to the target. Synergy increases when the target managers exert less effort. Therefore, antitakeover provisions induce the target managers to exert less effort, i.e., decrease the incentive effect of managerial ownership, *ceteris paribus*.

My findings have two important implications for board directors. First, directors should not grant stocks to the managers when shareholder rights are weak. Managerial ownership enhances firm value only when shareholder rights are strong. Second, my findings suggest that shareholder rights and managerial ownership are complementary governance mechanisms. Therefore,

directors should balance shareholder rights and managerial ownership when designing corporate governance mechanisms.

Again, I deeply appreciate the support of the Canadian Foundation for Governance Research for my research, and look forward to talking about this project on October 11th, 2011 in Toronto.

Sincerely yours,

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Shareholder Rights, Managerial Incentives, and Firm Value *

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October 1, 2011

Abstract

This paper investigates interactions between two central corporate governance mechanisms: shareholder rights and managerial ownership. I find that the effect of managerial ownership on firm value crucially depends on the strength of shareholder rights. For firms with strong shareholder rights, managerial ownership enhances firm value. For firms with weak shareholder rights, however, managerial ownership destroys firm value. The announcement return of manager share purchases in the open market is significantly lower in firms with weak shareholder rights. Firms with weak shareholder rights also have significantly lower managerial ownership. The findings are robust to various measures of managerial ownership, different estimation methods, and endogeneity concerns. The evidence supports that shareholder rights and managerial ownership are complementary governance mechanisms.

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Shareholder Rights, Managerial Incentives, and Firm Value

Abstract

This paper investigates interactions between two central corporate governance mechanisms: shareholder rights and managerial ownership. I find that the effect of managerial ownership on firm value crucially depends on the strength of shareholder rights. For firms with strong shareholder rights, managerial ownership enhances firm value. For firms with weak shareholder rights, however, managerial ownership destroys firm value. The announcement return of manager share purchases in the open market is significantly lower in firms with weak shareholder rights. Firms with weak shareholder rights also have significantly lower managerial ownership. The findings are robust to various measures of managerial ownership, different estimation methods, and endogeneity concerns. The evidence supports that shareholder rights and managerial ownership are complementary governance mechanisms.

1 Introduction

Managerial ownership has two effects on corporate governance: the incentive effect and the entrenchment effect. First, managerial ownership incentivizes a manager to act in the shareholders' interest (Jensen and Meckling, 1976). Second, it entrenches the manager because of the associated voting power of ownership (Stulz, 1988). Shareholder rights, as measured by antitakeover provisions, also have two effects on corporate governance. Antitakeover provisions entrench the manager by protecting him/her from takeovers. In addition, antitakeover provisions enhance a target firm's bargaining position against the acquirer and thus raise the bid premium.[1] Shareholder rights and managerial ownership work together to affect a firm's governance. This paper investigates how the two central governance mechanisms interact to affect managerial incentives and firm value. The questions of interest are: Do shareholder rights affect the incentives generated by manager shareholdings? How do shareholder rights and managerial ownership interact in affecting firm value? And how do shareholders adjust managerial ownership with respect to the strength of shareholder rights?

Theories suggest three channels of interaction between antitakeover provisions (shareholder rights) and managerial ownership. First, antitakeover provisions and managerial ownership may magnify each other's entrenchment effect. Before the passage of the second-generation antitakeover laws in the 1980s, an acquirer can purchase a significant proportion of a target firm's shares and then dismiss the target's managers with the voting power of the acquired shares, even if the target managers also hold non-trivial ownership. The second-generation antitakeover laws usually require that the acquirer must receive the approval of a supermajority of the target firm's shareholders before the acquirer purchases significant amounts of the target's shares. The supermajority requirement to approve a merger makes the target manager's voting power pivotal, and thus

[1] See DeAngelo and Rice (1983), Comment and Schwert (1995), and Heron and Lie (2006).

magnifies the entrenchment effect of managerial ownership. A staggered board—a widely adopted antitakeover provision—may also magnify the entrenchment effect of managerial ownership. With a staggered board, only a fraction (often one third) of the members of the board is elected each year instead of en masse (where all directors have one-year terms). The managers of a target firm with a staggered board are able to use their voting power in more than one year to prevent the acquirer from replacing the target directors who oppose the acquisition. Therefore, a staggered board magnifies the entrenchment effect of the target managers' ownership.

Second, antitakeover provisions may weaken the incentive effect of managerial ownership. When the manager exerts less effort, the firm's stand-alone value is lower and so acquiring this firm will generate a greater synergy gain. That is, less managerial effort leads to greater synergies. When the target firm is able to seize a larger fraction of the synergy with the help of antitakeover provisions which enhance the target firm's bargaining position against the acquirer, the target's manager has incentives to increase the size of the synergy by reducing effort, *ceteris paribus*. This implies that antitakeover provisions reduce managerial effort; or put another way, since managerial ownership leads to increased manager effort, antitakeover provisions weaken the incentive effect of managerial ownership. In consequence, the effect of managerial ownership on firm value decreases with the strength of antitakeover provisions.[2] This is consistent with Jensen (1993) who suggests that internal corporate governance mechanisms (including managerial ownership) do not function without the existence of an active takeover market.

Third, antitakeover provisions may enhance the effect of managerial ownership on long-term investment. A manager may sacrifice long-term growth for short-term objectives, hurting the shareholders' interests. Managerial ownership motivates the man-

[2]The model in the Appendix formalizes the impact of antitakeover provisions on the incentive effect of managerial ownership.

agers to commit to long-term investment and thus alleviates the "managerial myopia" problem.[3] Antitakeover provisions also alleviate the "managerial myopia" problem. Stein (1988) shows that, facing the threat of being acquired, the manager has incentives to invest in suboptimal short-term projects to boost short-term profits. Protecting the manager from takeovers, antitakeover provisions encourage him/her to commit to optimal long-term investment. Antitakeover provisions and managerial ownership may reinforce each other's effect on the "managerial myopia" problem.

The first two channels of interaction state that antitakeover provisions magnify the entrenchment effect of managerial ownership and weaken the incentive effect of managerial ownership, respectively. These two channels of interaction imply that antitakeover provisions *decrease* the overall firm value effect of managerial ownership. The third channel of interaction, in contrast, implies that antitakeover provisions enhance the incentive effect of managerial ownership and thus *increase* the firm value effect of managerial ownership.

No paper to my knowledge has developed or tested these channels of interaction between antitakeover provisions and managerial ownership. This study fills the void. Understanding the interactions between shareholder rights and managerial ownership is of considerable practical importance for the shareholders and boards of directors who design governance mechanisms for their firms. It is also important for legislators and regulators who may intervene in both firms' executive compensation practices, which may affect managerial ownership, and antitakeover provisions.

I measure the strength of shareholder rights with the entrenchment index (E index hereafter) constructed by Bebchuk, Cohen, and Ferrell (2009) using six antitakeover provisions. A greater E index indicates weaker shareholder rights (stronger antitakeover provisions). As a robustness check, I also examine the interaction between managerial

[3]See Bizjak, Brickley, and Coles (1993), and Narayanan (1996).

ownership and individual antitakeover provisions. Managerial ownership is measured with the stock ownership and/or pay-performance sensitivity of the top five executives (or the CEO) of each firm. Firm value is measured with Tobin's Q.

The main findings of this paper are as follows. I find that antitakeover provisions significantly, both statistically and economically, decrease the effect of managerial ownership on firm value. Each additional antitakeover provision in the E index reduces the marginal effect of managerial ownership on firm value by approximately 30 percent. The impact of antitakeover provisions is so large that the effect of managerial ownership on firm value becomes negative when the E index is above the median. In contrast, managerial ownership enhances firm value when the E index is below the median, unless the managers have very high levels of ownership. The six antitakeover provisions in the E index weaken the incentive effect of managerial ownership not only in aggregate but also individually. The results are robust to a battery of robustness checks, including alternative measures of managerial ownership and different econometric models.

The results are prone to endogeneity concerns because, arguably, both the level of managerial ownership and the strength of antitakeover provisions are endogenously determined. I deal with potential endogeneity issues by controlling for firm fixed effects, conducting an event study, running instrumental variable regressions, and excluding alternative explanations. The results of these endogeneity analyses uniformly support that antitakeover provisions decrease the effect of managerial ownership on firm value. For example, the event study shows that antitakeover provisions decrease the announcement return of manager share purchases in the open market.

The findings in this paper are consistent with the the first two channels of interaction between antitakeover provisions and managerial ownership, i.e., antitakeover provisions magnify the entrenchment effect of managerial ownership and/or weaken the incentive effect of managerial ownership. Aware of the negative impact of antitakeover provisions

on the value effect of managerial ownership, the shareholders should grant fewer shares to the manager when antitakeover provisions are strong.[4] Consistent with this prediction, I find that managerial ownership decreases significantly with the strength of antitakeover provisions. On average, the combined ownership of the top five executives is 7.6% in the firms with the weakest antitakeover provisions, and 2.1% in the firms with the strongest antitakeover provisions. These results corroborate the findings that antitakeover provisions decrease the value effect of managerial ownership.

This paper contributes to the literature on the value effect of managerial ownership, which documents an inverse U-shaped relation between managerial ownership and firm value.[5] The inverse U-shaped relation suggests that the incentive effect of managerial ownership dominates the entrenchment effect of managerial ownership at low levels of managerial ownership, while the entrenchment effect dominates the incentive effect at high levels of managerial ownership. Claessens, Djankov, Fan, and Lang (2002), Lins (2003), and Gompers, Ishii, and Metrick (2010) try to disentangle the incentive and entrenchment effects of managerial ownership, and find that firm value increases with managers' cash flow right but decreases with their control right. This paper finds the the value effect of managerial ownership depends on another important corporate governance mechanism, shareholder rights. The inverse U-shaped relation holds only when shareholder rights are strong. With weak shareholder rights, increasing managerial ownership always destroys firm value, because antitakeover provisions magnify the entrenchment effect of managerial ownership and/or weaken the incentive effect of managerial ownership: The magnified entrenchment effect of managerial ownership prevail over the weakened incentive effect of managerial ownership even at low levels of managerial ownership.

This paper also contributes to a growing literature on the interactions between corpo-

[4]The model in the Appendix formalizes this prediction.

[5]See, among others, Morck, Shleifer, and Vishny (1988), McConnell and Servaes (1990), Hermalin and Weisbach (1991), Kole (1995), and Holderness, Kroszner, Sheehan (1999), McConnell, Servaes, and Lins (2008), and Fahlenbrach and Stulz (2009).

rate governance mechanisms. Cremers and Nair (2005); Cremers, Nair, and Wei (2007); Huson, Parrino, and Starks (2001); and Kini, Kracaw, and Mian (2004) study how the market for corporate control interacts with the board of directors and/or institutional investor monitoring. Cohn and Rajan (2010) model the interaction between the board and activist investors. Giroud and Mueller (2010, 2011) study the interaction between shareholder rights and product market competition. Kim and Lu (2011) study whether and how CEO ownership interacts with product market competition and institutional investor monitoring. Bertrand and Mullainathan (1999, 2000), and Cheng and Indjejikian (2009) study how the second-generation state takeover laws affect the level and structure of executive compensation. This paper contributes to the literature by showing that shareholder rights and managerial ownership, two central corporate governance mechanisms, complement each other.

The rest of the paper is organized as follows. Section 2 describes the data and methodology. Section 3 presents the empirical results and implements various robustness checks. Section 4 addresses potential endogeneity issues. Section 5 examines the relation between managerial ownership and the strength of antitakeover provisions. Finally, section 6 concludes the paper.

2 Methodology and Data

2.1 Methodology

Following the literature (e.g., Morck, Shleifer, and Vishny, 1988), firm value is measured with Tobin's Q. Managerial ownership is calculated as the aggregate ownership of the top five executives covered in the Standard and Poor's ExecuComp database. Restricted stocks are included in the calculation, while stock options are excluded. Including stock options does not qualitatively affect the results, as will be shown in section 3.

