CONDITIONAL TESTS OF CORPORATE GOVERNANCE THEORIES

A Dissertation

by

JIANXIN CHI

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2005

Major Subject: Finance

CONDITIONAL TESTS OF CORPORATE GOVERNANCE THEORIES

A Dissertation

by

JIANXIN CHI

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Approved as to style and content by:

D. Scott Lee (Chair of Committee)	Badi Baltagi (Member)
David Blackwell (Member)	Sorin Sorescu (Member)
David Blackwell (Head of Department)	

May 2005

Major Subject: Finance

ABSTRACT

Conditional Tests of Corporate Governance Theories. (May 2005)

Jianxin Chi, B.E., Qingdao University;

M.B.A., Idaho State University

Chair of Advisory Committee: Dr. D. Scott Lee

Agency theories suggest that governance matters more when agency conflicts are potentially more severe. However, empirical studies often do not control for the potential severity of agency conflicts. I show that the marginal benefit of governance varies with the free cash flow level, a proxy for the potential severity of agency conflicts. As the free cash flow level increases, higher governance quality becomes incrementally more value-enhancing, and lower governance quality becomes incrementally more value-destroying. This is consistent with the hypothesis that better governance helps resolve the agency conflicts in investment decisions when a firm has more free cash flows (Jensen, 1986). This study highlights the importance of controlling for the potential severity of agency conflicts in governance studies and provides an improved method to estimate the marginal benefit of a governance mechanism.

Dedicated to my father, Piqin Chi, mother, Caihong Zhou, and wife, Huihui Zhang

ACKNOWLEDGEMENTS

I would like to thank Dr. Scott Lee, my dissertation advisor, for his invaluable mentoring and encouragement. I would like to thank my dissertation committee members, Drs. Badi Baltagi, David Blackwell, and Sorin Sorescu for their outstanding service on my committee and their insightful comments. I have also benefited greatly from the comments by Charles Cuny and Shane Johnson.

I am grateful to the heads of the finance department, Drs. Don Fraser and David Blackwell, for their gracious mentoring and financial support in form of assistantship and travel grants. I am also grateful for the financial support from the Dean's office in forms of fellowships and scholarships.

The faculty, staff, and students of the finance department have been extremely kind and helpful. I want to extend special thanks to Ted Moorman, my officemate, for working with me and making the tough times more bearable and the good times more memorable.

I want to thank my parents, for all they have done to raise me and help me be successful. I thank my wife Huihui, the love of my life, for always being there for me. With her, everything in my life has been more colorful and enjoyable.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The value of corporate governance lies in its ability to constrain agency conflicts. Theories suggest that the potential severity of agency conflicts varies across both time and firms. For example, Jensen (1986) asserts that the potential agency costs increase when the free cash flow level increases:

> Conflicts of interest between shareholders and managers over payout policies are <u>especially severe when</u> the organization generates substantial free cash flow. The problem is how to motivate managers to disgorge the cash rather than investing it at below the cost of capital or wasting it on organization inefficiencies. (p.323, emphasis added.)

Johnson et al. (2000) develop a model predicting that the potential agency costs increase when investment opportunities decrease:

> … in countries with weak corporate governance, <u>worse</u> economic prospects result in <u>more</u> expropriation by managers ... (p.141, emphasis added.)

If the potential severity of agency conflicts varies, the importance of governance quality should also vary; that is, good governance is more beneficial when the agency conflicts are potentially more severe.

However, empirical studies often overlook this conditional relationship between governance quality and firm value. This oversight leads to low-power tests and has the potential to produce evidence that is inconsistent with theoretical predictions. On the one hand, theories clearly predict that better governance mechanisms can help resolve

---

This dissertation follows the style and format of the Journal of Financial Economics.

agency conflicts and increase firm value,[1] as is supported by numerous event studies. For example, we see that outsider-dominated boards make different decisions than insider-dominated boards, and the market usually favors the decisions made by outsider-dominated boards (e.g., Weisbach (1988), Byrd and Hickman (1992), Borokovich, Parrino, and Trapani (1996), and Huson, Parrino, and Starks (2001)). On the other hand, large-sample empirical studies often do not detect a direct relationship between firm value and various governance mechanisms, such as board structure (Bhagat and Black, 2002), managerial ownership (Himmelberg, Hubbard, and Palia, 1999), managerial compensation (Palia, 2001), and an assortment of governance variables (Agrawal and Knoeber, 1996). A common explanation to this non-correlation between firm value and governance quality is not that governance does not matter, but that firms choose their governance mechanisms optimally. As such, empirical studies should not observe any value effect of a specific governance mechanism (e.g. Demsetz and Lehn, 1985). However, this argument cannot explain why event studies often do detect a governance effect.

Hermalin and Weisbach (2003) attribute the conflicting evidence between event studies and large sample studies to noisy proxies and the endogeneity between firm value and the governance mechanisms. I offer another explanation: theories suggest that the relationship between governance quality and firm value depends on the potential severity of agency conflicts, but large-sample studies that do not control for the conditional aspect of these theories are by construction low-power tests of the theories.

[1] Jensen and Meckling (1976) illustrate how agency conflicts directly lower firm value, and how governance mechanisms can reduce agency costs and increase firm value.

Ideally, a good governance mechanism should engage when the potential agency conflicts become severe. Event studies generally focus on times when the potential agency conflicts are severe and the marginal benefit of good governance is pronounced. For example, we know that managers tend to overinvest, and one way this tendency manifests itself is through acquisitions. An effective board of directors should alleviate overinvestment, which is what Byrd and Hickman (1992) find: tender offer decisions made by outsider-dominated boards are valued more favorably by the market. However, the large-sample study by Bhagat and Black (2002) does not find that board structure affects firm value or performance.

In this study, I examine the marginal benefit of governance quality on firm value (Tobin's Q) while controlling for the potential severity of agency conflicts. I measure governance quality by the Governance Index of Gompers, Ishii, and Metrick (2003). The level of this index equals the number of governance provisions a firm has. More provisions indicate more restricted shareholder rights and therefore lower governance quality. Bebchuk, Cohen, and Ferrell (2004) construct the Entrenchment Index with six governance provisions that most effectively entrench incumbent managers. I use the Entrenchment Index as an alternative measure of governance quality and obtain consistent results. Motivated by Jensen (1986) and Johnson et al. (2000), I use a firm's free cash flow level as the proxy for the potential severity of agency conflicts. I allow the effect of governance on firm value to be conditional on (i.e. vary with) the free cash flow level by creating an interaction term between the free cash flow level and the Governance Index.

I show that the effect of governance quality on firm value varies with the free cash flow level. The part of this governance effect that does not vary with the free cash flow level is close to zero. As the free cash flow level increases, higher governance quality becomes incrementally more value-enhancing, and lower governance quality becomes incrementally more value-destroying. This is consistent with the hypothesis that better governance helps resolve the agency conflicts in investment decisions when the free cash flow level is high (Jensen, 1986). It is also consistent with previous findings in the literature that firms with lower governance quality tend to have higher capital spending and make more acquisitions. This result is inconsistent with the hypothesis that low cash flow levels or poor investment opportunities exacerbate the agency problem of managerial expropriation (Johnson et al., 2000). One explanation is that my sample only includes U.S. firms. The U.S. has one of the strongest investor protection systems in the world, which makes expropriation a costly behavior for managers.[2]

The results of this study show that to correctly estimate the marginal benefit of a governance mechanism, one must control for the potential severity of agency conflicts. Recent corporate scandals have brought about new efforts to improve the quality of corporate governance. It is important for all stakeholders to understand that since the potential severity of agency conflicts differs across firms, the marginal benefit of any governance mechanism also differs across firms. Any one-size-fits-all approach to

[2] The recent study by Durnev and Kim (2004) further confirms the strong investor protection environment in the U.S. Examples of other cross-country studies of investor protection include La Porta et al. (1997, 1998, and 2000).

strengthen corporate governance is unlikely to be efficient or even effective. A firm should adopt a governance mechanism only when the marginal benefit outweighs the marginal cost. The empirical models in this study provide an improved method to estimate the marginal benefit of governance. Future studies can use these models to evaluate the marginal benefit of other governance mechanisms, such as board structure, managerial ownership, and compensation.

Governance studies have largely focused on the two-dimensioned relationship between governance quality and firm value. However, this two-dimensioned description is incomplete. The complete description requires a third dimension, namely the potential severity of agency conflicts, which affects the relationship between governance quality and firm value. Controlling for the potential severity of agency conflicts is different from controlling for the interaction between different governance mechanisms. For example, Harvey, Lins, and Roper (2004) document that firms with entrenching ownership structures benefit more from the monitoring function of debt. They still only ask *what* governance mechanism matters, not *when* it matters. A firm with entrenching ownership structure will benefit even more from the monitoring function of debt when the potential agency conflicts are more severe, such as when the firm generates substantial free cash flows.

This study indicates that at least for the U.S. firms covered by the sample, the agency conflicts associated with investment decisions are more detrimental to firm value than managerial expropriation. This is not surprising once we recall that financial theories always agree that firm value is ultimately created by investing in positive NPV

projects. Big firms have failed amid recent corporate scandals, and the media have often dramatized how greedy CEOs steal from innocent investors. However, the amount stolen by CEOs is often miniscule compared to the value destroyed by poor investments. A CEO can certify his annual reports and not steal a penny yet destroy billions of dollars by poor investments. The results of this study suggest that it may be more fruitful for the government and the investment society to direct their governance reform efforts to first resolve the agency conflicts in investment decisions.

Two limitations of this study warrant some discussion. First, endogeneity is always a challenge for governance research. I use panel data fixed effects to mitigate the endogeneity caused by unobservable firm characteristics that may simultaneously affect both the Governance Index and firm Tobin's Q. However, this remedy is not perfect since the unobservable firm characteristics may be time-varying while a fixed effects model assumes the unobservable firm characteristics are time-invariant. The other source of endogeneity is reverse causality, namely firm Tobin's Q may actually affect the Governance Index, rather than the other way around. Chi (2004) and Gompers, Ishii, and Metrick (2003) explore this possibility and conclude that this reverse causality is unlikely. The fact that the Governance Index is predetermined with respect to firm Tobin's Q also reduces the possibility of reverse causality.[3] Another way to solve the endogeneity problem is to use instrumental variables for the Governance Index.

[3] See the discussion in Greene (2000, p. 657).

However, I have not been able to identify truly exogenous and strong instruments for the Governance Index (also see the remark by Gompers, Ishii, and Metrick, 2003, p.131).[4]

The second limitation is that although the free cash flow level has strong theoretical foundation to be the conditioning variable, there may be other conditioning variables that work as well or even better. This may be an interest for future research. Because the true free cash flow level is unobservable, I use two proxies to measure the free cash flow level: 1) operating income minus taxes, interests, and dividends, and then scaled by book assets (Lehn and Poulsen,1989), and 2) EBITDA (earnings before interests, taxes, depreciation, and amortization) scaled by book value of assets. Although these two are popular measures of free cash flow, they are nevertheless noisy proxies for the potential severity of agency conflicts.

I describe the data in Chapter II. I describe the empirical tests and the results in Chapter III, discuss the results in Chapter IV, and conclude in Chapter V.

[4] See Coles, Lemmon, and Meschke (2003) for a recent discussion on the endogeneity between governance quality and firm value. Gillan, Hartzell, and Starks (2003) explore the determinants of governance mechanisms and alternative ways of creating governance indecies.

CHAPTER II

DATA AND A DISCUSSION ON PANEL DATA FIXED EFFECTS

2.1 Data

The main purpose of this paper is to test whether the marginal benefit of governance quality on firm value varies with the potential severity of agency conflicts. Thus, the key variables are the proxies for firm value, governance quality, and the potential severity of agency conflicts.[5]

I use a measure of Tobin's Q as the proxy for firm value.[6] Firm Q's are calculated as the book value of assets plus the market value of equity minus the book value of equity and deferred taxes and then divided by the book value of assets. Each firm's Q is adjusted by its industry median, where the 48 industry classification follows Fama and French (1997).