The strength of a firm's antitakeover provisions is measured with the E index constructed by Bebchuk, Cohen, and Ferrell (2009) using six antitakeover provisions: staggered boards, poison pills, supermajority requirement for mergers, limits to amend bylaws, limits to amend charter, and golden parachutes. The E index increases by one for each antitakeover provision in place. Therefore, it takes values from zero (for the weakest antitakeover provisions) to six (for the strongest antitakeover provisions).

The following econometric model is employed to test the interaction between antitakeover provision and managerial ownership:

$$\begin{aligned} Q_{it} = \ & \beta_0 + \beta_1 \times \text{Managerial ownership}_{it} + \beta_2 \times \text{Managerial ownership}_{it}^2 \\ & + \beta_3 \times \text{E index}_{it} + \beta_4 \times \text{Managerial ownership}_{it} \times \text{E index}_{it} \\ & + \beta_5 \times X_{it} + u_{it}. \end{aligned} \tag{1}$$

where Q_{it} is the Tobin's Q of stock i in year t; X_{it} is a vector of control variables; and u_{it} is the residual. The interaction variable of managerial ownership and the E index captures the impact of antitakeover provisions on the effect of managerial ownership on firm value. The square of managerial ownership is also added to capture the non-linear effect of managerial ownership on firm value.[6] Tobin's Q may have measurement errors. I alleviate this problem by using industry-adjusted Tobin's Q and controlling for firm fixed effects. Also, I cluster the residuals by firm and control for year fixed effects to account for cross-sectional and time-series dependence in the residuals, as suggested by Petersen (2009).

Following Himmelberg, Hubbard, and Palia (1999), I control for possible determinants of managerial ownership in the regression. Firms whose assets are difficult to monitor should provide greater incentives to their managers in order to mitigate the

[6]See Footnote 3 for the literature on the inverse U-shaped relation between managerial ownership and firm value.

moral hazard problem. Therefore, the following variables are included as proxies for the scope of managerial discretionary spending: capital-to-sales ratio, research and development (R&D) spending, advertisement spending, investment, and profit margin. The first three variables are related to asset tangibility; profit margin measures the gross cash flows available for operation; and investment measures the scope for discretionary projects. All else being equal, managers in firms with greater idiosyncratic risks prefer lower ownership for the reason of diversification. Therefore, idiosyncratic risk is also included as a control variable. In addition, I control for firm size as measured by sales.[7] Descriptions of these variables can be found in the Appendix.

2.2 Data

The data on managerial ownership are retrieved from Standard and Poor's ExecuComp database. Standard and Poor's collects the ownership data directly from companies' annual proxy since 1992. For each fiscal year from 1992-2007, managerial ownership is calculated as the total number of shares owned by the top five executives divided by the total number of shares outstanding. Stock return data are retrieved from the CRSP database, accounting numbers from the Compustat database, and corporate governance data from the RiskMetrics database. Utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999) are excluded from the sample. Including them in the sample yields similar results throughout. The final sample has 14,962 firm-year observations.

Table 1 Panel A presents the summary statistics of managerial ownership over the sample period. There are 524 firms in the sample in 1992. The number of firms increases to more than 700 during the period 1993-1997, and reaches 1,000 in 1998. The number stays stable at around 1,000 firms during the period 1998-2001, and further increases to more than 1,100 firms after 2001. On average, the top five executives own 3.9 percent

[7]The results are robust to other measures of firm size including total assets and book equity.

of their companies. The distribution of managerial ownership is positive-skewed with a median of 0.8 percent. The mean managerial ownership is more than 4 percent in the 1990s and gradually decreases to 2.7 percent in 2007.

RiskMetrics collects data on antitakeover provisions for the S&P 1500 firms in the years of 1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006. For the years when the antitakeover provision data are not updated, the most recent data are used following Bebchuk, Cohen, and Ferrell (2009). Table 1 Panel B presents the summary statistics of the E index for the years when the antitakeover provision data are updated.[8] The mean E index is around 2.3 in the 1990s and increases slightly to around 2.5 in the 2000s. The median E index is 2 or 3 over the sample period. The summary statistics are similar to those of Bebchuk et al. (2009).

Table 1 Panel C presents the frequencies of the six antitakeover provisions in the E index. Golden parachutes, staggered boards, and poison pills are the most commonly adopted provisions. On average, 62 percent of firms have golden parachutes in place, 59 percent have staggered boards, and 59 percent have poison pills. A supermajority requirement to approve mergers and limits to amend bylaws are adopted by 18 percent of the firms. Limits to amend charter is the least commonly adopted antitakeover provision among the six: On average, only 2 percent of firms have it. The frequencies of staggered boards, poison pills, and limits to amend charter are stable during the sample period with only small fluctuations over the years. The frequency of having a supermajority requirement to approve mergers steadily decreased from approximately 40 percent in 1992 to less than 33 percent in 2006. On the contrary, limits to amend bylaws gained popularity during this period—its frequency increased from 13 percent in 1992 to 19 percent in 2006. The most salient changes however happened to golden parachutes: The proportion of firms that had golden parachutes increased from about 50 percent in 1992

[8] I also include the year of 1992, the first year of the sample period.

to about 75 percent in 2006.

Table 2 Panel A presents the summary statistics of Tobin's Q, managerial ownership, the E index, and the control variables. The mean Tobin's Q and industry-adjusted Tobin's Q are 2.0 and 0.4, respectively. As shown in Table 1, the mean managerial ownership is 3.9 percent; the mean E index is 2.4. The average firm has annual sales of approximately $5 billion. On average, property, plant, and equipment (PPE) accounts for 38 percent of annual sales. The mean idiosyncratic risk is about 2.4 percent, while the mean profit margin is about 15 percent. On average, the sample firms spend 28 percent of PPE on R&D, 9.5 percent on advertisement, and 23 percent on investment. Lastly, the data on R&D spending and advertisement spending are available for 64 percent and 36 percent of the firms, respectively.

Before presenting the multivariate regression results, it is necessary to examine the correlations between the variables, which are presented in Table 2 Panel B. Managerial ownership is positively and significantly correlated with both Tobin's Q and industry-adjusted Tobin's Q; while the E index is negatively and significantly correlated with Tobin's Q, industry-adjusted Tobin's Q, and managerial ownership. The extent of the correlation among most pairs of variables raises little concern for multicollinearity in the regression analyses.

3 Interaction between Antitakeover Provisions and Managerial Ownership

3.1 Main Results

Table 3 presents the multivariate regression results of model (1). Column (1) reports the pooled OLS regression results. The residuals in the regression may be correlated across firm or over time, leading to over- or under-stated standard errors in the pooled OLS

regressions. Following the suggestions of Petersen (2009), I control for year fixed effects and cluster the residuals by firm in column (2) to have robust standard errors. Column (2) also controls for industry fixed effects. As an alternative way to show the impact of antitakeover provisions on the effect of managerial ownership on firm value, the sample is divided into two sub-samples based on the E index: the firms in the first sub-sample have an E index between 0 and 2, while those in the second sub-sample have an E index between 3 and 6.[9] Columns (3) and (4) of Table 3 present the regression results for these two sub-samples, respectively. In column (5), the dependent variable is replaced with the industry-adjusted Tobin's Q as an alternative way to control for industry effects. As another robustness check, the interaction variable of managerial ownership squared and the E index is added to the right hand side of the regression in column (6).

The results in column (1) indicate that managerial ownership is positively and significantly associated with Tobin's Q at the one percent level; the coefficient on managerial ownership squared is negative and statistically significant at the ten percent level; and the E index is negatively and significantly associated with Tobin's Q at the one percent level. These findings are consistent with the previous literature. More interestingly, the coefficient on the interaction variable of managerial ownership and the E index is negative and statistically significant at the one percent level, suggesting that the marginal effect of managerial ownership on firm value decreases with the E index. This interaction is also economically significant. When the E index increases by one, the marginal effect of managerial ownership on Tobin's Q decreases by 0.552, which is approximately one third of the coefficient on managerial ownership (1.635).

The results are robust when controlling for industry and year fixed effects and clustering standard errors by firm: the results in columns (2) and (5) are qualitatively similar to those in column (1).

[9]Figure 1 suggests that the effect of managerial ownership on firm value becomes negative for firms with an E index above 2.

The results in columns (3) and (4) confirm that the effect of managerial ownership on firm value depends significantly on the E index. The coefficient on managerial ownership is positive and statistically significant at the five percent level in column (3), where the firms have an E index from 0 to 2. The coefficient on managerial ownership becomes negative and statistically significant at the ten percent level in column (4), where the firms have an E index from 3 to 6.

Figure 1 plots the fitted value of Tobin's Q against managerial ownership at different E indexes. The fitted value of Tobin's Q is generated using the regression results in column (2) of Table 3: $Q = 3.574 + 1.858 \times$ Managerial ownership $- 1.360 \times$ Managerial ownership$^2 - 0.044 \times$ E index $- 0.536 \times$ Managerial ownership $\times$ E index. Since the top five executives in almost all firms have ownership below 20 percent, the figure focuses on the relation between managerial ownership and Tobin's Q over this empirical range of managerial ownership.[10] It shows that for the firms with an E index below 3, firm value increases with managerial ownership over the empirical range of managerial ownership. The effect of managerial ownership on firm value is indistinguishable from zero for the firms with an E index of 3, and becomes negative as the E index reaches above 3.[11]

Column (6) shows that the coefficient on the interaction variable of managerial ownership squared and the E index is statistically indifferent from zero. Also, adding this interaction variable does not affect the main results of the paper: the coefficient on the interaction variable of managerial ownership and the E index is still significantly negative.

Table 3 also shows that firms with smaller sales, less intangible assets, lower idiosyncratic risks, greater profit margins, more R&D spending, and more investments are positively associated with Tobin's Q. Moreover, sales squared and tangibility squared are

[10] The 95th percentile of managerial ownership is just above 20 percent in the sample.

[11] Over the full range of managerial ownership (from 0 to 100 percent) there is an inverse U-shaped relation between managerial ownership and Tobin's Q for the firms with an E index below 3. For the firms with an E index between 3 and 6, increasing managerial ownership always destroys firm value.

positively associated with Tobin's Q.

3.2 Different Measures of Managerial Ownership

Stock options have been widely used to compensate executives since the early 1990s (Hall and Liebman, 1998, and Aggarwal and Samwick, 2003). They are expected to provide similar incentives for executives as stock grants. As a robustness check, in this section I include stock options as part of managerial ownership. Usually the CEO makes the most important corporate decisions and thus has the biggest impact on firm value. Therefore as another robustness check, this section also singles out the CEO's ownership and investigates its effect on firm value.

Pay-performance sensitivity (PPS) is commonly used to measure managers' incentives when both stocks and stock options are considered. For stocks, PPS is simply the percentage stock ownership; for stock options, PPS equals the number of shares underlying the options times the delta of each option divided by the total number of shares outstanding. The delta is defined as the partial derivative of the option value with respect to stock price. Managerial PPS is computed following Guay (1999) and Core and Guay (2002).

Table 4 Panel A reports the means of six measures of managerial ownership for each year from 1992-2007. The six measures are managerial stock ownership, managerial PPS of stock options, managerial PPS of both stocks and stock options, CEO stock ownership, CEO PPS of stock options, and CEO PPS of both stocks and stock options. The mean stock ownership of the top five executives was more than 4 percent in the 1990s and gradually decreased to 2.7 percent in 2007. In contrast with the declining trend in managerial stock ownership, the mean managerial PPS of stock options gradually increased from 0.8 percent in 1992 to 2.5 percent in the new millennium, and then slightly decreased to 2.1 percent in 2007. The mean managerial PPS—sum of managerial stock

ownership and managerial PPS of stock options—was 5 percent in 1992, increased to 7 percent in the new millennium, and then decreased to 4.7 percent in 2007. The CEO stock ownership was on average 2.9 percent in 1992, slightly increased to its peak value of 3.2 percent in 1998, and then gradually decreased to 1.7 percent in 2007. On average, the CEO PPS of stock options was merely 0.2 percent in 1992, gradually increased to 1.2 percent in 2002, and then slightly decreased to 1.1 percent in 2007. Finally, the mean CEO PPS was 3.1 percent in 1992, increased to more than 4.1 percent during the "Internet Bubble" (1998-2000), and then decreased to 2.7 percent in 2007.

Table 4 Panel B reports the medians of the six measures of managerial ownership for each year from 1992-2007. The medians are much lower than their respective means in Panel A, but follow similar patterns as the means over the sample period. Taken together, the period 1992-2007 has exhibited diminishing managerial stock ownership and an increasing popularity in stock options as a component of executive compensation, while the total managerial PPS remained stable over the sample period. The temporal patterns observed in my sample are consistent with previous studies such as Hall and Liebman (1998) and Aggarwal and Samwick (2003).

To assess the robustness of the results in Table 3, I estimate model (1) using three alternative measures of managerial ownership: managerial PPS, CEO stock ownership, and CEO PPS. The results are reported in Table 4 Panel C. All these three measures of managerial ownership are positively associated with the industry-adjusted Tobin's Q, and all the associations are statistically significant. The coefficient on CEO stock ownership squared is negative and statistically significant at the ten percent level, whereas the coefficients on the squares of the other two measures are negative but statistically insignificant from zero. The E index is negatively and significantly associated with the industry-adjusted Tobin's Q in all three columns. In addition, the coefficients on the interaction variables between the E index and the three measures of managerial owner-

ship are all negative and statistically significant at the one percent or five percent level. Finally, the coefficients on the control variables have similar economic and statistical significances across the three regressions. Overall, the results in section 3.1 are robust to different measures of managerial ownership.

3.3 Individual Antitakeover Provisions

The results in the last two sections suggest that the six antitakeover provisions in the E index as a whole decrease the marginal effect of managerial ownership on firm value. Does each individual antitakeover provision interact with managerial ownership? This section answers this question.

Poison pills and staggered boards make it almost impossible for a takeover to succeed without negotiating with the target's board of directors. The number of directors is much smaller than the number of shareholders and the directors meet frequently. This makes it easier for the board to form a cartelized response to the acquirer and thereby enhances the target firm's bargaining position (DeAngelo and Rice, 1983). An enhanced bargaining position increases the proportion of the synergy that accrues to the target's shareholders, and consequently weakens the manager's incentives to work hard *ex ante*. Therefore, poison pills and staggered boards are expected to weaken the incentive effect of managerial ownership. Recall that this is the second channel of interaction between antitakeover provisions and managerial ownership developed in the introduction and the model in the Appendix. Protecting the manager from a takeover in more than one year, a staggered board magnifies the entrenchment effect of managerial ownership. This is the first channel of interaction. Managerial ownership encourages the manager to make long-run investment. Protecting the manager from takeovers, poison pills and staggered boards also encourage the manager to make long-run investment (Stein, 1988), and may enhance the effect of managerial ownership on long-run investment. Recall that this is the

third channel of interaction between antitakeoeve provisions and managerial ownership developed in the introduction. In summary, staggered boards are expected to interact with managerial ownership through all three channels, while poison pills are expected to interact with managerial ownership through the first and the third channel.

Limits to amend bylaws and limits to amend charter usually require a supermajority vote in order to pass an amendment. Limits to amend bylaws/charter as well as a supermajority requirement to approve mergers make the manager's voting power more pivotal and thus magnify the entrenchment effect of managerial ownership. From the perspective of each individual shareholder, these supermajority provisions encourage him/her to hold out for a higher bid price in an acquisition, and thus will increase the bid premium. Hence, these three supermajority provisions are also expected to weaken the incentive effect of managerial ownership through the second channel of interaction. These three supermajority provisions protect the manager from takeovers and thus may enhance the effect of managerial ownership on long-run investment through the third channel of interaction. In summary, limits to amend bylaws, limits to amend charter, and supermajority requirement to approve mergers are expected to interact with managerial ownership through all three channels of interaction.

Most managers lose their jobs after their firms are acquired, and fail to find a comparable job in other institutions (Hartzell, Ofek, and Yermack, 2004). This is probably because they have firm-specific skills which are not desirable for other firms. Such personal losses could lead the target's managers to resist merger proposals that benefit the shareholders. Golden parachutes, by reducing the target managers' personal losses, may induce them to agree with the acquisition. In other words, golden parachutes increase the probability of takeover and thus increase the expected bid premium to be received by the target's shareholders.[12] Harris (1990) shows that golden parachutes increase the

[12]Bebchuk, Cohen, and Wang (2010) and Fich, Tran, and Walkling (2011) find that golden parachutes increase the probability of receiving an M&A bid and the expected bid premium.

proportion of the synergy that accrues to the target firm using the Nash bargaining solution. Hence, golden parachutes are expected to weaken the incentive effect of managerial ownership through the second channel of interaction.

Expected Interactions between Antitakeover Provisions and Managerial Ownership

	First channel: Magnify entrenchment effect of managerial ownership	Second channel: Weaken incentive effect of managerial ownership	Third channel: Encourage long-term investment
Staggered board	Yes	Yes	Yes
Poison pill		Yes	Yes
Supermajority requirement to approve merger	Yes	Yes	Yes
Limits to amend bylaws	Yes	Yes	Yes
Limits to amend charter	Yes	Yes	Yes
Golden parachutes		Yes	

To investigate the interactions between the six provisions and managerial ownership, the E index in model (1) is replaced with dummy variables of the existence of each antitakeover provision, one at a time:

$$\begin{aligned} Q_{it} = \; & \beta_0 + \beta_1 \times \text{Managerial ownership}_{it} + \beta_2 \times \text{Managerial ownership}_{it}^2 \\ & + \beta_3 \times \text{Individual provision}_{it} + \beta_4 \times \text{Managerial ownership}_{it} \times \text{Individual provision}_{it} \\ & + \beta_5 \times X_{it} + u_{it}, \end{aligned} \tag{2}$$

where Q_{it} is the industry-adjusted Tobin's Q of firm i in year t, and *Individual provision*$_{it}$ is a dummy variable that takes the value of one if firm i has the provision in place in year t, and zero otherwise.

Table 5 Panel A reports the regression results of model (2) for each of the six provisions in the E index. All six antitakeover provisions reduce the marginal effect of managerial ownership on firm value, but the impacts of poison pills and supermajority requirement to approve mergers are statistically insignificant. The coefficients on all six provisions are negative, but only those on golden parachutes and poison pills are statistically significant. It is worth noting that staggered board, limits to amend bylaws,

and limits to amend charter significantly affect firm value only through their interactions with managerial ownership.

RiskMetrics also collects information on the other eighteen antitakeover provisions in addition to the six provisions in the E index. The twenty four provisions constitute the G index developed by Gompers, Ishii, and Metrick (2003). I replace the E index in model (1) with the G index and present the regression results in column (2) of Table 5 Panel B. The results show that the G index is negatively associated with the industry-adjusted Tobin's Q, with the effect statistically significant at the one percent level. However, the G index does not significantly interact with managerial ownership in affecting firm value.

Taken as a whole, the results in Table 5 suggest that the six antitakeover provisions in the E index decrease the effect of managerial ownership on firm value not only in aggregate but also individually. However, not all the six antitakeover provisions individually affect the value effect of managerial ownership. The twenty four antitakeover provisions in the RiskMetrics database in aggregate also do not affect the value effect of managerial ownership. One possible reason is that some individual provisions and the twenty four provisions in aggregate are noisy measures of shareholder rights. Interacting these proxies for shareholder rights that have measurement errors with managerial ownership will militate again finding significant effects (see Green, 2000).

4 Dealing with Endogeneity

The results in section 3 have established that managerial ownership, the E index and their interaction are significantly associated with firm value. The statistical associations, however, do not necessarily imply that managerial ownership or the E index causes variations in firm value. Managerial ownership, antitakeover provisions, and firm value may be simultaneously determined by some fundamental firm characteristics. These fundamental firm characteristics are usually unobserved by researchers and thus result in the

unobserved heterogeneity problem. If this problem is indeed relevant, the statistical relations will disappear once the relevant fundamental firm characteristics are *appropriately* controlled for.

This section addresses the unobserved heterogeneity concern in four ways. First, I use firm fixed effects to control for time-invariant firm characteristics. Second, I investigate the impact of antitakeover provisions on the announcement return of manager share purchases in the open market. Third, I construct instrumental variables for managerial ownership and the E index. Lastly, I propose and test an alternative explanation for the results in section 3.

4.1 Firm Fixed Effects

If the unobserved firm characteristics are constant over time, adding firm fixed effects in the regression can effectively resolve the unobserved heterogeneity problem. This observation motivates Himmelberg, Hubbard, and Palia (1999) to employ firm fixed effects to deal with the endogeneity issue concerning managerial ownership.

I run OLS regressions with firm fixed effects for Tobin's Q and the industry-adjusted Tobin's Q and present the results in the two columns of Table 6, respectively. Managerial ownership is positively associated with Tobin's Q and the industry-adjusted Tobin's Q, and both effects are significant at the one percent level. The coefficients on managerial ownership squared in the two columns are negative and statistically significant at the one percent level. The coefficients on the E index become statistically indifferent from zero. They are statistically significant at the one percent level in Table 3 where firm fixed effects are not controlled for. The coefficients on the interaction variable of managerial ownership and the E index are negative and statistically significant at the five percent and one percent level in the two columns, respectively. These results indicate that antitakeover provisions affect firm value only through their interactions with managerial ownership.

Zhou (2001) points out that managerial ownership changes slowly from year to year within a company, and argues that small, one-year changes in ownership are unlikely to provide sufficient incentives that would lead to substantive within-year changes in firm value. By relying on within variations, regressions with firm fixed effects may not detect an effect of managerial ownership on firm value even if one exists. This argument also applies to the E index, which shows small variations over the sample period (Table 1).

Zhou's argument implies that firm fixed effects militate against finding significant effects of managerial ownership and the E index on firm value. Even so, I find that antitakeover provisions still significantly decrease the effect of managerial ownership on firm value after controlling for firm fixed effects. Meanwhile, the E index is no longer directly associated with firm value after controlling for firm fixed effects, suggesting that antitakeover provisions affect firm value only through their impacts on managerial incentives.

4.2 An Event Study

Another way to resolve the unobserved heterogeneity problem is to investigate how antitakeover provisions affect the value effect of *changes* in managerial ownership. This method has two merits relative to the firm fixed effects approach. First, by relating changes in managerial ownership to changes in firm value, it controls for any unobserved firm-specific fixed effects. Second, changes in firm value within a short event window contain less "noise" than the annual changes in firm value using the firm fixed effects approach. Following McConnell, Servaes, and Lins (2008), I study the market reactions to announcements of manager share purchases in the open market. Share sales are excluded because they usually occur after option exercises and thereby are anticipated by the market (Ofek and Yermack, 2000).

I merge the ExecuComp database with the Thomson Reuters insider trading database

to retrieve open market stock purchases by the top executives whose shareholdings are reported in the ExecuComp database. Multiple manager share purchase announcements on the same day are combined into one. During the period 1993-2008, the top executives announced 4,162 stock purchases of the firms they manage. The mean (median) size of share purchases is 0.065 (0.008) percent of the total number of shares outstanding. Similar to McConnell et al., I compute the 7-day ([-1, +5]) cumulative abnormal returns (CARs) around the share purchase announcement. This 7-day window is chosen because the information usually does not enter the public domain for several days after being filed with the SEC (Lakonishok and Lee, 2001). The announcements are greeted with a mean (median) 7-day CARs of 2.08 (0.86) percent. The 5-day ([-1, +3]) CARs are also computed as a robustness check of the following regression analysis.

The following model is employed to investigate how antitakeover provisions influence the effect of manager share purchases on firm value:

$$\begin{aligned} CARs = \ & \beta_0 + \beta_1 \times \text{Manager share purchases}_i \\ & + \beta_2 \times \text{Pre-purchase managerial ownership}_i + \beta_3 \times \text{E index}_i \\ & + \beta_4 \times \text{Manager share purchases}_i \times \text{Pre-purchase managerial ownership}_i \\ & + \beta_5 \times \text{Manager share purchases}_i \times \text{E index}_i + u_i. \end{aligned} \tag{3}$$

where *Manager share purchases* is the number of shares the manager purchases divided by the total number of shares outstanding, and *Pre-purchase managerial ownership* is the managerial ownership at the beginning of the fiscal year.[13] The model is similar to

[13]The regression results are qualitatively unchanged if the managerial ownership right before the share purchase is used instead. This alternative measure requires tracking the changes in managerial ownership from the beginning of the fiscal year to the open market stock purchase, which are very small and thus do not change the results. The changes in managerial ownership during that period are hard to compute because the Thomson Reuters insider trading database only records open-market transactions and exercises of stock options, but does not include other changes in managerial ownership such as grants of restricted stocks. Therefore, the managerial ownership at the beginning of the fiscal year is preferable.

the one used by McConnell et al. except that I add the interaction variable of manager share purchases and the E index. The first interaction variable in the model captures the diminishing marginal effect of managerial ownership on firm value; the second interaction variable captures the impact of antitakeover provisions on the value effect of manager share purchases. If antitakeover provisions decrease the effect of managerial ownership on firm value, β_5 will be negative.