To measure governance quality, I use the Governance Index "G" constructed by Gompers, Ishii, and Metrick (2003).[7] The level of a firm's G equals the number of corporate-governance provisions the firm has and ranges from 2 to 19 for the sample

[5] I only study the agency conflicts between managers and shareholders. I do not study the agency conflicts between debt holders and shareholders.

[6] Q has been widely used as a measure of firm valuation or management performance. A few examples of these studies include Morck, Shleifer, and Vishny (1988), McConnell and Servaes (1990), Lang, Stulz, and Walkling (1989), and Lang and Stulz (1994). Some other studies have used Q or some close variations of it as a measure of growth opportunities, such as Smith and Watts (1992), Lang, Stulz, and Walkling (1991), and Opler and Titman (1993). These two different uses of Q are not very difficult to reconcile if we believe that firms with better growth opportunities are also valued higher. Yet other studies have used Q or some close variations of it as proxies for other things, such as over or under-investment (Lang and Litzenberger, 1989) and agency costs (Lehn, Netter, and Poulsen, 1990). In the asset pricing literature, book-to-market ratio of equity (close to the inverse of Q) has been used as measures of risk (e.g., Fama and French, 1996) or mispricing (e.g., Lakonishok, Shleifer, and Vishny, 1994). It is beyond the scope of this paper to reconcile all the different uses of Q. However, I do acknowledge that Q is a noisy measure of firm valuation, and we should keep this in mind when interpreting the results.

[7] I thank Andrew Metrick for providing the CRSP permnos associated with the sample firms.

firms. More provisions (higher G) reflect more restricted shareholder rights and lower governance quality. The governance provision data are from the *Corporate Takeover Defenses* published by the Investor Responsibility Research Center (IRRC, 1990, 1993, 1995, 1998, 2000, and 2002). For a year when IRRC has no publication, I use the G from the immediately preceding publication. For example, for 1991 and 1992, I use the G of 1990. This procedure is commonly followed by other studies that use the G Index. The firms covered by IRRC represent over 90% of the market value on NYSE, AMEX, and Nasdaq. Gompers, Ishii, and Metrick acknowledge that "*while this simple index does not accurately reflect the relative impacts of different provisions, it has the advantage of being transparent and easily reproducible* (p.114)." It is important to notice that those governance provisions are intended not only for takeover defenses. Some provisions such as classified board and supermajority voting can be used on other occasions to help the management stay in power. Therefore the level of the G Index indicates how restricted shareholder rights are.

Bebchuk, Cohen, and Ferrell (2004) identify six of the IRRC provisions that have the most impact on firm value and stockholder returns. Four of the six severely limit shareholder voting rights (classified boards, limits to shareholder bylaw amendments, supermajority requirement for mergers, and supermajority requirement for charter amendments). The other two insulate the incumbent management from the discipline of hostile takeovers (poison pills and golden parachutes). With these six provisions, Bebchuk et al. construct an Entrenchment Index "E", ranging from zero to six. Higher

index value reflects greater managerial entrenchment. I use this Entrenchment Index as an alternative measure of governance quality.

To find a proxy for the potential severity of agency conflicts, I search the theories for predictions as to when agency conflicts are expected to be more severe. Jensen (1986) asserts that managers have the tendency to overinvest.[8] When a firm has more free cash flows, more discretionary resources are susceptible to managerial misappropriation, agency conflicts are potentially more severe, and hence governance is more important to firm value.

Therefore, I use the free cash flow level as the proxy for the potential severity of the agency conflicts associated with investment decisions.[9] Jensen defines free cash flow as the "*cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital* (p.323)." The true free cash flow level is not directly observable. We observe a firm's gross level of cash flow from operations and the firm's capital expenditure, but a firm's true free cash flow level is not the difference of the two. By definition, a firm suffering higher agency costs will have higher capital expenditure and a lower cash flow level after capital expenditure. In this situation, a lower cash flow level after capital expenditure signals higher, rather than lower, agency conflicts. Therefore, the observed cash flow level after capital expenditure is not a valid proxy for the true free cash flow level.

---

[8] Stein (2003) surveys the agency costs related to investment decisions. There are numerous studies on managerial empire building. Besides Jensen (1986), examples include Baumol (1959), Marris (1964), Williamson (1964), Donaldson (1984), and Jensen (1993). Shleifer and Vishny (1997) also extensively discussed this topic in their survey.

[9] Dow, Gorton, and Krishnamurthy (2003) use an aggregate free cash flow measure as a state variable while studying how imperfect corporate control affects equilibrium asset prices.

Jensen's free cash flow theory says that when managers have more cash to spend, there is a greater chance that they will spend the cash unwisely. Therefore, all we need is a measure of how many resources are at the managers' disposal, and Lehn and Poulsen (1989) develop a measure that is arguably a good proxy for that. They use operating income minus taxes, interest payments on debt, and dividend payments on equity. I scale this free cash flow measure by the firm's book value of assets and refer to it hereafter as the free cash flow level (FCF). FCF measures how much cash is left for the managers to spend after paying taxes and financial obligations. It is important to emphasize that higher FCF reflects the *potential* severity of managerial overinvestment. Not all firms overinvest when FCF is high, but those with poor governance quality do. Therefore the marginal benefit of governance quality is more pronounced as FCF increases.

As FCF decreases, the potential severity of overinvestment decreases, but the potential severity of managerial expropriation may increase. One reason for this to happen is that if managers extract extra rents through either overinvestment or expropriation, lower FCF makes overinvesting more difficult and therefore may induce a greater propensity to expropriate other shareholders.[10] Another reason is given by Johnson et al. (2000), who develop a model predicting that holding managerial ownership constant, poor investment opportunities exacerbate managerial expropriation. This follows if we assume that a manager can increase his wealth through only two ways:

[10] Agency conflicts of equity manifest themselves mainly through investment decisions and managerial expropriation. Another manifestation is shirking, which can be reasonably treated as being subsumed by the agency conflicts associated with investment decisions.

receive returns from his ownership in the firm by investing in positive NPV projects, or expropriate other shareholders. When investment opportunities are poor, the manager cannot increase his wealth through investing and therefore is more likely to expropriate. However, when investment opportunities abound, the manager is less likely to expropriate because he stands to gain more by investing all available resources in value-enhancing projects, which increase the value of his ownership in the firm. This model does not consider the agency conflicts associated with investment decisions.

Johnson et al. (2000), Mitton (2002), and Lemmon and Lins (2003) study the 1997-1998 East Asian financial crisis and show that countries and firms of lower governance quality lost more value during the crisis. They interpret the evidence as consistent with lower governance quality allows more managerial expropriation in bad times. FCF is a defensible proxy for investment opportunities because lower FCF gives the manager fewer resources to invest and often indicates that the expected return on marginal investment is low.[11] Therefore, I use lower FCF as a proxy for higher potential severity of managerial expropriation.

I use EBITDA (earnings before interests, taxes, depreciation, and amortization scaled by book value of assets) as the alternative proxy for the free cash flow level. Examples of studies that have used EBITDA as a free cash flow measure or as a robustness check include Lang, Stulz, and Walkling (1991), Fenn and Liang (2001), and Palia (2001).

---

[11] On average it is reasonable to expect that higher cash flows from operations reflect higher return on marginal investment. However, this is not always true. For example, the oil industry in the late 1970's and early 1980's faced high average return but low marginal return on investment, as discussed in Jensen (1986).

Following Gompers, Ishii, and Metrick (2003), I include in the Q regressions the following controls variables: the log of assets, the log of firm age measured in months, a dummy variable indicating firms that are incorporated in Delaware, and a dummy variable indicating firms that are members of the S&P500 index. Previous research shows that these variables are likely to affect firm Q. In addition, I include a firm's current and last year sales growth to control for the firm's growth opportunity.

Table 1 provides a summary of the regression variables. Appendix A gives a detailed account on how each variable is constructed. All accounting data are collected from Compustat. I use firm-level fixed effects models to control for unobservable firm heterogeneity that may simultaneously affect both governance quality and firm value. Since a fixed effects model derives its estimation only through within-firm (i.e. time-series) variation, I restrict the sample to firms that have experienced some change in the Governance Index over the sample period. If a firm's G Index is constant over the sample period, the G Index and the firm fixed effects dummy will be perfectly multicollinear. That firm will not contribute to the coefficient estimation but only introduce noise and lower the test power. This data restriction eliminates about 2,000 firm years. I apply the same restriction when using the Entrenchment Index, and it eliminates about 6,000 firm years. The results without this restriction are not qualitatively different although the statistical significance is not as high.

Table 1: A Summary of the Regression Variables. A detailed description of how to construct these variables can be found in Appendix A. The data are from the Investor Responsibility Research Center (IRRC) and Compustat. The sample period is 1990-2002. To be included in the firm-level fixed effects regressions, a firm needs to have had some change in G (or E) over the sample period.

Variables	Definition	N	Mean	Median	Std Dev	Min	Max
Industry-adjusted Q	Industry-median adjusted firm Tobin's Q, which is calculated as the book value of assets plus the market value of equity minus the book value of equity and deferred taxes and then divided by the book value of assets. The market value is calculated at the end of each year, and the book value is calculated at the end of the fiscal year. 48 industries are classified at the end of each year according to Fama and French (1997).	11279	0.350	0.025	1.288	-3.311	29.474
G	The firm-level Governance Index as in Gompers, Ishii, and Metrick (2003). The level of a firm's G equals the number of corporate-governance provisions the firm has. Higher G levels (i.e. more provisions) reflect more restricted shareholder rights and lower governance quality. Firms with dual-class shares are not included in this study.	11279	9.105	9	2.772	2	19
E	The firm-level Entrenchment Index as in Bebchuk, Cohen, and Ferrell (2004). Construction of the E index is limited to only six governance provisions that directly lower shareholder voting power and insulate managers from the discipline of hostile takeovers. Higher E levels (i.e. more provisions) reflect more restricted shareholder rights and lower governance quality. Firms with dual-class shares are not included in this study.	7868	2.005	2	1.289	0	6
FCF	The measurement of undistributed cash flow and is calculated as operating income minus the sum of the following four components: a) total income taxes minus the change in deferred taxes from the previous year to the current year, b) gross interest expenses on debt, c) dividend payments on preferred stocks, and d) dividend payments on common stocks. I scale this free cash flow measure by the firm's book value of assets.	10616	0.070	0.074	0.093	-1.609	0.541
EBITDA	Earnings before interests, taxes, depreciation, and amortization scaled by the firm's book value of assets.	11032	0.133	0.133	0.110	-1.370	0.965
logBV	The log value of a firm's book value of assets, in US$ millions.	11279	7.256	7.110	1.614	2.086	13.908
logAge	The log value of firm age measured in months since the firm's first appearance in Compustat.	11279	5.508	5.799	0.644	2.485	6.223
Delaware Dummy	A dummy variable equals one if the firm is incorporated in Delaware.	11279	0.530	1	0.499	0	1
S&P500 Index Dummy	A dummy variable equals one if the firm is included in the S&P500 Index.	11279	0.344	0	0.475	0	1
Sales Growth	Firm annual sales growth rate.	11279	0.101	0.062	0.464	-1.000	36.191

Table 1 shows that the adjusted firm Q is positively skewed with large extreme values. My model specifications partly account for the potential non-linearity between Q and the G Index, and therefore should reduce the concern that outliers are driving my results. Outliers should be included in the sample unless we have sufficient evidence that they are results of data errors. I have no evidence that the extreme Q values are the results of any systematic data error. Nevertheless, in un-tabulated tests, I winsorize the adjusted-Q at the top 1% and bottom 1% levels. That is, I set all adjusted-Q's below the one percentile to the one percentile value (-1.43) and all the adjusted-Q's above the 99 percentile to the 99 percentile value (5.59). The regression results (not tabulated) are similar to the reported results. In un-tabulated tests, I also winsorize FCF and EBITDA at the top and bottom 1% levels. The results are similar to the reported results.

2.2 A discussion on panel data fixed effects

I use panel data fixed effects models in this study.[12] A fixed effects model controls for unobservable firm heterogeneity. The main motivation of using a fixed effects model is not that the unobservable firm heterogeneity is fixed (i.e. constant) over time, but rather that the unobservable firm heterogeneity may be correlated with the independent variable. If the unobservable firm heterogeneity is correlated with the independent variable but is omitted from the regression, the error term, which by definition contains the omitted firm heterogeneity, will be correlated with the independent variable. This correlation between the error term and the independent variable causes endogeneity and biased coefficient estimate. A fixed effects model

[12] See Baltagi (2002) for a detailed explanation on panel data models.

mitigates this endogeneity problem by creating a dummy variable for each firm. Thus, by extracting the omitted firm heterogeneity from the error term, the error term is no longer correlated with the independent variable, and the coefficient estimate will be unbiased.[13]

The omitted variable bias is a concern when studying the effect of governance on firm value because different firm characteristics may affect firms' choices on their governance structure (Demsetz and Lehn, 1985). Some of the firm characteristics may be unobservable. For example, one firm may have an honest and ethical corporate culture that leads to both higher governance quality and higher firm value.[14] A regression model not controlling for this unobservable firm characteristic will document a positive but spurious correlation between governance quality and firm value.

Another unique feature of a fixed effects model is that it derives its estimation solely from the within-firm (time-series) variation. Therefore, a fixed effects model directly examines how the change in a firm's governance quality affects its firm value, and how this governance effect varies with the firm's potential severity of agency conflicts. Since the ultimate goal of all economic studies is to make some causal inference, and since a causal relationship is essentially a time-series one, a fixed effects model serves this goal well.

However, it is conceivable that governance quality affects firm value not only in the time series but also in the cross-section. A random effects model captures both the

[13] One limitation of this remedy is that if the omitted variable is not fixed but varies over time, the firm dummies will not completely capture the effect of the omitted variables.
[14] Himmelberg, Hubbard, and Palia (1999) discuss other examples of unobservable firm characteristics that may affect both governance quality and firm value, including some superior monitoring technology, the perceived valued of firm intangible assets by the market, and different degrees of market power.

time-series and the cross-sectional variations, and therefore produces more efficient estimates than a fixed effects model does. However, a random effects model assumes that the unobservable firm heterogeneity is uncorrelated with the independent variable and therefore may suffer the potential endogeneity caused by omitted variables. Since I am concerned about the endogeneity caused by omitted variables, I use fixed effects models in this study. Hausman (1978) specification tests for fixed effects or random effects reject the assumption of no endogeneity in my models and therefore validate the use of fixed effects.

CHAPTER III

EMPIRICAL ANALYSIS

I use two proxies for governance quality: the Governance Index "G" and the Entrenchment Index "E." I will first focus on the tests using the Governance Index and then discuss the tests using the Entrenchment Index. Both proxies produce results consistent with the main hypothesis that the effect of governance quality on firm value varies with the potential severity of agency conflicts.

3.1 Using the Governance Index as a proxy for governance quality

Table 2 presents the results using the Governance Index as the proxy for governance quality and the Lehn and Poulsen (1989) FCF measure as the proxy for the potential severity of agency conflicts. Column (1) in Panel A shows that the average marginal benefit of eliminating one corporate governance provision (i.e. lowering a firm's G Index by one) is an increase in firm Q of 2.6 percentage points, significant at the one-percent level.

Examining the control variables we see book size is negatively related to Q, but firm age is positively related to Q. Coefficients on the Delaware incorporation dummy and the S&P500 dummy are not significant. These two variables have little within-firm variation, and a fixed effects model is unlikely to pick up their effects. The current year and the last year sales growth have significant explanatory power for Q. This is expected since Q reflects the expectation for future growth, and high Q firms are

Table 2: Fixed Effects Results – The Governance Index "G" Interacting with Free Cash Flow (FCF). Shown in this table are the panel data fixed effects (firm-level) results by regressing industry-adjusted firm Tobin's Q on firms' Governance Index "G", FCF or dummies indicating the FCF levels, interactions between G and FCF or its dummies, and the control variables. FCF is operating income after taxes, interests, and dividends, scaled by total assets. The control variables include a dummy variable for incorporation in Delaware, a dummy variable indicating whether a firm is included in the S&P500 index, the log of assets in the current year, the log of firm age in the current year measured in months, and firm current year and last year sales growth. A detailed explanation of the regression variables can be found in Table 1 and Appendix A. The data are from the Investor Responsibility Research Center (IRRC) and Compustat. The sample period is 1990-2002. To be included in these firm-level fixed effects regressions, a firm must have some change in G over the sample period. Regression coefficients are shown with White (1980) robust standard errors in parentheses. *, **, and *** indicate significance at the ten-percent, five-percent, and one-percent levels.

Panel A: Governance Index Interacting with Dummies Indicating FCF Levels

TOP1/3 is a dummy equal to one if the firm's FCF is among the top third of all sample firms in that year. Similarly, BOT1/3 is a dummy equal to one if the firm's FCF is among the bottom third of all sample firms in that year. G×TOP1/3 and G×BOT1/3 are the interaction terms between G, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are G and its interaction terms.				
Independent variables:	(1)	(2)	(3)	(4)
G (β_1)	-0.026***	-0.017**	-0.030***	-0.018*
(standard error)	(0.010)	(0.009)	(0.011)	(0.010)
G×TOP1/3 (β_2)		-0.033***		-0.031***
		(0.011)		(0.011)
G×BOT1/3 (β_3)			0.014	0.003
			(0.009)	(0.008)
Control Variables:				
TOP1/3		0.657***		0.622***
		(0.123)		(0.116)
BOT1/3			-0.299***	-0.120
			(0.102)	(0.089)
LogBV	-0.229***	-0.199***	-0.222***	-0.198***
	(0.039)	(0.039)	(0.039)	(0.039)
LogAge	0.306***	0.320***	0.318***	0.326***
	(0.069)	(0.067)	(0.069)	(0.067)
Delaware Incorporation Dummy	-0.022	-0.003	-0.007	0.003
	(0.108)	(0.108)	(0.108)	(0.108)
S&P500 Inclusion Dummy	0.054	0.044	0.059	0.047
	(0.079)	(0.078)	(0.078)	(0.078)
Sales Growth (current year)	0.168**	0.140**	0.157**	0.136**
	(0.078)	(0.068)	(0.074)	(0.066)
Sales Growth (last year)	0.083**	0.066**	0.074**	0.063**
	(0.036)	(0.032)	(0.035)	(0.032)
Prob > F (test for joint significance)	0.000	0.000	0.000	0.000
N of firm years	11279	11279	11279	11279
Prob > F (test that all firm fixed effects are jointly zero)	0.000	0.000	0.000	0.000
Adjusted R^2	0.572	0.581	0.574	0.581
$\beta_1 + \beta_2$		-0.050***		-0.049***
(Prob>F)		(0.000)		(0.000)
$\beta_1 + \beta_3$			-0.016	-0.015
(Prob>F)			(0.105)	(0.139)

Table 2: Continued.

Panel B: Governance Index Interacting with FCF

TOP1/3 and BOT1/3 are dummies indicating a firm's FCF level in the sample and is described in Panel A. G×FCF is the interaction term between G and FCF. G×FCF×TOP1/3 and G×FCF×BOT1/3 are the three-way interaction terms between G, FCF, TOP1/3, and BOT1/3. FCF×TOP1/3 and FCF×BOT1/3 are the interaction terms between FCF, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are G and its interaction terms.				
Independent variables	(1)	(2)	(3)	(4)
G (β_1) (standard error)	-0.013 (0.012)	-0.005 (0.011)	0.002 (0.012)	-0.004 (0.012)
G×FCF (β_2)	-0.221* (0.132)	-0.154 (0.135)	-0.402*** (0.156)	-0.194 (0.151)
G×FCF×TOP1/3 (β_3)		-0.263** (0.118)		-0.202*** (0.079)
G×FCF×BOT1/3 (β_4)			0.171 (0.197)	-0.051 (0.185)
Control Variables:				
FCF	4.318*** (1.294)	2.017 (1.322)	8.720*** (1.629)	4.688*** (1.585)
FCF×TOP1/3		6.174*** (1.240)		4.169*** (0.849)
FCF×BOT1/3			-6.735*** (2.009)	-2.672 (1.897)
LogBV	-0.228*** (0.039)	-0.166*** (0.037)	-0.164*** (0.037)	-0.152*** (0.037)
LogAge	0.398*** (0.068)	0.351*** (0.063)	0.300*** (0.063)	0.310*** (0.062)
Delaware Incorporation Dummy	-0.014 (0.119)	0.024 (0.117)	0.023 (0.116)	0.031 (0.116)
S&P500 Inclusion Dummy	0.138* (0.075)	0.118 (0.073)	0.136* (0.073)	0.124* (0.072)
Sales Growth (current year)	0.078* (0.044)	0.057 (0.037)	0.054 (0.035)	0.051 (0.035)
Sales Growth (last year)	0.048 (0.030)	0.031 (0.024)	0.023 (0.025)	0.024 (0.023)
Prob > F (test for joint significance)	0.000	0.000	0.000	0.000
N of firm years	10616	10616	10616	10616
Prob > F (test that all firm fixed effects are jointly zero)	0.000	0.000	0.000	0.000
Adjusted R^2	0.589	0.605	0.605	0.608
$\beta_2 + \beta_3$ (Prob>F)		-0.417*** (0.003)		-0.396*** (0.012)
$\beta_2 + \beta_4$ (Prob>F)			-0.231 (0.152)	-0.245 (0.129)

often labeled growth firms. Not reported here, I have also used the R&D to total assets ratio as a control variable. The R&D variable is insignificant in the presence of the sales growth variables. Inclusion of the R&D variable also significantly reduces the sample size. Therefore I do not include R&D as a control variable in the regressions.

The regression model of Column (1) assumes that the marginal benefit of improving governance quality (i.e., the –0.026 coefficient estimate) is constant for all firms at all time. However, theories suggest that the marginal benefit of governance should vary with the potential severity of agency conflicts. Governance is more beneficial when the agency conflicts are potentially more severe.

As discussed in the previous section, theories suggest that overinvestment becomes potentially more severe as FCF increases, while managerial expropriation becomes potentially more severe as FCF decreases. This implies a non-linear relationship between FCF and the potential severity of agency conflicts. Figure 1 provides a visual illustration of this potential non-linear relationship.

A simple way to control for this potential non-linearity is to use dummy variables to partition the firm-year observations into different FCF levels. I sort the sample firms annually into FCF thirds and create two dummies: $TOP1/3_{it}$ ($BOT1/3_{it}$) is a dummy variable equal to one if firm *i*'s FCF is among the top (bottom) third of all sample firms in year *t*. I then interact the Governance Index with these two dummies, and the results are in Columns (2) through (4) of Panel A in Table 2.