Table 7 presents the regression results of model (3). The dependent variable is the 5-day CARs in the first column, and the 7-day CARs in the second column. The results indicate that the amount of manager share purchases is positively associated with the announcement returns. This effect is statistically significant at the five percent level for 5-day CARs and at the one percent level for 7-day CARs. In terms of economic significance, the purchase of one percent of a firm's shares by its managers increases the stock price by approximately 7 percent and 4 percent over the 7- and 5-day announcement period, respectively. The E index is negatively associated with the announcement returns, but this effect is statistically insignificant. The coefficient on the interaction variable of manager share purchases and pre-purchase managerial ownership is negative and statistically significant, suggesting that the marginal effect of managerial ownership on firm value diminishes as managers hold more shares. More interesting, the coefficient on the interaction variable of manager share purchases and the E index is negative and statistically significant at the ten percent and five percent level, respectively, indicating that antitakeover provisions decrease the effect of managerial ownership on firm value.

Large amounts of manager share purchases are more likely to affect managerial incentives and firm value. Following McConnell, Servaes, and Lins (2008), I exclude manager share purchases less than 5,000 and 10,000 shares in columns (3)-(4) and (5)-(6), respectively. The coefficient on the interaction variable of manager share purchases and the E index is negative in all the four columns and statistically significant at the 10 percent

or 5 percent level in columns (3), (4), and (6), suggesting that the results are robust to excluding small amounts of manager share purchases.

4.3 Instrumental Variable Regressions

In this section I construct instrumental variables for managerial ownership and the E index to deal with the endogeneity issue. The first instrument for the E index is the firm's E index in 1990. Table 1 shows that the E index has small time-series variations, indicating significant correlations between the E index in 1990 and the E indexes in later years. To be a valid instrument, the E index in 1990 should not be correlated with the error term in model (1). I argue that the E index in 1990 is unlikely to be correlated with the error terms in the years far away from 1990. To make it a more valid instrument, I also exclude the data before 1995 from the regressions to leave a longer gap between the instrument year and the data year.[14] Similarly, I use the managerial ownership in 1992 (the first year when the data on managerial ownership are available) as an instrument for managerial ownership.

The second instruments for the E index and managerial ownership are the average E index and the average managerial ownership of the firm's industry peers, respectively. Firms in the same industry may have a similar E index and managerial ownership level because of common industry characteristics. Meanwhile, the E index and managerial ownership of industry peers are unlikely to be correlated with the firm-specific error term in the model. This makes them valid instruments.

Since each state has different antitakeover laws, I also use the average E index of the firms incorporated in the same state as an instrument for the E index.

[14]Excluding the data before 1995 leaves at least a five year gap between the instrument year and the data year. On one hand, I want to make the gap as large as possible because the E index in 1990 is less likely to be correlated with the error term in the more remote future. On the other hand, I need to keep as many data points as possible for the results to be consistent. The empirical results are qualitatively similar if I use the cut-off year of 1993-1997.

Columns (1) and (2) of Table 8 present the OLS regression results of managerial ownership and the E index, respectively, on the instruments and control variables. The results indicate that both managerial ownership and the E index are significantly and positively correlated with their respective instruments, suggesting that the proposed instruments are strong ones.

Following the suggestions of Wooldridge (2000), I use the square of the fitted managerial ownership from the regression in column (1) as an instrument for managerial ownership squared, and the product of the fitted managerial ownership times the fitted E index from the regression in column (2) as an instrument for the interaction variable of managerial ownership and the E index.

Column (3) of Table 8 presents the GMM regression results where the dependent variable is the industry-adjusted Tobin's Q. The results indicate that managerial ownership is positively associated with the industry-adjusted Tobin's Q and significant at the one percent level. The coefficient on managerial ownership squared is negative and statistically significant at the five percent level. The coefficient on the E index is positive but statistically indifferent from zero. The coefficient on the interaction variable of managerial ownership and the E index is negative and statistically significant at the ten percent level. These findings again suggest that antitakeover provisions affect firm value only indirectly through their interactions with managerial ownership.

It is necessary to check the validity of the proposed instruments. The p-value of the Sargen-Hansen J-test is 0.42, indicating that the instruments are not significantly correlated with the error terms. The p-values associated with the F-tests for the strength of the instruments are all below the one percent level, indicating that they are strong instruments.

4.4 Accounting for Management Quality

Management quality may simultaneously determine managerial ownership, the E index, and firm value. High-quality managers should own more shares of their firms for two reasons. First, they may use high ownership to signal their quality (Leland and Pyle, 1977). Second, Milbourn (2003) shows that high-quality managers should have more ownership because they are less likely to be replaced. The lower probability of being replaced implies that more of their efforts—and less of the efforts of other managers who may replace them—are incorporated into stock prices. The more informative a manager's effort is, the more effective stock-based incentives are. Therefore, high-quality managers are granted with more ownership, and thus have incentives to exert more effort. Less likely to be replaced, high-quality managers will find it unnecessary to protect themselves from takeovers with strong antitakeover provisions. Firms with high-quality managers are more valuable because of the high management quality and high managerial ownership. Overall, high-quality managers are expected to be associated with more ownership, weaker antitakeover provisions, and greater firm value.

The management quality hypothesis can be empirically examined. Similar to Milbourn (2003), I use the cumulative abnormal returns (CARs) during the past three years as a proxy for management quality. The stock returns are adjusted with respect to the Fama-French three factors. The management quality hypothesis predicts that past stock returns are negatively associated with the E index, positively associated with managerial ownership, and positively associated with the firm value.

Table 9 presents the regression results. The CARs in the past three years are negatively, positively, and positively associated with the E index, managerial ownership, and the industry-adjusted Tobin's Q, respectively. These effects are all statistically significant at the one percent level, consistent with the management quality hypothesis. However, managerial ownership, the E index, and their interaction are still significantly associated

with the industry-adjusted Tobin's Q after controlling for past stock returns. The results suggest that management quality is not the driving force behind the findings of this paper.

4.5 Reverse Causality?

The above analyses focus on the direction of causation from managerial ownership and antitakeover provisions to firm value. The direction of causation, however, may be the opposite, i.e., from firm value to managerial ownership and antitakeover provisions. For instance, managers may adjust their shareholdings in anticipation of changes in firm value: They increase (decrease) their ownership if they expect high (low) firm performance. Since the amount of synergy gain decreases with firm performance, firms may adopt weaker (stronger) antitakeover provisions if they expect high (low) performance. This reverse causality hypothesis predicts a positive relation between managerial ownership and firm value, and a negative relation between antitakeover provisions and firm value.

This reverse causality hypothesis is able to explain the negative association between the E index and firm value. It is also consistent with the positive relation between managerial ownership and firm value for firms with low E indexes. However, this hypothesis predicts that the positive relation between managerial ownership and firm value does not depend on the strength of antitakeover provisions, and therefore fails to explain the negative association between managerial ownership and firm value for firms with high E indexes. Therefore, the findings support the direction of causation from antitakeover provisions and managerial ownership to firm value.

5 Managerial Ownership and Strength of Antitakeover Provisions

Sections 3 and 4 show that antitakeover provisions decrease the effect of managerial ownership on firm value. The results are consistent with the the first two channels of interaction between antitakeover provisions and managerial ownership, i.e., antitakeover provisions magnify the entrenchment effect of managerial ownership and/or weaken the incentive effect of managerial ownership. If shareholders are aware of the negative impact of antitakeover provisions on the value effect of managerial ownership and optimally adjust managerial ownership, they should grant fewer stocks to managers when antitakeover provisions are strong. Note that antitakeover provisions protect the managers from takeovers, but shall not prevent the shareholders from adjusting the managers' compensation structure. This predicts a negative association between managerial ownership and the strength of antitakeover provisions.[15] An alternative view is that antitakeover provisions enable the managers to enjoy excess compensation.[16] This alternative view predicts a positive association between managerial ownership and the strength of antitakeover provisions.

Table 10 Panel A presents the summary statistics of managerial ownership for five groups of firms based on the E index. The first four groups of firms have an E index of 0, 1, 2, and 3, respectively. The last group of firms has an E index between 4 and 6. The firms with an E index of 5 and 6 account for only 2.5 percent of the sample, and thus are grouped together with the firms with an E index of 4. Managerial ownership decreases

[15]See the model in the Appendix for a formal proof of the negative association between managerial ownership and strength of antitakeover provisions.

[16]Borokhovich, Brunarski, and Parrino (1997) find that the CEOs of the ninety-four firms that adopted antitakeover provisions over the period 1978-1987 were compensated with more salary and bonus and were granted with more stock options. On the other hand, Dai, Jin, and Zhang (2011) find that antitakeover provisions do not affect the dynamics of pay-for-performance sensitivity over the CEO's tenure.

significantly as the E index increases. The mean managerial ownership is 7.6 percent for the firms with an E index of 0, and 2.1 percent for the firms with an E index above 3.

Table 10 Panel B presents the regression results of the stock ownership and the PPS of the top five executives and the CEO on the E index and the control variables. The E index is negatively associated with all four measures of managerial ownership, and this effect is statistically significant at the one percent level. In terms of economic significance, each additional antitakeover provision in the E index decreases the ownership (options excluded) of the top five executives and the CEO by 1.1 percentage points and 0.8 percentage points, respectively. Recall that the mean managerial ownership of the top five executives is 3.9 percent, while the mean ownership of the CEO is 2.6 percent.

Table 10 shows a significant negative association between managerial ownership and the strength of antitakeover provisions. These results are consistent with the view that managerial ownership is adjusted with respect to the strength of antitakeover provisions, and corroborate the findings in sections 3 and 4 that antitakeover provisions decrease the value effect of managerial ownership.

6 Conclusions

This paper investigates the interactions between antitakeover provisions and managerial ownership, two corporate governance mechanisms. Antitakeover provisions may magnify the entrenchment effect of managerial ownership, weaken the incentive effect of managerial ownership, and enhance the effect of managerial ownership on long-term investment. The first two channels of interaction predict that antitakeover provisions decrease the effect of managerial ownership on firm value, while the third channel predicts that antitakeover provisions increase the effect of managerial ownership on firm value.

The impact of antitakeover provisions on the value effect of managerial ownership is then empirically tested. I find that the effect of managerial ownership on firm val-

ue decreases significantly with the strength of antitakeover provisions. For firms with weak antitakeover provisions, managerial ownership enhances firm value unless the managers have very high levels of ownership. For firms with strong antitakeover provisions, however, increasing managerial ownership always destroys firm value. Antitakeover provisions decrease the value effect of managerial ownership not only in aggregate but also individually.

The analyses with firm fixed effects and instrumental variables show that antitakeover provisions do not directly affect firm value. They affect firm value only indirectly by decreasing the value effect of managerial ownership. These findings highlight the importance of investigating the interactions between antitakeover provisions and managerial ownership.

Appendix A: Antitakeover Provisions and Incentive Effect of Managerial Ownership

The shareholders hire a professional manager to run their firm. They compensate the manager with a salary, s, and a certain amount of ownership, $\alpha \in [0,1]$.[17] The shareholders are assumed to be risk neutral.