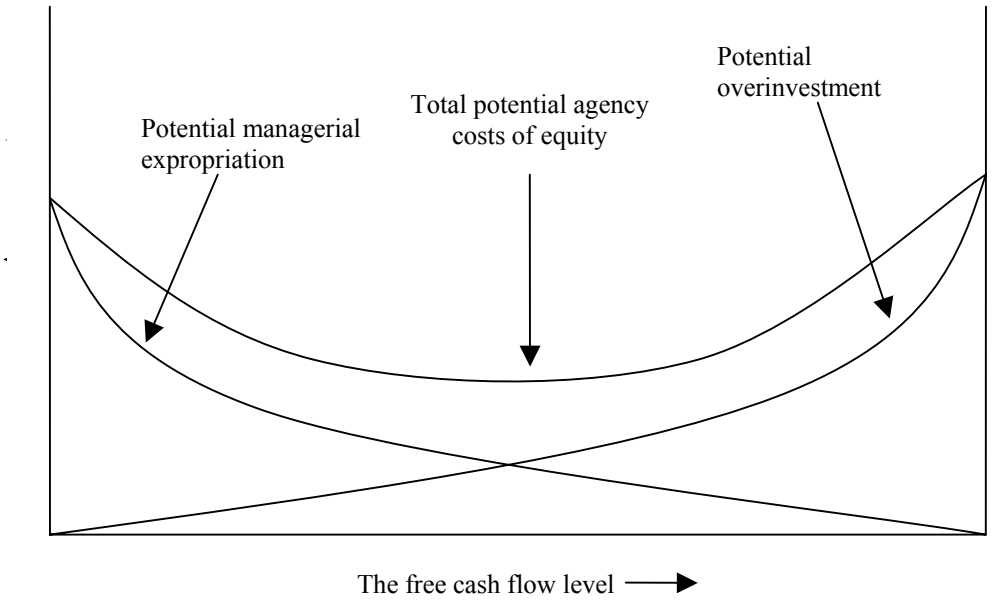

Figure 1: An illustration of the potential non-linearity between the free cash flow level and the potential agency costs. As the free cash flow level decreases, the potential agency costs associated with managerial expropriation increase (Johnson et al., 2000). As the free cash flow level increases, the potential agency costs associated with overinvestment increase (Jensen 1986). The total agency costs may have a U-shaped curve in the free cash flow level.

The results in Column (2) show that when a firm is not in the top third FCF group, the coefficient estimate for G is –0.017. When a firm is in the top third FCF group, the coefficient estimate for G is –0.017 – 0.033 = –0.050, highly significant at the one-percent level, as shown in the second row from the bottom. The difference, –0.033, is significant at the one-percent level, indicating that governance quality affects firm value more when a firm has high FCF than when it has lower FCF. I include TOP1/3 as

a control variable to ensure that the interaction term G×TOP1/3 only captures the interaction effect, not the effect of TOP1/3. The coefficient on the TOP1/3 dummy is large and significant, indicating the importance of including TOP1/3 as a control variable.

Comparing Columns (1) and (2) we can see that the negative correlation between G and Q is more pronounced when a firm has higher FCF. The results are consistent with the hypothesis that potential agency costs are higher and therefore governance is more important when a firm has more cash to invest.

Column (3) shows that when a firm is not in the bottom third FCF group, the coefficient estimate for G is –0.030 and significant. When a firm is in the bottom third FCF group, the coefficient for G is –0.030 + 0.014 = –0.016, with a p-value of 0.105, as shown in the bottom row. The difference of 0.014 is not significant. The results do not indicate that governance quality is more important when a firm's FCF is low, inconsistent with the hypothesis that potential managerial expropriation is more severe and governance is more important when FCF is low.

The regression in Column (4) of Panel A includes both of the interaction terms between G and the FCF dummies. When a firm is in the middle third FCF group, the coefficient on G is –0.018, marginally significant. When a firm is in the top third FCF group, the coefficient on G is –0.018 – 0.031 = –0.049, significant at the one-percent level. When a firm is in the bottom third FCF group, the coefficient on G is –0.018 + 0.003 = –0.015, insignificant. The economic interpretation is that when a firm's FCF is among the top third of all firms, removing one governance provision that restricts

shareholder rights increases the firm's Q by 4.9 percentage points. When a firm is in the bottom third FCF group, changing the Governance Index has no significant impact on firm value.

The results in Panel A of Table 2 give a coherent picture of how the marginal benefit of governance varies with the potential severity of agency conflicts. When the free cash flow level is high, higher good governance quality is more beneficial, and lower governance quality is more harmful.

In Panel B of Table 2, I allow the marginal benefit of the Governance Index to vary with FCF. Column (1) shows that the marginal benefit of the Governance Index on firm value is $\partial Q/\partial G = -0.013 - 0.221 \times FCF$. The part of this marginal benefit that does not vary with FCF is –0.013 and insignificant. The part that varies with FCF is $-0.221 \times FCF$, where –0.221 is significant at the ten-percent level. The –0.221 coefficient means that as the cash flow level increases, the adverse effect of higher Governance Index (i.e. lower governance quality) becomes incrementally greater. This is consistent with the hypothesis that higher FCF increases the potential severity of overinvestment, but inconsistent with the hypothesis that lower FCF increases the potential severity of managerial expropriation.

With a mean value of 0.070 for FCF, the marginal effect of the Governance Index is $-0.013 - 0.221 \times 0.070 = -0.028$. That is, removing one governance provision will increase a firm's Q by 2.8 percentage points. When FCF increases by one standard deviation of 0.093, the marginal effect of the Governance Index changes to –0.049. Now, removing one governance provision increases a firm's Q by 4.9 percentage points.

The higher the free cash flow level is, the more beneficial it is to grant shareholders more rights. Because the correlation coefficient between FCF and the G Index is only 0.037, the results are not likely to be affected by high correlation between FCF and G.

Again, to control for the potential non-linearity between the potential severity of agency conflicts and the free cash flow level (Figure 1), I use dummies to partition my sample firms into three cash flow groups, and the results are in Columns (2) through (4) in Panel B of Table 2. Column (2) shows that for the top third FCF firms, the coefficient for the interaction term G×FCF is –0.154 – 0.263 = –0.417, which is significant and different from –0.154. The insignificant –0.154 coefficient on the interaction term is for firms not in the top third FCF group. This result indicates that for a high-FCF firm, as the free cash flow level increases, the marginal benefit of higher governance quality becomes even greater.

Column (3) in Panel B shows that for firms in the bottom third FCF group, the coefficient for the interaction term G×FCF is –0.402 + 0.171 = –0.231, quite large but insignificant nevertheless.

The regression model in Column (4) includes both of the interaction terms between the G, FCF, and the FCF dummies. When a firm is in the middle third FCF group, the part of the marginal effect of the G Index that varies with FCF is –0.194, insignificant. When a firm is in the top third FCF group, the part of the marginal effect of G that varies with FCF is –0.194 –0.202 = –0.396, highly significant. When a firm is in the bottom third FCF group, the part of the marginal benefit of G that varies with FCF

is –0.194 – 0.051 = –0.245 (p-value = 0.121). The part of the marginal effect of the G Index that does not vary with FCF is close to zero (–0.004).

The results in Panel B of Table 2 show that the marginal benefit of the Governance Index on firm Q varies significantly with a firm's free cash flow level. The part of this marginal benefit that does not vary with the free cash flow level is close to zero. As the free cash flow level increases, higher governance quality becomes incrementally more value-enhancing, and lower governance quality becomes incrementally more value-destroying. That is, as a firm's cash flow level increases, higher Governance Index will *more adversely* affect its Q, and this effect is more pronounced for high cash flow firms. This is consistent with higher free cash flow level increases the potential severity of agency conflicts.

The regressions in Table 3 use EBITDA as the alternative proxy for the free cash flow level and have the same specifications as those in Table 2. The results in Table 3 are qualitatively close to the results in Table 2.

3.2 Using the Entrenchment Index as a proxy for governance quality

Bebchuk, Cohen, and Ferrell (2004) provide theoretical argument and empirical evidence that not all the governance provisions are equally damaging to firm value. They identify six provisions that most effectively restrict shareholder rights and lower governance quality. Four of the six are "constitutional" provisions that limit shareholders' voting rights: staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, and supermajority requirements for charter

Table 3: Fixed Effects Results – The Governance Index "G" Interacting with EBITDA. Shown in this table are the panel data fixed effects (firm-level) results by regressing industry-adjusted firm Tobin's Q on firms' Governance Index "G", EBITDA or dummies indicating the EBITDA levels, interactions between G and EBITDA or its dummies, and the control variables. EBITDA is operating income before interest, taxes, depreciation, and amortization scaled by total assets. The control variables include a dummy variable for incorporation in Delaware, a dummy variable indicating whether a firm is included in the S&P500 index, the log of assets in the current year, the log of firm age in the current year measured in months, and firm current year and last year sales growth. A detailed explanation of the regression variables can be found in Table 1 and Appendix A. The data are from the Investor Responsibility Research Center (IRRC) and Compustat. The sample period is 1990-2002. To be included in these firm-level fixed effects regressions, a firm must have some change in G over the sample period. Regression coefficients are shown with White (1980) robust standard errors in parentheses. *, **, and *** indicate significance at the ten-percent, five-percent, and one-percent levels.

Panel A: Governance Index Interacting with Dummies Indicating EBITDA Levels

TOP1/3 is a dummy equal to one if the firm's EBITDA is among the top third of all sample firms in that year. Similarly, BOT1/3 is a dummy equal to one if the firm's EBITDA is among the bottom third of all sample firms in that year. G×TOP1/3 and G×BOT1/3 are the interaction terms between G, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are G and its interaction terms.			
Independent variables:	(1)	(2)	(3)
G (β_1) (standard error)	-0.011 (0.009)	-0.035*** (0.010)	-0.015* (0.009)
G×TOP1/3 (β_2)	-0.051*** (0.012)		-0.047*** (0.011)
G×BOT1/3 (β_3)		0.027 (0.010)	0.009 (0.008)
Control Variables:			
TOP1/3	1.023*** (0.135)		0.941*** (0.124)
BOT1/3		-0.531*** (0.109)	-0.243*** (0.089)
LogBV	-0.166*** (0.038)	-0.201*** (0.039)	-0.156*** (0.038)
LogAge	0.279*** (0.066)	0.276*** (0.068)	0.263*** (0.066)
Delaware Incorporation Dummy	0.022 (0.106)	0.007 (0.108)	0.034 (0.106)
S&P500 Inclusion Dummy	0.026 (0.076)	0.058 (0.078)	0.031 (0.075)
Sales Growth (current year)	0.127** (0.063)	0.152** (0.071)	0.120** (0.060)
Sales Growth (last year)	0.051* (0.028)	0.073** (0.032)	0.048* (0.027)
Prob > F (test for joint significance)	0.000	0.000	0.000
N of firm years	11279	11279	11279
Prob > F (test that all firm fixed effects are jointly zero)	0.000	0.000	0.000
Adjusted R^2	0.591	0.577	0.593
$\beta_1 + \beta_2$ (Prob>F)	-0.062*** (0.000)		-0.062*** (0.000)
$\beta_1 + \beta_3$ (Prob>F)		-0.008 (0.489)	-0.006 (0.575)

Table 3: Continued.