The manager decides how much effort to exert given the compensation contract. The effort exerted by the manager is neither observed by the shareholders, nor is it contractible. The manager's effort is denoted as e, and is costly to the manager. For simplicity, the cost-of-effort function is assumed to be quadratic: $C(e) = \frac{1}{2k}e^2$, where $k > 0$. A greater k indicates a lower cost of effort. The firm's stand-alone value is equal to the manager's effort plus a noise: $\phi = e + \epsilon$, where ϵ is normally distributed with zero mean and variance σ^2. The manager has a mean-variance risk preference represented by the following utility function:

$$u(w,e) = E\left[w - C(e)\right] - \frac{\eta}{2}var(w), \tag{A-1}$$

where w is the amount of compensation the manager receives, $E(.)$ and $var(.)$ are the mean and variance operators, respectively, and $\eta > 0$ is the coefficient of risk aversion.[18] The manager's reservation utility is $\bar{u}$, which is known to the shareholders.

The above model setup is standard in the literature on linear compensation contracts (Bolton and Dewatripont, 2005). New to the literature, this paper introduces antitakeover provisions to the model and explores how they affect the contract and man-

[17] This compensation contract may not be the optimal one. A linear contract is the second-best solution under certain conditions, as shown by Holmström and Milgrom (1987). This linear contract is used for its simplicity. A complex compensation contract would make it difficult to highlight the economic intuition.

[18] When the amount of compensation follows a normal distribution, this mean-variance utility function is equivalent to the constant absolute risk-averse (CARA) utility function with coefficient of absolute risk aversion η: $u(w,e) = -\exp\{-\eta\left[w - C(e)\right]\}$.

agerial incentives. Antitakeover provisions are assumed to be exogenously given. This simplifies the algebra and thereby allows me to clearly demonstrate the impact of antitakeover provisions on managerial incentives.[19]

A raider tries to acquire the firm mentioned above at the end of the model. The value of the target firm to the raider is: $\tau = \bar{v} + \epsilon$, where ϵ is the same noise that affects the stand-alone value of the target firm, and $\bar{v}$ is the intrinsic value of the target firm to the raider.[20] Thus, the synergy gain associated with the takeover is: $\tau - \phi = \bar{v} - e$.

How the synergy is divided between the raider and the target depends on the target's bargaining position, which in turn is determined by the strength of the target firm's antitakeover provisions. Stronger antitakeover provisions enable the target shareholders to form a cartelized response to the takeover bid and therefore enhance the target's bargaining position. That is, stronger antitakeover provisions enable the target to seize a larger share of the synergy.[21] Suppose the target's antitakeover provisions allow it to seize $p \in (0, 1)$ of the synergy. In other words, the raider will pay a bid premium $p\,(\bar{v} - e)$ to the target's shareholders.

The shareholders choose a compensation contract (s and α) to maximize their expected wealth, subject to the manager's optimal choice of effort and the manager's participation constraint:

$$\max_{s,\alpha} \quad \psi = (1-\alpha)[e + p(\bar{v} - e)] - s \tag{A-2}$$

$$s.t. \quad e \in \arg\max \left\{ s + \alpha\,[e + p(\bar{v} - e)] - \frac{1}{2k}e^2 - \frac{\eta}{2}\alpha^2\sigma^2 \right\} \tag{A-3}$$

$$s + \alpha\,[e + p(\bar{v} - e)] - \frac{1}{2k}e^2 - \frac{\eta}{2}\alpha^2\sigma^2 \geq \bar{u}. \tag{A-4}$$

[19] In an extended version of this model, I show that antitakeover provisions can be endogenized without affecting the main results of the model. For the reason of simplicity, only the simplified model is presented in the Appendix.

[20] The results are not affected if $\bar{v}$ is assumed to depend on e as long as the synergy decreases with e. The results are also not affected if τ does not depend on ϵ.

[21] I discuss how antitakeover provisions enhance the target's bargaining position in more detail at the end of this appendix.

The optimal managerial ownership and the optimal managerial effort are:

$$\alpha^* = \frac{k(1-p)^2}{k(1-p)^2 + \eta\sigma^2}, \tag{A-5}$$

$$e^* = k\alpha^*(1-p) = \frac{k^2(1-p)^4}{k(1-p)^2 + \eta\sigma^2}. \tag{A-6}$$

Proposition 1. *Antitakeover provisions have the following impacts on managerial incentives:*

(1) Antitakeover provisions reduce managerial effort ($\frac{de^*}{dp} \leq 0$).

(2) Antitakeover provisions decrease the marginal effect of managerial ownership on firm value ($\frac{\partial^2 \pi}{\partial \alpha \partial p} \leq 0$, where π denotes firm value).

(3) Managerial ownership decreases with the strength of antitakeover provisions ($\frac{d\alpha^*}{dp} \leq 0$).

Proof. Solving the manager's problem yields the optimal managerial effort:

$$e^* = k\alpha(1-p). \tag{A-7}$$

In equilibrium, the shareholders offer the lowest salary to the manager so that the participation constraint is binding. Then the participation constraint becomes:

$$s + \alpha[e + (1-p)(\bar{v} - e)] = \bar{u} + \frac{1}{2k}e^2 + \frac{\eta}{2}\alpha^2\sigma^2. \tag{A-8}$$

Plugging (A-8) and (A-7) into the shareholders' objective function yields the following problem:

$$\max_{\alpha} \left[k\alpha(1-p)^2 + p\bar{v}\right] - \left[\bar{u} + \frac{k}{2}(1-p)^2\alpha^2 + \frac{\eta}{2}\alpha^2\sigma^2\right]. \tag{A-9}$$

The first-order condition of (A-9) yields the optimal managerial ownership in equilibrium:

$$\alpha^* = \frac{k(1-p)^2}{k(1-p)^2 + \eta\sigma^2}. \tag{A-10}$$

Then

$$\begin{aligned} e^* &= k\alpha(1-p) = \frac{k^2(1-p)^4}{k(1-p)^2 + \eta\sigma^2}, && \text{(A-11)} \\ \frac{d\alpha^*}{dp} &= -\frac{2\eta\sigma^2 k(1-p)}{k(1-p)^2 + \eta\sigma^2} \leq 0 && \text{(A-12)} \\ \frac{de^*}{dp} &= -\frac{2k^2(1-p)^3\left[k(1-p)^2 + 2\eta\sigma^2\right]}{\left[k(1-p)^2 + \eta\sigma^2\right]^2} \leq 0. && \text{(A-13)} \end{aligned}$$

Note that the terms in the first bracket of (A-9) are the expected firm value which equals to the target's stand-alone value plus bid premium. Define the expected firm value as π. Then equation (A-9) becomes:

$$\max_{\alpha} \pi - \left[\bar{u} + \frac{k}{2}(1-p)^2\alpha^2 + \frac{\eta}{2}\alpha^2\sigma^2\right]. \tag{A-14}$$

The first-order condition is:

$$\frac{\partial \pi}{\partial \alpha} - k(1-p)^2\alpha - \eta\sigma^2\alpha = 0. \tag{A-15}$$

Differentiating both sides of (A-15) yields:

$$d\left(\frac{\partial \pi}{\partial \alpha}\right) - (1-p)^2 dk - k(1-p)^2 d\alpha - 2(1-p)dp - \sigma^2\alpha d\eta - \eta\alpha d\sigma^2 - \eta\sigma^2 d\alpha = 0. \tag{A-16}$$

Then:

$$\begin{aligned}\frac{d}{dp}\left(\frac{\partial \pi}{\partial \alpha}\right) &= \left[k(1-q)^2+\eta\alpha\sigma^2\right]\frac{d\alpha}{dp}-2(1-p)\\ &= -\frac{2\eta\sigma^2 k(1-p)}{k(1-p)^2+\eta\sigma^2}-2(1-p)<0. \qquad \text{(A-17)}\end{aligned}$$

Q.E.D.

The intuition behind Proposition 1 can be explained as follows. Less managerial effort leads to a greater synergy gain, which is divided between the target and the raider. Stronger antitakeover provisions raise the target's share of the synergy, and thus encourage the manager to exert less effort because more of the synergy accrues to the target with stronger antitakeover provisions. That is, antitakeover provisions reduce managerial effort, *ceteris paribus*. A high managerial ownership incentivizes the manager to exert more effort. Antitakeover provisions weaken this incentive effect by reducing managerial effort. Consequently, the marginal effect of managerial ownership on firm value decreases with the strength of antitakeover provisions. Aware of this negative impact of antitakeover provisions on the incentive effect of managerial ownership, shareholders grant fewer shares to the manager when there are stronger antitakeover provisions.

Antitakeover Provisions and Target Firms' Bargaining Position

This section discusses how antitakeover provisions enhance a target firm's bargaining position against an acquirer, which is a key assumption in the model.

Suppose a raider launches a takeover bid to acquire up to 100% of the target firm's shares. The bid succeeds if more than 50% of the shares are tendered. Grossman and Hart (1980) suggest that a necessary condition for the bid to succeed is that the offer price must be greater than the stock price of the target after the bid succeeds. Otherwise, the free rider problem arises and no shareholder will tender.

The target's shareholders as a group have an incentive to not tender their shares (hold up) in order to push up the bid price. If the shareholders are able to form a cartel then no shareholder will tender at a low price, and consequently they will be able to bargain for a higher offer. However on an individual level, each shareholder has an incentive to tender at a low price because the bid premium will be lost if he or she holds up while other shareholders tender more than 50% of the total shares of the firm. In other words, individual shareholders have an incentive to rush, while as a group they have an incentive to hold up.

DeAngelo and Rice (1983) suggest that antitakeover provisions help the target's shareholders form a cartelized response to a tender offer and thus enhance their bargaining position. For example, supermajority provisions raise the level of ownership that must be purchased in order to ensure subsequent shareholder approval of a merger, and therefore encourage shareholders to hold out for a higher price.

Another example of antitakeover provisions is poison pills, which make it almost impossible for a bid to succeed without the approval of the target's board. Poison pills can be removed by the board without the approval of shareholders. Therefore, one way to circumvent poison pills is to initiate a proxy fight in the hope of replacing the directors who resist the acquisition. The proxy fight may not succeed given that many firms have staggered boards, which would prevent the raider from replacing the directors all at once and would thus increase the cost of the proxy fight. Hence, poison pills and staggered boards force the raider to negotiate directly with the target's directors on the bid premium. Since there are fewer directors than shareholders, and since the directors meet frequently, they can collude at a lower cost and therefore bargain for better acquisition terms. This enhanced bargaining position will increase the proportion of the synergy that accrues to the target's shareholders, provided that the board is acting in the shareholders' interest.

The above discussions suggest that antitakeover provisions enhance the bargaining position of the target firm, and therefore enable the target to seize a larger share of the synergy. Consistent with these discussions, Comment and Schwert (1995) and Heron and Lie (2006) find that antitakeover provisions significantly increase the bid premium in large samples of takeovers.

Appendix B: Variable Descriptions

Variable	Definition
Measures of Managerial Ownership and Strength of Antitakeover Provisions	
Managerial ownership	The total number of shares owned by the top five executives (including restricted stocks but not options) divided by the total number of shares outstanding.
Pay-performance sensitivity (PPS)	The sensitivity of executives compensation to stock price fluctuation. For stocks, PPS is simply the percentage stock ownership; for stock options, PPS equals the number of shares underlying the options times the delta of each option divided by the total number of shares outstanding. The delta is defined as the partial derivative of option value with respect to stock price. I follows Guay (1999) and Core and Guay (2002) to calculate the delta using the ExecuComp database.
E index	An index based on six antitakeover provisions in the RiskMetrics database: staggered board, poison pills, supermajority requirement for mergers, limits to shareholder bylaw amendments, limits to charter amendments, and golden parachutes. The index value increases by one for each antitakeover provision in place.
G index	An index based on twenty-four antitakeover provisions in the RiskMetrics database. The value of the index increases by one for each antitakeover provision in place.
Accounting Variables	
Tobin's Q	The market value of total assets divided by the book value of total assets. The market value of assets is computed as the book value of total assets (data 6 in the Compustat database) plus common shares outstanding (data 25) times stock price (data 199).
Industry-adjusted Tobins Q	Tobins Q minus the median industry Tobins Q. I use the Fama-French (1997) industry classifications.
Sales	The natural log of total sales (data 12).
Sales squared	The square of Sales.
Tangibility	The ratio of property, plant, and equipment (data 8) to sales (data12).
Tangibility squared	The square of PPE/Sales.
Idiosyncratic risk	The standard deviation of the residuals of the CAPM model estimated using daily stock returns in the fiscal year.
Profit margin	The ratio of operating income before depreciation (data 13) to total sales (data 12).
R&D	The ratio of research and development expenses (data 46) to property, plant, and equipment (data 8).
R&D dummy	A dummy variable which takes the value of one if the R&D data are available, and zero otherwise.
Advertisement	The ratio of advertisement expenditures (data 45) to property, plant, and equipment (data 8).
Advertisement dummy	A dummy variable which takes the value of one if the advertisement expenses data are available, and zero otherwise.
Investment	The ratio of capital expenditure (data 128) to property, plant, and equipment (data 8).