Panel B: Governance Index Interacting with EBITDA

TOP1/3 and BOT1/3 are dummies indicating a firm's EBITDA level in the sample and is described in Panel A. G×EBITDA is the interaction term between G and EBITDA. G×EBITDA×TOP1/3 and G×EBITDA×BOT1/3 are the three-way interaction terms between G, EBITDA, TOP1/3, and BOT1/3. EBITDA×TOP1/3 and EBITDA×BOT1/3 are the interaction terms between EBITDA, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are G and its interaction terms.				
Independent variables	(1)	(2)	(3)	(4)
G (β_1) (standard error)	-0.007 (0.018)	-0.008 (0.018)	0.006 (0.017)	-0.000 (0.017)
G×EBITDA (β_2)	-0.134 (0.121)	-0.026 (0.139)	-0.229** (0.113)	-0.106 (0.122)
G×EBITDA×TOP1/3 (β_3)		-0.185** (0.074)		-0.128** (0.057)
G×EBITDA×BOT1/3 (β_4)			0.175 (0.129)	0.008 (0.112)
Control Variables:				
EBITDA	5.367*** (1.195)	2.493* (1.332)	6.875*** (1.126)	3.928*** (1.197)
EBITDA×TOP1/3		4.200*** (0.769)		3.218*** (0.598)
EBITDA×BOT1/3			-4.415*** (1.250)	-1.782* (1.087)
LogBV	-0.180*** (0.039)	-0.124*** (0.037)	-0.121*** (0.037)	-0.100*** (0.037)
LogAge	0.424*** (0.069)	0.346*** (0.065)	0.303*** (0.065)	0.287*** (0.065)
Delaware Incorporation Dummy	0.048 (0.108)	0.070 (0.107)	0.076 (0.108)	0.081 (0.106)
S&P500 Inclusion Dummy	0.029 (0.075)	0.005 (0.074)	0.022 (0.074)	0.005 (0.073)
Sales Growth (current year)	0.081* (0.045)	0.072* (0.043)	0.074* (0.042)	0.070* (0.042)
Sales Growth (last year)	0.040 (0.029)	0.023 (0.024)	0.027 (0.024)	0.018 (0.023)
Prob > F (test for joint significance)	0.000	0.000	0.000	0.000
N of firm years	11032	11032	11032	11032
Prob > F (test that all firm fixed effects are jointly zero)	0.000	0.000	0.000	0.000
Adjusted R^2	0.603	0.615	0.611	0.618
$\beta_2 + \beta_3$ (Prob>F)		-0.211* (0.065)		-0.234** (0.037)
$\beta_2 + \beta_4$ (Prob>F)			-0.054 (0.757)	-0.098 (0.582)

amendments. The other two are anti-takeover provisions that protect incumbent managers from the discipline of hostile takeovers: poison pills and golden parachutes. Using these six provisions, Bebchuk et al. construct the Entrenchment Index ranging from zero to six. The higher the Entrenchment Index, the lower the governance quality. They show that the previously documented relationship between the Governance Index and firm value or stock returns by Gompers, Ishii, and Metrick (2003) is mainly driven by the six governance provisions that constitute the Entrenchment Index.

I use the Entrenchment Index "E" as an alternative proxy for governance quality and perform the same tests as those in Tables 2 and 3. The results are in Tables 4 and 5 and are consistent with the results using the Governance Index. Similar to the fixed effects regressions using the Governance Index, I require a firm to have some change in the Entrenchment Index over time for it to be included in the fixed effects regressions. This requirement results in a sample size of over 7,000 firm years.

Table 4 reports the results using FCF as the proxy for the free cash flow level. Column (1) in Panel A shows that as the Entrenchment Index decreases by one, firm Q on average increases by 6.4 percentage points. This is greater than the 2.6-percentage-point coefficient observed in Panel A of Table 2 for the Governance Index. Columns (2) through (4) show that the coefficients on the interaction terms are not significant although the ones for E×TOP1/3 are quiet large. For example, in Column (4), the difference in the marginal effect of the E Index between the top third FCF firms and the middle third FCF firms is –0.040, not statistically significant. However, the marginal

Table 4: Fixed Effects Results – The Entrenchment Index "E" Interacting with Free Cash Flow (FCF). Shown in this table are the panel data fixed effects (firm-level) results by regressing industry-adjusted firm Tobin's Q on firms' Entrenchment Index "E", FCF or dummies indicating the FCF levels, interactions between E and FCF or its dummies, and the control variables. FCF is operating income after taxes, interests, and dividends, scaled by total assets. The control variables include a dummy variable for incorporation in Delaware, a dummy variable indicating whether a firm is included in the S&P500 index, the log of assets in the current year, the log of firm age in the current year measured in months, and firm current year and last year sales growth. A detailed explanation of the regression variables can be found in Table 1 and Appendix A. The data are from the Investor Responsibility Research Center (IRRC) and Compustat. The sample period is 1990-2002. To be included in these firm-level fixed effects regressions, a firm must have some change in E over the sample period. Regression coefficients are shown with White (1980) robust standard errors in parentheses. *, **, and *** indicate significance at the ten-percent, five-percent, and one-percent levels.

Panel A: Entrenchment Index Interacting with Dummies Indicating FCF Levels

TOP1/3 is a dummy equal to one if the firm's FCF is among the top third of all sample firms in that year. Similarly, BOT1/3 is a dummy equal to one if the firm's FCF is among the bottom third of all sample firms in that year. E×TOP1/3 and E×BOT1/3 are the interaction terms between E, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are E and its interaction terms.				
Independent variables:	(1)	(2)	(3)	(4)
E (β_1)	-0.064***	-0.056***	-0.071***	-0.059***
(standard error)	(0.018)	(0.009)	(0.021)	(0.018)
E×TOP1/3 (β_2)		-0.044		-0.040
		(0.027)		(0.027)
E×BOT1/3 (β_3)			0.024	0.011
			(0.019)	(0.016)
Control Variables:				
TOP1/3		0.454***		0.425***
		(0.080)		(0.076)
BOT1/3			-0.203***	-0.097**
			(0.054)	(0.046)
LogBV	-0.272***	-0.236***	-0.266***	-0.234***
	(0.048)	(0.048)	(0.048)	(0.048)
LogAge	0.362***	0.362***	0.369***	0.365***
	(0.082)	(0.081)	(0.082)	(0.081)
Delaware Incorporation Dummy	0.104	0.110	0.117	0.116
	(0.121)	(0.120)	(0.121)	(0.120)
S&P500 Inclusion Dummy	0.098	0.073	0.101	0.076
	(0.091)	(0.090)	(0.090)	(0.090)
Sales Growth (current year)	0.359***	0.306***	0.336***	0.298***
	(0.059)	(0.060)	(0.060)	(0.060)
Sales Growth (last year)	0.137**	0.111**	0.126**	0.108*
	(0.057)	(0.056)	(0.057)	(0.056)
Prob > F (test for joint significance)	0.000	0.000	0.000	0.000
N of firm years	7868	7868	7868	7868
Prob > F (test that all firm fixed effects are jointly zero)	0.000	0.000	0.000	0.000
Adjusted R^2	0.548	0.558	0.550	0.558
$\beta_1 + \beta_2$		-0.010***		-0.099***
(Prob>F)		(0.002)		(0.003)
$\beta_1 + \beta_3$			-0.047**	-0.048***
(Prob>F)			(0.016)	(0.010)

Table 4: Continued.

Panel B: Entrenchment Index Interacting with FCF

TOP1/3 and BOT1/3 are dummies indicating a firm's FCF level in the sample and is described in Panel A. E×FCF is the interaction term between E and FCF. E×FCF×TOP1/3 and E×FCF×BOT1/3 are the three-way interaction terms between E, FCF, TOP1/3, and BOT1/3. FCF×TOP1/3 and FCF×BOT1/3 are the interaction terms between FCF, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are E and its interaction terms.				
Independent variables	(1)	(2)	(3)	(4)
E (β_1) (standard error)	-0.014 (0.026)	-0.022 (0.021)	-0.007 (0.023)	-0.016 (0.024)
E×FCF (β_2)	-0.698** (0.289)	-0.404* (0.212)	-0.762*** (0.298)	-0.533* (0.285)
E×FCF×TOP1/3 (β_3)		-0.367 (0.245)		-0.225 (0.211)
E×FCF×BOT1/3 (β_4)			0.440 (0.311)	0.216 (0.284)
Control Variables:				
FCF	3.521*** (0.813)	1.277** (0.561)	6.258*** (0.882)	3.594*** (0.837)
FCF×TOP1/3		4.534*** (0.674)		2.909*** (0.567)
FCF×BOT1/3			-5.695*** (0.862)	-3.148*** (0.777)
LogBV	-0.283*** (0.049)	-0.212*** (0.048)	-0.215*** (0.047)	-0.199*** (0.048)
LogAge	0.476*** (0.084)	0.407*** (0.079)	0.354*** (0.078)	0.362*** (0.078)
Delaware Incorporation Dummy	0.133 (0.124)	0.159 (0.120)	0.167 (0.120)	0.169 (0.120)
S&P500 Inclusion Dummy	0.165* (0.087)	0.131 (0.085)	0.152* (0.085)	0.136 (0.085)
Sales Growth (current year)	0.212*** (0.066)	0.166** (0.066)	0.151** (0.067)	0.148** (0.068)
Sales Growth (last year)	0.084 (0.054)	0.060 (0.052)	0.051 (0.051)	0.050 (0.051)
Prob > F (test for joint significance)	0.000	0.000	0.000	0.000
N of firm years	7390	7390	7390	7390
Prob > F (test that all firm fixed effects are jointly zero)	0.000	0.000	0.000	0.000
Adjusted R^2	0.557	0.574	0.573	0.577
$\beta_2 + \beta_3$ (Prob>F)		-0.771*** (0.005)		-0.758*** (0.012)
$\beta_2 + \beta_4$ (Prob>F)			-0.322 (0.106)	-0.317* (0.102)

effect of the E Index for the top third FCF firms is –0.059 – 0.040 = –0.099, highly significant. The low significance of the coefficients for the interaction terms is likely caused by the smaller sample size and hence lower test power.

Panel B of Table 4 shows the results of allowing the marginal benefit of the E Index to vary with FCF. The coefficients for the interaction term between E and FCF are negative, and more so for higher FCF firms. Consistent with the results in previous tables, this indicates that as FCF increases, the value of better governance becomes even greater.

Table 5 shows the results using EBITDA as the free cash flow level proxy. The evidence is consistent with what we have seen so far.

3.3 Alternative estimation methods

The fixed effects results show that the marginal benefit of good governance increases with the free cash flow level. Next, I examine whether these results hold up in other regression specifications. As mentioned earlier, the Hausman (1978) specification test indicates that the endogeneity caused by omitted firm heterogeneity is present and therefore validates the use of fixed effects models. However, even though the fixed effects estimation is unbiased, it is not the most efficient. Specifically, the fixed effects estimation is based only on the within firm (i.e. time-series) variation and entirely ignores the cross-sectional variation. In addition, the large number of firm dummies included in a fixed effects model significantly reduces the degrees of freedom.

A Fama-MacBeth (1973) regression picks up the cross-sectional variation. A

Table 5: Fixed Effects Results – The Entrenchment Index "E" Interacting with EBITDA. Shown in this table are the panel data fixed effects (firm-level) results by regressing industry-adjusted firm Tobin's Q on firms' Entrenchment Index "E", EBITDA or dummies indicating the EBITDA levels, interactions between E and EBITDA or its dummies, and the control variables. EBITDA is operating income before interest, taxes, depreciation, and amortization scaled by total assets. The control variables include a dummy variable for incorporation in Delaware, a dummy variable indicating whether a firm is included in the S&P500 index, the log of assets in the current year, the log of firm age in the current year measured in months, and firm current year and last year sales growth. A detailed explanation of the regression variables can be found in Table 1 and Appendix A. The data are from Investor Responsibility Research Center (IRRC) and Compustat. The sample period is 1990-2002. To be included in these firm-level fixed effects regressions, a firm must have some change in E over the sample period. Regression coefficients are shown with White (1980) robust standard errors in parentheses. *, **, and *** indicate significance at the ten-percent, five-percent, and one-percent levels.