Variable Descriptions (Continued)

Variable	Definition
	Stock returns
CARs in past three years	The cumulative abnormal stock returns over the 36-month period ending at the beginning of the fiscal year. The returns are adjusted with respect to the Fama-French three factors.
Announcement returns of manager share purchase in the open market	The cumulative abnormal return over the trading days [-1, +5] or [-1, +3] around the share purchase announcement. The returns are adjusted with the CAPM model. The estimation window for the market model is [-252,-42] days prior to the announcement.

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Figure 1: Relation between Managerial Ownership and Tobin's Q by the E Index

This figure plots the fitted value of Tobin's Q against managerial ownership at different values of the E index. The X-axis is managerial ownership (in percentage). The Y-axis is Tobin's Q. The values of Tobin's Q are estimated from the regression results in column (2) of Table 3: $Q = 3.574 + 1.858 \times$ Managerial ownership$-1.360 \times$Managerial ownership$^2 - 0.044 \times$E index$- 0.536 \times$Managerial ownership$\times$ E index. Managerial ownership ranges from 0 to 20 percent in the figure since almost all firms in the sample have managerial ownership below 20 percent.

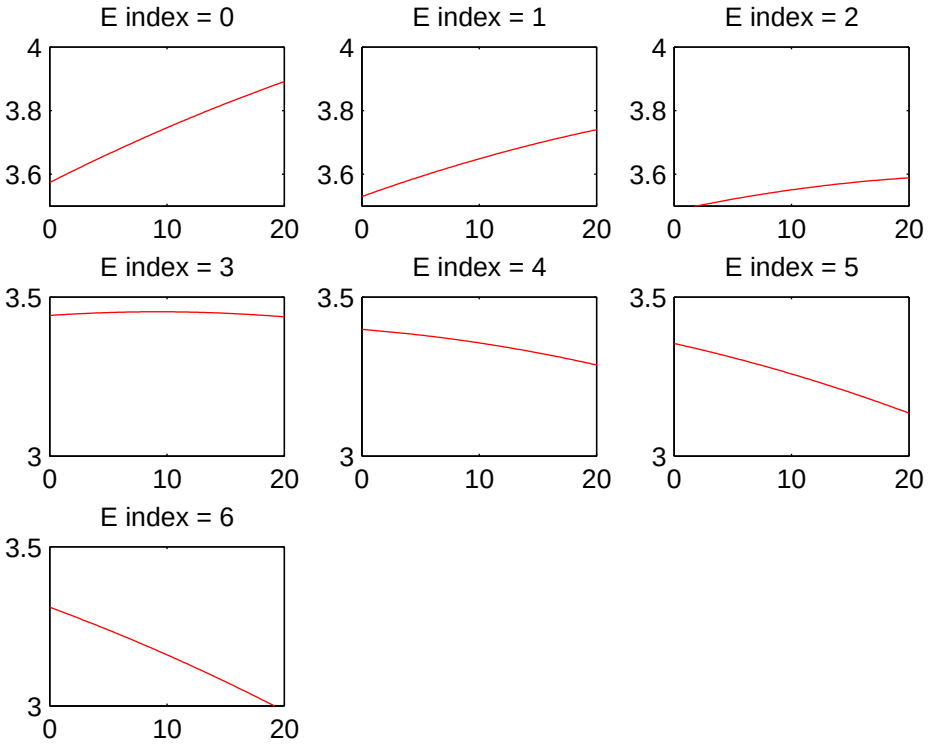

Table 1: Managerial Ownership and the E Index

This table presents the summary statistics of managerial ownership (Panel A) and the E index (Panel B). Panel C reports the frequencies of the six provisions in the E index. In Panels B and C, only the years when the E index is updated are included. The sample consists of 14,962 firm-year observations over the period 1992-2007. See the Appendix for the descriptions of the variables.

Panel A: Managerial Ownership, 1992-2007

Year	N	mean	sd	p5	p50	p95
1992	524	4.17%	10.12%	0.03%	0.54%	22.72%
1993	714	4.44%	9.44%	0.05%	0.87%	23.96%
1994	711	4.38%	8.88%	0.05%	0.88%	24.47%
1995	775	4.40%	8.77%	0.04%	0.80%	25.01%
1996	772	4.08%	8.53%	0.05%	0.69%	23.68%
1997	783	3.91%	7.91%	0.05%	0.73%	21.85%
1998	1073	4.77%	9.03%	0.06%	0.93%	24.92%
1999	1004	4.52%	8.71%	0.06%	0.85%	23.70%
2000	972	4.60%	8.83%	0.06%	0.91%	23.68%
2001	946	4.13%	8.45%	0.05%	0.79%	21.96%
2002	1145	3.98%	8.21%	0.05%	0.80%	20.09%
2003	1136	3.50%	7.32%	0.04%	0.72%	18.55%
2004	1169	3.36%	7.26%	0.05%	0.76%	16.90%
2005	1095	3.04%	6.53%	0.06%	0.75%	15.52%
2006	1104	2.94%	6.26%	0.05%	0.73%	15.45%
2007	1039	2.69%	6.00%	0.06%	0.70%	13.36%
Total	14962	3.87%	8.08%	0.05%	0.77%	21.39%

Panel B: E Index, 1992-2007

Year	N	mean	sd	p5	p50	p95
1992	524	2.27	1.42	0.00	2.00	5.00
1993	714	2.28	1.40	0.00	2.00	4.00
1995	775	2.27	1.36	0.00	2.00	4.00
1998	1073	2.17	1.31	0.00	2.00	4.00
2000	972	2.31	1.31	0.00	2.00	4.00
2002	1145	2.47	1.28	0.00	3.00	4.00
2004	1169	2.49	1.24	0.00	3.00	4.00
2006	1104	2.41	1.24	0.00	2.00	4.00
Total	7476	2.35	1.31	0.00	2.00	4.00

Panel C: Frequencies of Antitakeover Provisions

Year	Staggered board	Poison pill	Super-majority	Limits to amend bylaws	Limits to amend charter	Golden parachutes
1992	57.82%	62.40%	39.89%	12.98%	2.48%	51.72%
1993	59.38%	60.08%	38.94%	14.99%	2.66%	52.38%
1995	60.13%	57.94%	38.71%	14.58%	2.97%	52.52%
1998	57.04%	55.17%	34.30%	15.66%	2.33%	52.47%
2000	58.23%	58.85%	34.36%	17.28%	2.16%	60.08%
2002	60.52%	62.10%	33.80%	20.79%	1.40%	68.03%
2004	59.97%	61.68%	32.42%	20.87%	1.71%	72.11%
2006	55.53%	56.25%	32.52%	19.02%	1.81%	76.27%
Total	58.56%	59.15%	34.97%	17.60%	2.10%	62.37%

Table 2: Summary Statistics

This table presents the summary statistics (Panel A) and the correlation matrix (Panel B) of the variables. The p-values for statistical significance of the correlations are presented in the brackets in Panel B. The sample consists of 14,962 firm-year observations over the period 1992-2007. See the Appendix for the descriptions of the variables.

Panel A: Summary Statistics

Variable	N	mean	sd	p5	p50	p95
Tobin's Q	14962	2.02	1.28	0.94	1.62	4.53
Industry-adjusted Q	14962	0.41	1.19	-0.73	0.08	2.72
Managerial ownership (%)	14962	3.87	8.08	0.05	0.77	21.39
E index	14962	2.35	1.31	0.00	2.00	4.00
Sales ($Bn)	14962	4.95	11.52	0.16	1.37	20.50
Tangibility	14962	0.38	0.53	0.04	0.22	1.37
Idiosyncratic risk (%)	14962	2.37	1.17	1.08	2.07	4.69
Profit margin	14962	0.15	0.15	0.01	0.13	0.39
R&D	14962	0.28	0.67	0.00	0.01	1.51
R&D dummy	14962	0.64	0.48	0.00	1.00	1.00
Advertising expense	14962	0.09	0.31	0.00	0.00	0.46
Advertising dummy	14962	0.36	0.48	0.00	0.00	1.00
Investment	14962	0.23	0.14	0.07	0.20	0.51

Panel B: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Tobin's Q	1.00												
2	Industry-adjusted Q	0.94	1.00											
		[0.00]												
3	Managerial ownership	0.02	0.05	1.00										
		[0.00]	[0.00]											
4	E index	-0.13	-0.13	-0.19	1.00									
		[0.00]	[0.00]	[0.00]										
5	Sales	-0.04	0.00	-0.15	0.02	1.00								
		[0.00]	[0.80]	[0.00]	[0.07]									
6	Tangibility	-0.11	-0.10	-0.05	0.01	-0.08	1.00							
		[0.00]	[0.00]	[0.00]	[0.20]	[0.00]								
7	Idiosyncratic risk	0.01	0.01	0.05	-0.09	-0.41	0.01	1.00						
		[0.53]	[0.07]	[0.00]	[0.00]	[0.00]	[0.46]							
8	Profit margin	0.22	0.21	-0.03	-0.01	0.15	0.28	-0.30	1.00					
		[0.00]	[0.00]	[0.00]	[0.31]	[0.00]	[0.00]	[0.00]						
9	R&D	0.22	0.13	-0.06	-0.08	-0.29	-0.14	0.26	-0.21	1.00				
		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]					
10	R&D dummy	0.12	0.08	-0.10	0.02	0.00	-0.23	0.07	-0.12	0.31	1.00			
		[0.00]	[0.00]	[0.00]	[0.04]	[0.59]	[0.00]	[0.00]	[0.00]	[0.00]				
11	Advertising expense	0.08	0.08	0.05	-0.07	-0.02	-0.15	0.01	-0.06	0.16	-0.03	1.00		
		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.21]	[0.00]	[0.00]	[0.00]			
12	Advertising dummy	0.09	0.09	0.02	-0.05	0.12	-0.15	-0.02	-0.04	0.08	0.06	0.41	1.00	
		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]	[0.00]		
13	Investment	0.30	0.25	0.03	-0.11	-0.15	-0.19	0.18	0.01	0.34	0.06	0.18	0.08	1.00
		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.09]	[0.00]	[0.00]	[0.00]	[0.00]	

Table 3: Determinants of Tobin's Q

The dependent variable in the first five columns and the last column are Tobin's Q and the industry-adjusted Tobin's Q, respectively. The firms that are used in the regression in column (4) have an E index between 0 and 2; the firms in column (5) have an E index between 3 and 6. The sample consists of 14,962 firm-year observations over the period 1992-2007. See the Appendix for the descriptions of the variables. The p-values are reported in the brackets. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Dependent Variable	Tobin's Q				Industry-adjusted Tobin's Q	
Sample	Whole sample		E index ≤ 2	E index > 2	Whole sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Managerial ownership	1.635***	1.858**	1.891**	-1.268*	2.218**	2.818**
	[0.000]	[0.046]	[0.030]	[0.076]	[0.019]	[0.023]
Managerial ownership squared	-1.091*	-1.360	-2.455	2.819*	-2.159	-3.744
	[0.089]	[0.299]	[0.130]	[0.057]	[0.102]	[0.100]
E index	-0.050***	-0.044***			-0.044***	-0.038**
	[0.000]	[0.007]			[0.008]	[0.033]
Managerial ownership × E index	-0.552***	-0.536**			-0.560**	-0.937**
	[0.000]	[0.016]			[0.013]	[0.033]
Managerial ownership squared × E index						1.065
						[0.216]
Sales	-0.729***	-0.576***	-0.670***	-0.464***	-0.476***	-0.478***
	[0.000]	[0.000]	[0.000]	[0.006]	[0.000]	[0.000]
Sales squared	4.622***	3.711***	4.344***	2.971***	3.071***	3.081***
	[0.000]	[0.000]	[0.000]	[0.006]	[0.000]	[0.000]
Tangibility	-0.578***	-0.727***	-0.781***	-0.672***	-0.598***	-0.601***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Tangibility squared	0.089***	0.147***	0.190***	0.088**	0.110***	0.111***
	[0.000]	[0.000]	[0.001]	[0.013]	[0.001]	[0.001]
Idiosyncratic risk	-0.009	-0.050***	-0.048*	-0.057***	-0.066***	-0.066***
	[0.404]	[0.008]	[0.084]	[0.010]	[0.000]	[0.000]
Profit margin	2.810***	2.627***	2.592***	2.764***	2.238***	2.236***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
R&D	0.260***	0.192***	0.190***	0.212**	0.138***	0.138***
	[0.000]	[0.000]	[0.002]	[0.012]	[0.004]	[0.004]
R&D dummy	0.188***	0.159***	0.235***	0.065	0.121**	0.121**
	[0.000]	[0.001]	[0.001]	[0.216]	[0.011]	[0.011]
Advertising expense	-0.021	-0.036	0.062	-0.177	-0.004	-0.004
	[0.658]	[0.705]	[0.510]	[0.287]	[0.960]	[0.964]
Advertising dummy	0.116***	0.046	0.027	0.079	0.156***	0.156***
	[0.000]	[0.325]	[0.691]	[0.184]	[0.001]	[0.001]
Investment	1.742***	1.837***	1.940***	1.644***	1.484***	1.485***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Constant	4.035***	3.574***	3.831***	3.057***	1.785***	1.785***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]
Industry fixed effects	No	Yes	Yes	Yes	No	No
Year fixed effects	No	Yes	Yes	Yes	Yes	Yes
Cluster by firm	No	Yes	Yes	Yes	Yes	Yes
Observations	14962	14962	7916	7046	14962	14962
R^2	0.209	0.299	0.305	0.315	0.176	0.176

Table 4: Different Measures of Managerial Ownership

Panel A presents the means of six measures of managerial ownership from 1992-2007; Panel B presents the corresponding medians. For stocks, pay-performance sensitivity (PPS) is the percentage stock ownership; for stock options, PPS equals the number of shares underlying the options times the delta of each option divided by the total number of shares outstanding. Panel C presents the regression results of the industry-adjusted Tobin's Q with three different measures of managerial ownership as explanatory variables. The sample consists of 14,962 firm-year observations over the period 1992-2007. See the Appendix for the descriptions of the variables. The p-values are reported in the brackets. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Panel A: Mean Managerial Ownership

Year	Managerial ownership exc. options	Managerial PPS options only	Managerial PPS inc. options	CEO ownership exc. options	CEO PPS options only	CEO PPS inc. options
1992	4.17%	0.79%	4.96%	2.86%	0.23%	3.08%
1993	4.44%	1.13%	5.58%	2.76%	0.48%	3.19%
1994	4.38%	1.30%	5.68%	2.94%	0.57%	3.47%
1995	4.40%	1.45%	5.85%	2.91%	0.65%	3.51%
1996	4.08%	1.58%	5.66%	2.64%	0.73%	3.34%
1997	3.91%	1.77%	5.68%	2.62%	0.82%	3.42%
1998	4.77%	2.18%	6.95%	3.21%	0.97%	4.15%
1999	4.52%	2.29%	6.80%	3.09%	1.04%	4.10%
2000	4.60%	2.48%	7.08%	3.05%	1.13%	4.15%
2001	4.13%	2.49%	6.63%	2.83%	1.17%	3.95%
2002	3.98%	2.54%	6.52%	2.74%	1.21%	3.90%
2003	3.50%	2.45%	5.95%	2.44%	1.17%	3.59%
2004	3.36%	2.29%	5.65%	2.20%	1.10%	3.27%
2005	3.04%	2.04%	5.08%	1.93%	1.02%	2.93%
2006	2.94%	2.17%	5.08%	1.71%	1.10%	2.74%
2007	2.69%	2.06%	4.72%	1.72%	1.06%	2.69%
Total	3.87%	2.03%	5.90%	2.55%	0.97%	3.49%

Panel B: Median Managerial Ownership

Year	Managerial ownership exc. options	Managerial PPS options only	Managerial PPS inc. options	CEO ownership exc. options	CEO PPS options only	CEO PPS inc. options
1992	0.54%	0.45%	1.48%	0.16%	0.10%	0.38%
1993	0.87%	0.64%	2.12%	0.30%	0.20%	0.78%
1994	0.88%	0.78%	2.32%	0.33%	0.28%	0.94%
1995	0.80%	0.95%	2.42%	0.33%	0.35%	0.98%
1996	0.69%	1.02%	2.43%	0.28%	0.39%	1.00%
1997	0.73%	1.14%	2.56%	0.31%	0.47%	1.13%
1998	0.93%	1.57%	3.49%	0.38%	0.58%	1.45%
1999	0.85%	1.69%	3.35%	0.33%	0.67%	1.40%
2000	0.91%	1.87%	3.65%	0.34%	0.77%	1.55%
2001	0.79%	1.89%	3.58%	0.31%	0.81%	1.56%
2002	0.80%	1.99%	3.79%	0.33%	0.87%	1.67%
2003	0.72%	1.83%	3.50%	0.30%	0.81%	1.55%
2004	0.76%	1.77%	3.21%	0.31%	0.77%	1.44%
2005	0.75%	1.47%	2.84%	0.31%	0.63%	1.25%
2006	0.73%	1.66%	3.00%	0.29%	0.77%	1.29%
2007	0.70%	1.61%	2.75%	0.28%	0.73%	1.19%
Total	0.77%	1.43%	3.01%	0.31%	0.60%	1.30%

Panel C: Regression Results with Different Measures of Managerial Ownership

Dependent Variable	Industry-adjusted Tobin's Q		
Measure of managerial ownership	Managerial PPS inc. options	CEO ownership exc. options	CEO PPS inc. options
	(1)	(2)	(3)
Managerial ownership	1.526*	2.793**	2.111*
	[0.093]	[0.022]	[0.074]
Managerial ownership squared	-0.656	-3.593*	-1.770
	[0.579]	[0.095]	[0.372]
E index	-0.034*	-0.053***	-0.048***
	[0.067]	[0.002]	[0.006]
Managerial ownership × E index	-0.625***	-0.632**	-0.687**
	[0.003]	[0.031]	[0.016]
Sales	-0.482***	-0.446***	-0.449***
	[0.000]	[0.001]	[0.001]
Sales squared	3.083***	2.871***	2.874***
	[0.000]	[0.001]	[0.001]
Tangibility	-0.607***	-0.588***	-0.595***
	[0.000]	[0.000]	[0.000]
Tangibility squared	0.111***	0.107***	0.108***
	[0.001]	[0.001]	[0.001]
Idiosyncratic risk	-0.066***	-0.067***	-0.069***
	[0.000]	[0.000]	[0.000]
Profit margin	2.237***	2.228***	2.227***
	[0.000]	[0.000]	[0.000]
R&D	0.131***	0.139***	0.132***
	[0.007]	[0.005]	[0.007]
R&D dummy	0.116**	0.124**	0.119**
	[0.015]	[0.012]	[0.015]
Advertising expense	-0.003	-0.005	-0.004
	[0.972]	[0.954]	[0.964]
Advertising dummy	0.157***	0.161***	0.163***
	[0.001]	[0.001]	[0.001]
Investment	1.491***	1.529***	1.525***
	[0.000]	[0.000]	[0.000]
Constant	1.821***	1.807***	1.830***
	[0.001]	[0.001]	[0.001]
Year fixed effects	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes
Observations	14962	14196	14346
R^2	0.176	0.177	0.176

Table 5: Individual Antitakeover Provisions and the G Index

For each of the six antitakeover provisions in the E index, panel A reports the regression results of the following model:

$$\begin{aligned} Q_{it} = \; & \beta_0 + \beta_1 \times \text{Managerial ownership}_{it} + \beta_2 \times \text{Managerial ownership}_{it}^2 \\ & + \beta_3 \times \text{Individual provision}_{it} + \beta_4 \times \text{Managerial ownership}_{it} \times \text{Individual provision}_{it} \\ & + \beta_5 \times X_{it} + u_{it}. \end{aligned}$$

Panel B reports the regression results for the G index. I control for year fixed effects and cluster the residuals by firm in all the regressions. The sample consists of 14,962 firm-year observations over the period 1992-2007. See the Appendix for the descriptions of the variables. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Panel A: Individual Provisions in the E Index

Dependent Variable	Industry-adjusted Tobin's Q					
Provision	Staggered board	Poison pill	Supermajority requirement	Limits to amend bylaws	Limits to amend charter	Golden parachutes
	(1)	(2)	(3)	(4)	(5)	(6)
Managerial ownership	1.976**	1.315*	1.593**	1.659**	1.472**	1.426*
	[0.018]	[0.090]	[0.044]	[0.024]	[0.033]	[0.060]
Managerial ownership squared	-1.629	-1.856	-2.049	-2.073	-1.868	-1.493
	[0.251]	[0.177]	[0.119]	[0.111]	[0.147]	[0.217]
Provision	-0.006	-0.094**	-0.031	-0.065	-0.033	-0.137***
	[0.896]	[0.040]	[0.495]	[0.202]	[0.723]	[0.003]
Managerial ownership × Provision	-1.220**	-0.238	-0.275	-1.150**	-2.999***	-1.314***
	[0.034]	[0.742]	[0.633]	[0.029]	[0.000]	[0.006]
Sales	-0.530***	-0.503***	-0.533***	-0.533***	-0.543***	-0.492***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sales squared	3.449***	3.263***	3.472***	3.485***	3.540***	3.182***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Tangibility	-0.609***	-0.597***	-0.609***	-0.609***	-0.611***	-0.615***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Tangibility squared	0.112***	0.110***	0.112***	0.112***	0.113***	0.116***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Idiosyncratic risk	-0.062***	-0.062***	-0.062***	-0.059***	-0.060***	-0.060***
	[0.001]	[0.001]	[0.001]	[0.002]	[0.001]	[0.002]
Profit margin	2.273***	2.275***	2.285***	2.290***	2.294***	2.255***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
R&D	0.143***	0.152***	0.146***	0.147***	0.147***	0.139***
	[0.003]	[0.002]	[0.003]	[0.003]	[0.003]	[0.004]
R&D dummy	0.113**	0.120**	0.114**	0.113**	0.112**	0.118**
	[0.018]	[0.012]	[0.018]	[0.018]	[0.019]	[0.013]
Advertising expense	0.006	-0.001	-0.001	-0.003	0.002	0.009
	[0.950]	[0.990]	[0.995]	[0.977]	[0.986]	[0.916]
Advertising dummy	0.158***	0.157***	0.161***	0.160***	0.158***	0.162***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Investment	1.512***	1.494***	1.500***	1.505***	1.502***	1.482***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Constant	1.814***	1.767***	1.826***	1.813***	1.848***	1.782***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,962	14,962	14,962	14,962	14,962	14,962
R^2	0.171	0.171	0.170	0.171	0.170	0.176

Panel B: The G Index

Dependent Variable	Industry-adjusted Tobin's Q	
	(1)	(2)
Managerial ownership	2.218**	1.325
	[0.019]	[0.244]
Managerial ownership squared	-2.159	-1.744
	[0.102]	[0.185]
E index	-0.044***	
	[0.008]	
Managerial ownership × E index	-0.560**	
	[0.013]	
G index		-0.022***
		[0.007]
Managerial ownership × G index		-0.010
		[0.921]
Sales	-0.476***	-0.491***
	[0.000]	[0.000]
Sales squared	3.071***	3.223***
	[0.000]	[0.000]
Tangibility	-0.598***	-0.608***
	[0.000]	[0.000]
Tangibility squared	0.110***	0.113***
	[0.001]	[0.001]
Idiosyncratic risk	-0.066***	-0.067***
	[0.000]	[0.000]
Profit margin	2.238***	2.263***
	[0.000]	[0.000]
R&D	0.138***	0.146***
	[0.004]	[0.003]
R&D dummy	0.121**	0.117**
	[0.011]	[0.014]
Advertising expense	-0.004	-0.004
	[0.960]	[0.964]
Advertising dummy	0.156***	0.158***
	[0.001]	[0.001]
Investment	1.484***	1.466***
	[0.000]	[0.000]
Constant	1.785***	1.925***
	[0.001]	[0.000]
Year fixed effects	Yes	Yes
Cluster by firm	Yes	Yes
Observations	14,962	14,962
R^2	0.176	0.171