Panel A: Entrenchment Index Interacting with Dummies Indicating EBITDA Levels

TOP1/3 is a dummy equal to one if the firm's EBITDA is among the top third of all sample firms in that year. Similarly, BOT1/3 is a dummy equal to one if the firm's EBITDA is among the bottom third of all sample firms in that year. E×TOP1/3 and E×BOT1/3 are the interaction terms between E, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are E and its interaction terms.			
Independent variables:	(1)	(2)	(3)
E (β_1)	-0.053***	-0.062***	-0.041***
(standard error)	(0.019)	(0.018)	(0.016)
E×TOP1/3 (β_2)	-0.061**		-0.067***
	(0.027)		(0.025)
E×BOT1/3 (β_3)		0.001	-0.023
		(0.023)	(0.020)
Control Variables:			
TOP1/3	0.664***		0.631***
	(0.081)		(0.075)
BOT1/3		-0.275***	-0.115**
		(0.063)	(0.054)
LogBV	-0.199***	-0.240***	-0.186***
	(0.048)	(0.049)	(0.049)
LogAge	0.310***	0.317***	0.287***
	(0.079)	(0.081)	(0.079)
Delaware Incorporation Dummy	0.146	0.130	0.155
	(0.120)	(0.120)	(0.120)
S&P500 Inclusion Dummy	0.064	0.095	0.066
	(0.088)	(0.090)	(0.088)
Sales Growth (current year)	0.282***	0.326***	0.269***
	(0.059)	(0.059)	(0.059)
Sales Growth (last year)	0.080	0.110**	0.069
	(0.055)	(0.056)	(0.055)
Prob > F (test for joint significance)	0.000	0.000	0.000
N of firm years	7868	7868	7868
Prob > F (test that all firm fixed effects are jointly zero)	0.000	0.000	0.000
Adjusted R^2	0.567	0.554	0.569
$\beta_1 + \beta_2$	-0.114***		-0.108***
(Prob>F)	(0.000)		(0.000)
$\beta_1 + \beta_3$		-0.061**	-0.064**
(Prob>F)		(0.021)	(0.016)

Table 5: Continued.

Panel B: Entrenchment Index Interacting with EBITDA

TOP1/3 and BOT1/3 are dummies indicating a firm's EBITDA level in the sample and is described in Panel A. E×EBITDA is the interaction term between E and EBITDA. E×EBITDA×TOP1/3 and E×EBITDA×BOT1/3 are the three-way interaction terms between E, EBITDA, TOP1/3, and BOT1/3. EBITDA×TOP1/3 and EBITDA×BOT1/3 are the interaction terms between EBITDA, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are E and its interaction terms.				
Independent variables	(1)	(2)	(3)	(4)
E (β_1) (standard error)	0.017 (0.040)	-0.008 (0.040)	0.005 (0.037)	-0.018 (0.038)
E×EBITDA (β_2)	-0.585** (0.266)	-0.383 (0.317)	-0.448* (0.237)	-0.163 (0.260)
E×EBITDA×TOP1/3 (β_3)		-0.128 (0.182)		-0.265** (0.136)
E×EBITDA×BOT1/3 (β_4)			-0.251 (0.295)	-0.405 (0.250)
Control Variables:				
EBITDA	5.336*** (0.692)	3.104*** (0.744)	5.602*** (0.670)	3.296*** (0.689)
EBITDA×TOP1/3		2.652*** (0.428)		2.523*** (0.360)
EBITDA×BOT1/3			-1.963*** (0.657)	-0.633 (0.564)
LogBV	-0.206*** (0.048)	-0.147*** (0.048)	-0.147*** (0.048)	-0.123*** (0.048)
LogAge	0.449*** (0.084)	0.362*** (0.080)	0.316*** (0.082)	0.297*** (0.081)
Delaware Incorporation Dummy	0.220* (0.119)	0.234** (0.117)	0.243** (0.116)	0.244** (0.116)
S&P500 Inclusion Dummy	0.062 (0.087)	0.038 (0.086)	0.046 (0.086)	0.034 (0.086)
Sales Growth (current year)	0.165*** (0.064)	0.157*** (0.064)	0.158*** (0.065)	0.154** (0.065)
Sales Growth (last year)	0.036 (0.060)	0.014 (0.057)	0.015 (0.056)	0.005 (0.055)
Prob > F (test for joint significance)	0.000	0.000	0.000	0.000
N of firm years	7693	7693	7693	7693
Prob > F (test that all firm fixed effects are jointly zero)	0.000	0.000	0.000	0.000
Adjusted R^2	0.582	0.593	0.589	0.595
$\beta_2 + \beta_3$ (Prob>F)		-0.511** (0.035)		-0.428* (0.067)
$\beta_2 + \beta_4$ (Prob>F)			-0.699* (0.076)	-0.670 (0.148)

random effects regression picks up both the time-series and the cross-sectional variations while modeling the error terms differently for each firm. Although these two estimation methods cannot control for unobservable firm heterogeneity and therefore will produce biased estimates, both of them may produce more efficient estimation. These two specifications are also often used in governance studies. It is informative to see how sensitive my results are to different estimation methods.

Appendix B (Tables A1 and A2) describes the random effects and Fama-MacBeth regressions results. For these regressions, I relax the data requirement for the fixed effects regressions that a firm needs to have some time-series change in the Governance Index or the Entrenchment Index. The results are easy to summarize: the results that we observe in Tables 2 through 5 persist.

CHAPTER IV

DISCUSSION

I present evidence that high governance quality is more valuable as the free cash flow level increase. This is consistent with the hypothesis that the agency conflicts related to investment decisions become potentially more severe as the free cash flow level increases. This result is expected because financial theories always suggest that firm value is created mainly through investing in positive NPV projects. Therefore the most important decisions that managers make are investment decisions, and the agency conflicts in investment decisions can be the most damaging to firm value. Previous literature documents persuasive evidence that managers are reluctant to return free cash flow to investors and are prone to investing in empire-building or entrenching projects (e.g., Jensen, 1986). Gompers, Ishii, and Metrick (2003) find that firms with higher G Index (lower governance quality) have higher capital expenditure and make more acquisitions. Harford, Mansi, Maxwell (2004) show that firms with higher G Index spend their cash more quickly, mainly on acquisitions. When the free cash flow level is high, managers have greater opportunities to destroy firm value through non-value-maximizing projects. Governance mechanisms can increase firm value the most by solving the agency conflicts related to investment decisions.

My results are inconsistent with the hypothesis that as cash flow level decreases, managerial expropriation increases, and governance quality becomes more important to firm value. One possible explanation is that excessive managerial expropriation happens only when the cash flow level is extremely low, and my sorting into thirds cannot

capture this extreme situation. In un-tabulated results, I also sort firms into free cash flow quintiles, and the results do not change. However, we may still need extreme crisis for the managerial expropriation be empirically observable. Another possible explanation is that my sample includes only U.S. firms. The U.S. has stronger legal protection for shareholders, which makes managerial expropriation a less severe problem in the U.S. (e.g. Durnev and Kim, 2004). Overall, the results suggest that the investors of the large sample of U.S. firms in this study have been more concerned about overinvestment than managerial expropriation. This finding can be illustrated by Figure 2.

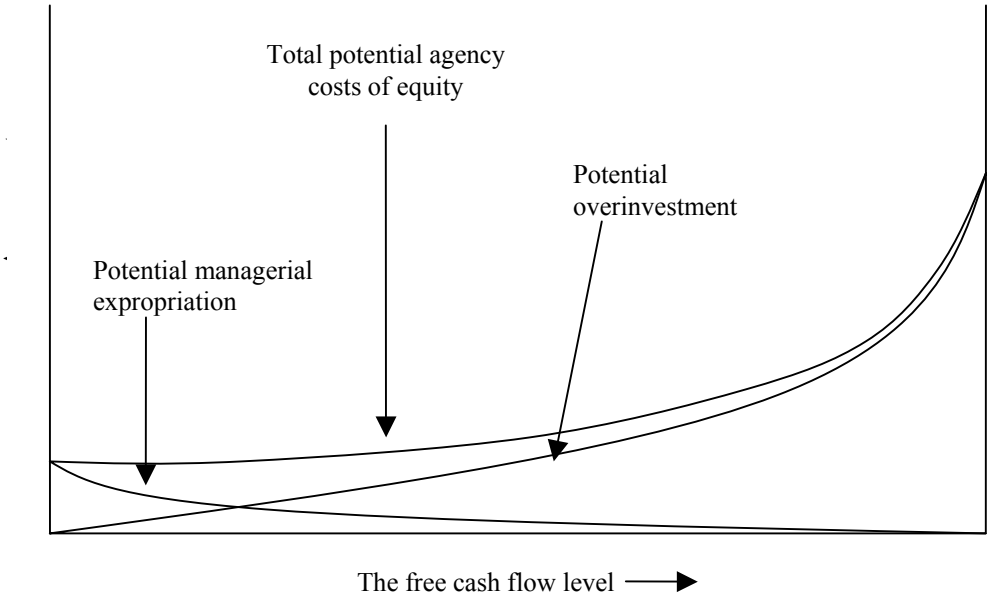

Figure 2: An illustration of the actual non-linearity between the free cash flow level and the potential agency costs. The results of this study show that for the large sample of U.S. firms, the potential agency costs associated with overinvestment are greater than those associated with managerial expropriation.

Certain characteristics of the Governance and the Entrenchment Indexes and the fixed effects specification make the results of this study more interesting and warrant some discussion. The Governance and Entrenchment Indexes change slowly over time. Between any two publication years of the *Corporate Takeover Defenses*, 58% of the sample firms do not experience a change in their Governance Index, and 76% do not experience a change in their Entrenchment Index. As discussed earlier, a fixed effects regression derives its estimation solely from the within-firm (time-series) variation. When we regress firm Q on the Governance Index using a fixed effects model, the coefficient on the Governance Index may be insignificant simply because there is little time-series variation in the Governance Index. That is, the time-invariant nature of the Governance Index and the Entrenchment Index makes a fixed effects model a low-power test in detecting any relationship between firm value and the Governance Index or the Entrenchment Index.[15] The very fact that we obtain significant results with fixed effects models makes the results more convincing: even small changes in the Governance Index or the Entrenchment Index are related with changes in firm value that are significant enough to be detected. Along with the benefit of a fixed effects model in controlling for unobservable firm heterogeneity and mitigating the related endogeneity, we can be more confident in interpreting the results.

[15] Zhou (2001) critiques the fixed effects approach by Himmelberg, Hubbard, and Palia (1999) in studying managerial ownership and firm value. Zhou points out that managerial ownership changes slowly within firm, and a fixed effect model has low power to detect any relationship between ownership and firm value.

CHAPTER V

CONCLUSION

Theories suggest that the marginal benefit of governance quality varies with the potential severity of agency conflicts. However, empirical governance studies often do not control for the potential severity of agency conflicts. This oversight leads to low-power tests and may have partly contributed to the lack of direct empirical evidence that better governance increases firm value, even though this is a clear prediction of governance theories and is supported by numerous event studies.

I allow the marginal benefit of governance to vary with the free cash flow level, a proxy for the potential severity of agency conflicts. The results show that the marginal benefit of governance varies significantly with the free cash flow level. As the free cash flow level increases, higher governance quality becomes incrementally more value-enhancing, and lower governance quality becomes incrementally more value-destroying. This is consistent with the hypothesis that higher governance quality increases firm value by constraining the agency conflicts in investment decisions (Jensen, 1986). It is also consistent with previous evidence that firms of lower governance quality have higher capital expenditure and make more acquisitions (e.g., Gompers, Ishii, and Metrick, 2003; Harford, Mansi, Maxwell, 2004).

When examining the marginal benefit of a governance mechanism, researchers need to control for the potential severity of agency conflicts. Future research can use the empirical models of this paper to explore the relationship between firm value and other governance variables. Governance reformers can direct their efforts to first resolve the

agency conflicts in investment decisions. Investors should be more concerned with governance quality when a firm is performing well and has a high free cash flow level. Public outcry of poor governance may be the loudest when a firm's performance turns south, but good governance can potentially create more value when a firm is performing well and generating substantial cash flows.

REFERENCES

Agrawal, A., Knoeber, C.R., 1996. Firm performance and mechanisms to control agency problems between managers and shareholders. Journal of Financial and Quantitative Analysis 31, 377-394.

Baltagi, B.H., 2002. Econometric Analysis of Panel Data. John Wiley & Sons, New York, New York.

Baumol, W., 1959. Business Behavior, Value, and Growth. Macmillan, New York, New York.

Bebchuk, L., Cohen, A., Ferrell, A., 2004. What matters in corporate governance? Unpublished working paper, Harvard Law School.

Bhagat, S., Black,B.S., 2002. The non-correlation between board independence and long-term performance. Journal of Corporation Law 27, 231-273.

Borokovich, K.A., Parrino, R., Trapani, T., 1996. Outside directors and CEO selection. Journal of Financial and Quantitative Analysis 31, 337-355.

Byrd, J.W., Hickman, K.A., 1992. Do outside directors monitor managers? Evidence from tender offer bids. Journal of Financial Economics 32, 195-221.

Chi, J.D., 2004. Understanding the endogeneity between firm value and shareholder rights. Unpublished working paper, Texas A&M University.

Coles, J.L., Lemmon, M.L., Meschke, J.F., 2003. Structural models and endogeneity in corporate finance: The link between managerial ownership and corporate finance. Unpublished working paper, Arizona State University.

Demsetz, H., Lehn, K., 1985. The structure of corporate ownership: Causes and consequences. Journal of Political Economy 93, 1155-1177.

Donaldson, G., 1984. Managing Corporate Wealth. Praeger, New York, New York.

Dow, J., Gorton, G., Krishnamurthy, A., 2003. Equilibrium asset prices under imperfect corporate control. NBER Working Paper No. 9758.

Durnev, A., Kim, E.H., 2004. To steal or not to steal: Firm attributes, legal environment, and valuation. The Journal of Finance, forthcoming.

Fama, E.F., French, K.R., 1996. Multifactor explanation of asset pricing anomalies. The Journal of Finance 51, 55-84.

Fama, E.F., French, K.R., 1997. Industry costs of equity. Journal of Financial Economics 43, 153-194.

Fama, E.F., MacBeth, J.D., 1973. Risk, return, and equilibrium: Empirical tests. Journal of Political Economy 71, 607-636.

Fenn, G.W., Liang, N., 2001. Corporate payout policy and managerial stock incentives. Journal of Financial Economics 60, 45-72.

Gillan, S.L., Hartzell, J.C., Starks, L.T., 2003. Explaining Corporate Governance: Boards, Bylaws, and Charter Provisions. Weinberg Center for Corporate Governance Working Paper No. 2003-03.

Gompers, P.A., Ishii, J.L., Metrick, A., 2003. Corporate governance and equity prices. The Quarterly Journal of Economics 118, 107-155.

Greene, W.H., 2000. Econometric Analysis, Fourth Edition. Prentice-Hall, Upper Saddle River, New Jersey.

Harford, J., Mansi, S.A., Maxwell, W.F., 2004. Corporate governance and firm cash holdings. Unpublished working paper, The University of Washington.

Harvey, C.R., Lins, K.V., Roper, A.H., 2004. The effect of capital structure when expected agency costs are extreme. Journal of Financial Economics 74, 3-30.

Hausman, J.A., 1978. Specification tests in econometrics. Econometrica 46, 1251-1271.

Hermalin, B.E., Weisbach, M.S., 2003. Boards of directors as an endogenously determined institution: A survey of the economic literature. Economic Policy Review 9, 7-26.

Himmelberg, C.P., Hubbard, R.G., Palia, D., 1999. Understanding the determinants of managerial ownership and the link between ownership and performance. Journal of Financial Economics 53, 353-384.

Huson, M., Parrino, R., Starks, L.T., 2001. Internal monitoring and CEO turnover: A long-term perspective. The Journal of Finance 56, 2265-2297.

Investor Responsibility Research Center (IRRC), 1990, 1993, 1995, 1998, 2000, 2002. Corporate Takeover Defenses. Investor Responsibility Research Center, Washington, D.C.

Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance, and takeovers. American Economic Review 76, 323-329.

Jensen, M.C., 1993. The modern industrial revolution, exit, and the failure of internal control systems. The Journal of Finance 48, 831-880.

Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics 3, 305-360.

Johnson, S., Boone, P., Breach, A., Friedman, E., 2000. Corporate governance in the Asian financial crisis. Journal of Financial Economics 58, 141-186.

Lakonishok, J., Shleifer, A., Vishny, R.W., 1994. Contrarian investment, extrapolation, and risk. The Journal of Finance 49, 1541-1578.

Lang, L., Litzenberger, R.H., 1989. Dividend announcements: Cash flow signaling vs. free cash flow hypothesis? Journal of Financial Economics 24, 181-191.

Lang, L., Stulz, R.M., 1994. Tobin's q, corporate diversification, and firm performance. Journal of Political Economy 102, 1248-1280.

Lang, L., Stulz, R.M., Walkling, R.A., 1989. Managerial performance, Tobin's q, and the gains from successful tender offers. Journal of Financial Economics 24, 137-154.

Lang, L., Stulz, R.M., Walkling, R.A., 1991. A test of the free cash flow hypothesis: The case of bidder returns. Journal of Financial Economics 29, 315-335.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1997. Legal determinants of external finance. The Journal of Finance 52, 1131-1150.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1998. Law and finance. Journal of Political Economy 106, 1113-1155.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 2000. Investor protection and corporate governance. Journal of Financial Economics 58, 3-27.

Lehn, K., Poulsen, A., 1989. Free cash flow and stockholder gains in going private transactions. The Journal of Finance 44, 771-787.

Lehn, K., Netter, J., Poulsen, A., 1990. Consolidating corporate control: Dual-class recapitalizations versus leveraged buyouts. Journal of Financial Economics 27, 557-580.

Lemmon, M.L., Lins, K.V., 2003. Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis. The Journal of Finance 58, 1445-1468.

Marris, R., 1964. The Economic Theory of Managerial Capitalism. Free Press of Glencoe, New York, New York.

McConnell, J.J., Servaes, H., 1990. Additional evidence on equity ownership and corporate value. Journal of Financial Economics 27, 595-612.

Mitton, T., 2002. A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis. Journal of Financial Economics 64, 215-241.

Morck, R., Shleifer, A., Vishny, R.W., 1988. Management ownership and market valuation: An empirical analysis. Journal of Financial Economics 20, 293-315.

Opler, T., Titman, S., 1993. The determinants of leveraged buyout activity: Free cash flow vs. financial distress costs. The Journal of Finance 48, 1985-1999.

Palia, D., 2001. The endogeneity of managerial compensation in firm value: A solution. The Review of Financial Studies 14, 735-764.

Shleifer, A., and Vishny, R.W., 1997. A survey of corporate governance. The Journal of Finance 52, 737-783.

Smith, C.W., Watts, R.W., 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. Journal of Financial Economics 32, 263-292.

Stein, J., 2003. Agency, information, and corporate investment. In: Constantinides, G., Harris, M., Stulz, R. (Eds.), Handbook of the Economics of Finance, Elsevier Science, Amsterdam, pp. 111-165.

Weisbach, M.S., 1988. Outside directors and CEO turnover. Journal of Financial Economics 20, 431-460.

White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and direct test for heteroskedasticity. Econometrica 48, 817-838.

Williamson, D., 1964. The Economics of Discretionary Behavior: Managerial Objectives in a Theory of the Firm. Prentice Hall, Englewood Cliffs, New Jersey.

Zhou, X., 2001. Understanding the determinants of managerial ownership and the link between ownership and performance: Comment. Journal of Financial Economics 62, 559-571.

APPENDIX A

A DETAILED EXPLANATION OF THE REGRESSION VARIABLES

Governance Index "G" – A firm's G equals the number of corporate-governance provisions it has. More provisions reflect more restricted shareholder rights and lower governance quality. Data are from IRRC. See Gompers, Ishii, and Metrick (2003) for a detailed explanation of this Governance Index.

Entrenchment Index "E" – A firm's E equals the number of the following six governance provisions it has: staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills, and golden parachutes. Data are from IRRC. See Bebchuk, Cohen, and Ferrell (2003) for a detailed explanation of this Entrenchment Index.

Tobin's Q – The market value of assets divided by the book value of assets (Compustat item 6). The market value of assets is the sum of the book value of assets at each fiscal year end and the market value of common stocks at the corresponding calendar year end (Compustat item 24 × item 25) subtracting the book value of common stock (Compustat item 60) and deferred taxes (Compustat item 74). Each firm's Q is adjusted by its industry median, where the 48 industry classification follows Fama and French (1997). I use each firm's historical SIC (Compustat item 324) when classifying industries. When Item 324 is missing, I use the SIC indicated by DNUM.

FCF – The measurement of undistributed cash flow and is calculated as operating income (Compustat item 13) minus the sum of the following four components: a) total income taxes (Compustat item 16) minus the change in deferred taxes from the previous year to the current year (change in Compustat item 35), b) gross interest expenses on debt (Compustat item 15), c) dividend payments on preferred stocks (Compustat item 19), and d) dividend payments on common stocks (Compustat item 21). I then scale this free cash flow measure by the firm's book value of assets (Compustat item 6).

EBITDA – Earnings before interests, taxes, depreciation, and amortization (Compustat item 13) scaled by the firm's book value of assets (Compustat item 6). EBITDA measures a company's cash flow from operations.

Delaware Dummy – A dummy variable equals one if the firm is incorporated in Delaware. Data are from IRRC.

S&P500 Index Dummy – A dummy variable equals one if the firm is included in the S&P500 Index. Data are from Compustat's Historical S&P Major Index Code (item 276).

Log Firm Age – The log value of firm age measured in months since the firm's first appearance in Compustat.

Log Assets – The log value of a firm's book value of assets (Compustat item 6).

TOP1/3 – A dummy takes the value of one if a firm's cash flow over total assets ratio is among the top third of all sample firms in that year. The cash flow variable is either FCF or EBITDA.

BOT1/3 – A dummy takes the value of one if a firm's cash flow over total assets ratio is among the bottom third of all sample firms in that year. The cash flow variable is either FCF or EBITDA.

Sales Growth – Firm-level annual growth rate in sales, i.e. the percentage change in Compustat item 12.

APPENDIX B

FAMA-MACBETH AND RANDOM EFFECTS REGRESSIONS

I use fixed effects regressions in this study to control for unobservable firm heterogeneity that may simultaneously affect both the Governance Index (and the Entrenchment Index) and firm Tobin's Q. Hausman (1978) specification test indicates that omitted variable is present and therefore validates the use of fixed effects models. However, even though fixed effects estimation is unbiased, it is not the most efficient. Specifically, fixed effects estimation is based only on the within firm (i.e. time-series) variation and entirely ignores the cross-sectional variation. All the firm dummies included in a fixed effects model also significantly reduce the degrees of freedom.

A Fama-MacBeth (1973) regression picks up the cross-sectional variation. A random effects regression picks up both time-series and cross-sectional variations while modeling the error terms differently for each firm. Although these two estimation methods cannot control for unobservable firm heterogeneity and therefore will produce biased estimates, both of them may produce more efficient estimates and are often used in finance research. It will be informative to see how sensitive my results are to different estimation methods. In the random effects and Fama-MacBeth regressions, I relax the data requirement of the fixed effects regressions that a firm needs to have some time-series change in the G Index or the E Index. To obtain the Fama-MacBeth results, I first run thirteen annual cross-sectional regressions, and then report the time-series means of the coefficient estimates and the time-series standard errors. The statistical significance

from this procedure accounts for the cross-sectional correlation by ignoring the cross-sectional standard errors and using only the time-series standard errors.

In Table A1, I show random effects and Fama-MacBeth (1973) type results of regressing Q on G and its interactions with FCF or FCF dummies. In Table A2, I show the results with the Entrenchment Index. The results in Tables A1 and A2 are consistent with those in Tables 2 through 5: the governance effect varies with the FCF level. The higher the FCF level, the more adversely will lower governance quality affect firm value.