Table 6: Determinants of Tobin's Q: Firm Fixed Effects

The dependent variables in the two columns are Tobin's Q and the industry-adjusted Tobin's Q, respectively. The sample consists of 14,962 firm-year observations over the period 1992-2007. See the Appendix for the descriptions of the variables. The p-values are reported in the brackets. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Dependent Variable	Tobin's Q	Industry-adjusted Tobin's Q
	(1)	(2)
Managerial ownership	1.965***	2.067***
	[0.000]	[0.000]
Managerial ownership squared	-2.367***	-2.125***
	[0.000]	[0.001]
E index	-0.019	-0.013
	[0.217]	[0.375]
Managerial ownership × E index	-0.281**	-0.379***
	[0.015]	[0.001]
Sales	-0.986***	-0.973***
	[0.000]	[0.000]
Sales squared	4.803***	4.619***
	[0.000]	[0.000]
Tangibility	-1.129***	-1.103***
	[0.000]	[0.000]
Tangibility squared	0.202***	0.198***
	[0.000]	[0.000]
Idiosyncratic risk	-0.056***	-0.060***
	[0.000]	[0.000]
Profit margin	2.438***	2.259***
	[0.000]	[0.000]
R&D	-0.074	-0.053
	[0.167]	[0.299]
R&D dummy	-0.025	-0.011
	[0.546]	[0.780]
Advertising expense	0.009	0.009
	[0.908]	[0.902]
Advertising dummy	-0.138***	-0.120***
	[0.000]	[0.000]
Investment	1.146***	1.044***
	[0.000]	[0.000]
Constant	6.429***	4.917***
	[0.000]	[0.000]
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
Observations	14962	14962
R^2	0.714	0.689

Table 7: An Event Study: Manager Share Purchases in the Open Market

This table presents the OLS regression results of the 5- and 7-day cumulative abnormal returns commencing from the day before the manager share purchase announcement. The sample consists of 4,128 stock purchases announced by the top five executives of the firms in the ExecuComp database over the period 1993-2008. See the Appendix for the descriptions of the variables. In columns (1)-(2), all manager share purchases are included in the sample; In columns (3)-(4), only manager share purchases greater than 5,000 shares are included; In columns (5)-(6), only manager share purchases greater than 10,000 shares are included. The p-values are reported in the brackets. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Dependent Variable	CAR5	CAR7	CAR5	CAR7	CAR5	CAR7
Sample: Number of shares purchased	> 0		$> 5{,}000$		$> 10{,}000$	
	(1)	(2)	(3)	(4)	(5)	(6)
Manager shares purchases	4.007**	7.071***	2.994*	5.242**	2.798	5.439**
	[0.020]	[0.009]	[0.083]	[0.046]	[0.117]	[0.047]
Pre-purchase managerial ownership	-0.014	-0.021	-0.043	-0.051	-0.014	-0.028
	[0.408]	[0.342]	[0.141]	[0.156]	[0.676]	[0.505]
E index	-0.001	-0.002	-0.001	-0.004*	-0.002	-0.004
	[0.571]	[0.201]	[0.638]	[0.085]	[0.379]	[0.233]
Manager shares purchases × Pre-purchase ownership	-4.493*	-8.634**	-2.970	-5.953*	-2.840	-6.192*
	[0.066]	[0.015]	[0.226]	[0.090]	[0.256]	[0.093]
Manager shares purchases × E index	-0.584*	-0.959**	-0.481*	-0.771**	-0.459	-0.822**
	[0.063]	[0.025]	[0.092]	[0.048]	[0.113]	[0.040]
Constant	0.003	0.009*	0.007	0.019*	0.001	0.006
	[0.449]	[0.096]	[0.385]	[0.061]	[0.960]	[0.633]
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,128	4,128	1,648	1,648	1,086	1,086
R^2	0.022	0.029	0.044	0.051	0.056	0.066

Table 8: Instrumental Variable Regressions

Columns (1) and (2) report the OLS regression results where the dependent variables are managerial ownership and the E index, respectively. Column (3) presents the GMM regression results where the dependent variable is the industry-adjusted Tobin's Q. The instrumental variables for managerial ownership are the managerial ownership in 1992 and the average managerial ownership of industry peers; the instrumental variables for the E index are the E index in 1990, the average E index of industry peers, and the average E index of the firms incorporated in the same state; the instrumental variable for managerial ownership squared is the square of the fitted managerial ownership from the regression in column (1); the instrumental variable for the interaction variable of managerial ownership and the E index is the product of the fitted managerial ownership from the regression in column (1) times the fitted E index from the regression in column (2). See the Appendix for the descriptions of the variables. The p-values are reported in the brackets. Robust standard errors are used to compute the p-values. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Dependent Variable	Managerial ownership	E index	Industry-adjusted Tobin's Q
Stage of Estimation	First stage	First stage	Second stage
Estimation Method	OLS	OLS	GMM
	(1)	(2)	(3)
Managerial ownership in 1992	0.431***	-0.756***	
	[0.000]	[0.003]	
Average industry managerial ownership	0.105*	0.975	
	[0.089]	[0.328]	
E index in 1990	-0.006***	0.709***	
	[0.001]	[0.000]	
Average industry E index	0.002	0.192***	
	[0.515]	[0.004]	
Average state E index	0.007**	0.272***	
	[0.046]	[0.000]	
Managerial ownership			8.085***
			[0.008]
Managerial ownership squared			-11.860**
			[0.035]
E index			0.004
			[0.922]
Managerial ownership × E index			-1.587*
			[0.075]
Sales	0.006	0.792***	0.193
	[0.679]	[0.000]	[0.486]
Sales squared	-0.046	-5.421***	-0.810
	[0.586]	[0.000]	[0.635]
Tangibility	-0.004	-0.176	-0.705***
	[0.662]	[0.265]	[0.000]
Tangibility squared	0.001	0.032	0.100
	[0.722]	[0.455]	[0.110]
Idiosyncratic risk	-0.001	0.053*	-0.019
	[0.819]	[0.096]	[0.546]
Profit margin	-0.017	0.237	3.794***
	[0.271]	[0.420]	[0.000]
R&D	-0.003	0.102	0.304**
	[0.393]	[0.218]	[0.044]
R&D dummy	-0.014***	-0.079	0.197***
	[0.008]	[0.253]	[0.005]
Advertising expense	0.025**	-0.050	0.182
	[0.047]	[0.762]	[0.400]
Advertising dummy	-0.002	0.000	0.226***
	[0.563]	[0.998]	[0.002]
Investment	0.001	0.102	0.798***
	[0.957]	[0.651]	[0.008]
Constant	-0.012	-3.047***	-1.610
	[0.872]	[0.000]	[0.151]
P-value of Sargen-Hansen J-test			0.421
Year fixed effects	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes
Observations	4850	4850	4850
R^2	0.466	0.696	0.259

Table 9: Controlling for Management Quality

The cumulative abnormal return in the past three years is a proxy for management quality. The sample consists of 14,936 firm-year observations over the period 1992-2007. See the Appendix for the descriptions of the variables. The p-values are reported in the brackets. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Dependent Variable	E index	Managerial ownership	Industry-adjusted Tobin's Q
	(1)	(2)	(3)
CARs in past three years	-0.115***	0.005***	0.393***
	[0.000]	[0.000]	[0.000]
Managerial ownership			1.863**
			[0.038]
Managerial ownership squared			-1.663
			[0.184]
E index			-0.032**
			[0.043]
Managerial ownership × E index			-0.530**
			[0.013]
Sales	1.306***	-0.016*	-0.503***
	[0.000]	[0.050]	[0.000]
Sales squared	-8.663***	0.030	3.171***
	[0.000]	[0.564]	[0.000]
Tangibility	0.174	-0.022**	-0.581***
	[0.299]	[0.017]	[0.000]
Tangibility squared	-0.051	0.004	0.105***
	[0.292]	[0.115]	[0.001]
Idiosyncratic risk	-0.080***	-0.001	-0.017
	[0.001]	[0.579]	[0.343]
Profit margin	-0.736***	0.004	1.962***
	[0.000]	[0.707]	[0.000]
R&D	0.019	-0.011***	0.126***
	[0.652]	[0.000]	[0.006]
R&D dummy	0.063	-0.009*	0.085*
	[0.402]	[0.070]	[0.064]
Advertising expense	-0.229**	0.010	0.036
	[0.011]	[0.161]	[0.672]
Advertising dummy	-0.048	0.001	0.148***
	[0.429]	[0.825]	[0.001]
Investment	-0.191	-0.013	0.930***
	[0.261]	[0.233]	[0.000]
Constant	-2.257***	0.163***	1.925***
	[0.000]	[0.000]	[0.000]
Industry fixed effects	Yes	Yes	No
Year fixed effects	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes
Observations	14936	14936	14936
R^2	0.132	0.112	0.228

Table 10: Relation between Managerial Ownership and the E Index

Panel A presents the summary statistics of managerial ownership for five subsamples based on the E index. Panel B presents the regression results of four measures of managerial ownership on the E index and other variables. The sample consists of 14,962 firm-year observations over the period 1992-2007. See the Appendix for the descriptions of the variables. The *p*-values are reported in the brackets. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Panel A: Managerial Ownership by E Index

	N	mean	sd	p5	p50	p95
E index = 0	1412	7.55%	11.70%	0.04%	1.33%	32.56%
E index = 1	2679	5.40%	10.49%	0.04%	0.92%	27.73%
E index = 2	3825	3.88%	7.78%	0.04%	0.78%	21.67%
E index = 3	3987	2.88%	5.92%	0.05%	0.73%	14.12%
E index $\geq$ 4	3059	2.14%	5.11%	0.09%	0.66%	9.81%
Total	14962	3.87%	8.08%	0.05%	0.77%	21.39%

Panel B: Regression Results of Four Measures of Managerial Ownership

Dependent Variable	Managerial ownership exc. options	Managerial PPS inc. options	CEO ownership exc. options	CEO PPS inc. options
	(1)	(2)	(3)	(4)
E index	-0.011***	-0.010***	-0.008***	-0.008***
	[0.000]	[0.000]	[0.000]	[0.000]
Sales	-0.001	-0.012	-0.001	-0.007
	[0.873]	[0.156]	[0.832]	[0.330]
Sales squared	-0.069	-0.030	-0.040	-0.019
	[0.189]	[0.563]	[0.357]	[0.664]
Tangibility	-0.020**	-0.024***	-0.018**	-0.018***
	[0.025]	[0.009]	[0.012]	[0.010]
Tangibility squared	0.003	0.004*	0.003	0.003
	[0.165]	[0.088]	[0.138]	[0.118]
Idiosyncratic risk	-0.002	-0.001	-0.001	0.000
	[0.195]	[0.737]	[0.701]	[0.970]
Profit margin	-0.001	-0.007	0.005	0.003
	[0.909]	[0.540]	[0.521]	[0.737]
R&D	-0.011***	-0.010***	-0.007***	-0.007***
	[0.000]	[0.000]	[0.001]	[0.001]
R&D dummy	-0.008	-0.006	-0.007*	-0.006
	[0.101]	[0.194]	[0.069]	[0.129]
Advertising expense	0.007	0.008	0.005	0.005
	[0.333]	[0.294]	[0.353]	[0.309]
Advertising dummy	0.000	0.000	0.002	0.002
	[0.935]	[0.924]	[0.487]	[0.427]
Investment	-0.010	-0.005	-0.011	-0.009
	[0.336]	[0.610]	[0.202]	[0.338]
Constant	0.136***	0.194***	0.100***	0.128***
	[0.000]	[0.000]	[0.001]	[0.000]
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes	Yes
Observations	14962	14962	14196	14346
R^2	0.140	0.171	0.132	0.141