Table A1: Alternative Model Specifications – results with the Governance Index. Shown in this table are the Fama-MacBeth and random effects results by regressing industry-adjusted firm Tobin's Q on firms' Governance Index "G", FCF or dummies indicating the FCF levels, interactions between G and FCF or its dummies, and the control variables. FCF is operating income after taxes, interests, and dividends, scaled by total assets. The control variables include a dummy variable for incorporation in Delaware, a dummy variable indicating whether a firm is included in the S&P500 index, the log of assets in the current year, the log of firm age in the current year measured in months, and firm current year and last year sales growth. A detailed explanation of the regression variables can be found in Table 1 and Appendix A. The data are from Investor Responsibility Research Center (IRRC) and Compustat. The sample period is 1990-2002. Regression coefficients are shown with standard errors in parentheses. The Fama-MacBeth (1973) procedure is to first run annual cross-sectional regressions and then compute the time-series averages of the coefficient estimates and the corresponding time-series standard errors. *, **, and *** indicate significance at the ten-percent, five-percent, and one-percent levels.

Panel A: Governance Index Interacting with Dummies Indicating FCF Levels

TOP1/3 is a dummy equal to one if the firm's FCF is among the top third of all sample firms in that year. Similarly, BOT1/3 is a dummy equal to one if the firm's FCF is among the bottom third of all sample firms in that year. G×TOP1/3 and G×BOT1/3 are the interaction terms between G, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are G and its interaction terms.				
Independent variables:	Fama-MacBeth results		Random Effects	
G (β_1)	-0.032***	-0.026***	-0.023***	-0.020***
(standard error)	(0.006)	(0.007)	(0.007)	(0.008)
G×TOP1/3 (β_2)		-0.033***		-0.025***
		(0.008)		(0.008)
G×BOT1/3 (β_3)		0.008		0.009
		(0.008)		(0.008)
Control Variables:				
TOP1/3		0.893***		0.610***
		(0.080)		(0.078)
BOT1/3		-0.237***		-0.206
		(0.080)		(0.077)
LogBV	-0.150***	-0.105***	-0.096***	-0.074***
	(0.014)	(0.012)	(0.014)	(0.014)
LogAge	-0.244***	-0.183***	-0.109***	-0.083**
	(0.029)	(0.028)	(0.035)	(0.034)
Delaware Incorporation Dummy	-0.020	-0.025	0.009	0.019
	(0.024)	(0.019)	(0.042)	(0.041)
S&P500 Inclusion Dummy	0.748***	0.589***	0.214***	0.189***
	(0.116)	(0.108)	(0.040)	(0.039)
Sales Growth (current year)	0.490***	0.357***	0.175***	0.138***
	(0.088)	(0.074)	(0.018)	(0.018)
Sales Growth (last year)	0.313***	0.242***	0.025**	0.019*
	(0.096)	(0.079)	(0.011)	(0.010)
$\beta_1 + \beta_2$		-0.059***		-0.045***
(Prob>F)		(0.000)		(0.000)
$\beta_1 + \beta_3$		-0.018***		-0.011
(Prob>F)		(0.006)		(0.187)

Table A1: Continued.

Panel B: Governance Index Interacting with FCF

TOP1/3 and BOT1/3 are dummies indicating a firm's FCF level in the sample and is described in Panel A. G×FCF is the interaction term between G and FCF. G×FCF×TOP1/3 and G×FCF×BOT1/3 are the three-way interaction terms between G, FCF, TOP1/3, and BOT1/3. FCF×TOP1/3 and FCF×BOT1/3 are the interaction terms between FCF, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are G and its interaction terms.		
Independent variables	Fama-MacBeth results	Random Effects
G (β_1)	-0.017**	-0.007
(standard error)	(0.007)	(0.008)
G×FCF (β_2)	0.060	-0.130
	(0.096)	(0.098)
G×FCF×TOP1/3 (β_3)	-0.322***	-0.168**
	(0.083)	(0.084)
G×FCF×BOT1/3 (β_4)	-0.065	0.054
	(0.147)	(0.113)
Control Variables:		
FCF	2.439**	4.127***
	(1.004)	(0.969)
FCF×TOP1/3	6.961***	4.207***
	(0.885)	(0.841)
FCF×BOT1/3	-3.383**	-3.924***
	(1.409)	(1.093)
LogBV	-0.053***	-0.043***
	(0.009)	(0.014)
LogAge	-0.093***	-0.045
	(0.029)	(0.034)
Delaware Incorporation Dummy	-0.049***	0.001
	(0.015)	(0.040)
S&P500 Inclusion Dummy	0.461***	0.214***
	(0.095)	(0.038)
Sales Growth (current year)	0.242***	0.063***
	(0.066)	(0.018)
Sales Growth (last year)	0.174**	0.008
	(0.064)	(0.010)
$\beta_2 + \beta_3$	-0.262**	-0.298***
(Prob>F)	(0.016)	(0.000)
$\beta_2 + \beta_4$	-0.004	-0.076
(Prob>F)	(0.976)	(0.197)

Table A2: Alternative Model Specifications – results with the Entrenchment Index. Shown in this table are the Fama-MacBeth and random effects results by regressing industry-adjusted firm Tobin's Q on firms' Entrenchment Index "E", FCF or dummies indicating the FCF levels, interactions between E and FCF or its dummies, and the control variables. FCF is operating income after taxes, interests, and dividends, scaled by total assets. The control variables include a dummy variable for incorporation in Delaware, a dummy variable indicating whether a firm is included in the S&P500 index, the log of assets in the current year, the log of firm age in the current year measured in months, and firm current year and last year sales growth. A detailed explanation of the regression variables can be found in Table 1 and Appendix A. The data are from Investor Responsibility Research Center (IRRC) and Compustat. The sample period is 1990-2002. Regression coefficients are shown with standard errors in parentheses. The Fama-MacBeth (1973) procedure is to first run annual cross-sectional regressions and then compute the time-series averages of the coefficient estimates and the corresponding time-series standard errors. *, **, and *** indicate significance at the ten-percent, five-percent, and one-percent levels.

Panel A: Entrenchment Index Interacting with Dummies Indicating FCF Levels

TOP1/3 is a dummy equal to one if the firm's FCF is among the top third of all sample firms in that year. Similarly, BOT1/3 is a dummy equal to one if the firm's FCF is among the bottom third of all sample firms in that year. E×TOP1/3 and E×BOT1/3 are the interaction terms between E, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are E and its interaction terms.				
Independent variables:	Fama-MacBeth results		Random Effects	
E (β_1)	-0.096***	-0.068***	-0.067***	-0.064***
(standard error)	(0.016)	(0.018)	(0.013)	(0.015)
E×TOP1/3 (β_2)		-0.107***		-0.035**
		(0.019)		(0.017)
E×BOT1/3 (β_3)		0.021		0.018
		(0.014)		(0.017)
Control Variables:				
TOP1/3		0.808***		0.460***
		(0.066)		(0.044)
BOT1/3		-0.211***		-0.166***
		(0.042)		(0.042)
LogBV	-0.155***	-0.108***	-0.096***	-0.073***
	(0.013)	(0.012)	(0.014)	(0.014)
LogAge	-0.249***	-0.188***	-0.118***	-0.093***
	(0.029)	(0.029)	(0.034)	(0.033)
Delaware Incorporation Dummy	0.000	-0.005	0.026	0.035
	(0.024)	(0.022)	(0.043)	(0.041)
S&P500 Inclusion Dummy	0.736***	0.574***	0.213***	0.187***
	(0.112)	(0.102)	(0.040)	(0.039)
Sales Growth (current year)	0.491***	0.360***	0.174***	0.139***
	(0.087)	(0.073)	(0.018)	(0.018)
Sales Growth (last year)	0.317***	0.244***	0.024**	0.018*
	(0.097)	(0.079)	(0.011)	(0.010)
$\beta_1 + \beta_2$		-0.175***		-0.099***
(Prob>F)		(0.000)		(0.000)
$\beta_1 + \beta_3$		-0.047***		-0.046***
(Prob>F)		(0.003)		(0.005)

Table A2: Continued.

Panel B: Entrenchment Index Interacting with FCF

TOP1/3 and BOT1/3 are dummies indicating a firm's FCF level in the sample and is described in Panel A. E×FCF is the interaction term between E and FCF. E×FCF×TOP1/3 and E×FCF×BOT1/3 are the three-way interaction terms between E, FCF, TOP1/3, and BOT1/3. FCF×TOP1/3 and FCF×BOT1/3 are the interaction terms between FCF, TOP1/3, and BOT1/3.

Dependent Variable: Firm Tobin's Q Adjusted by Industry Medians The variables of interest in each regression are E and its interaction terms.		
Independent variables	Fama-MacBeth results	Random Effects
E (β_1)	-0.025*	-0.017
(standard error)	(0.012)	(0.015)
E×FCF (β_2)	-0.096	-0.499**
	(0.156)	(0.208)
E×FCF×TOP1/3 (β_3)	-0.972***	-0.280
	(0.185)	(0.181)
E×FCF×BOT1/3 (β_4)	0.450	0.360
	(0.292)	(0.236)
Control Variables:		
FCF	3.096***	3.980***
	(0.469)	(0.533)
FCF×TOP1/3	5.953***	3.263***
	(0.593)	(0.473)
FCF×BOT1/3	-4.560***	-4.120***
	(0.704)	(0.596)
LogBV	-0.056***	-0.043***
	(0.009)	(0.014)
LogAge	-0.096***	-0.055*
	(0.031)	(0.032)
Delaware Incorporation Dummy	-0.031*	0.019
	(0.016)	(0.040)
S&P500 Inclusion Dummy	0.455***	0.211***
	(0.091)	(0.038)
Sales Growth (current year)	0.248***	0.064***
	(0.066)	(0.018)
Sales Growth (last year)	0.167**	0.007
	(0.062)	(0.010)
$\beta_2 + \beta_3$	-1.068***	-0.779***
(Prob>F)	(0.000)	(0.000)
$\beta_2 + \beta_4$	0.354	-0.139
(Prob>F)	(0.197)	(0.245)

VITA

Jianxin Chi

c/o Department of Finance
Mays Business School
Texas A&M University
College Station, Texas 77843-4218
Email: dchi@tamu.edu; chijian@yahoo.com

Nick Name: Daniel

Education:

- Texas A&M University, Ph.D., Finance, 2001-2005
- Idaho State University, MBA, 1997-1999, Beta Gamma Sigma
- Qingdao University (China), Bachelor of Economics, 1992-1996

Research Interests:

Corporate finance, corporate governance.

Work Experience:

- Operations Manager, Lite-On Manufacturing Services, Tucson, Arizona, 2001
- Operations Manager, Precision Plastics, Idaho Falls, Idaho, 2000 – 2001
- Business Analyst, Precision Plastics, Idaho Falls, Idaho, 1999 – 2000
- Marketing Representative, China Ocean Shipping Agency, Qingdao, China, 1996 – 1997
- Manager, Cheelin Import/Export Corporation, Qingdao, China, 1994 – 1996

Scholarships, Honors, Grants, and Other Activities:

- Mays Business School Ph.D. Scholarship, Texas A&M University, 2004, 2005
- Regent's Fellowship, Texas A&M University, 2001-2004
- Mays Business School Summer Research Grant, Texas A&M University, 2003
- Tuition Scholarship, Texas A&M University, 2001-2002
- President, MBA Association, Idaho State University, 1998-1999
- Co-founder and Vice President, Idaho State University Chinese Association, 1998-1999
- Beta Gamma Sigma - honor society of collegiate schools of business, since 1999
- Graduate Scholarship, Idaho State University, 1997-1999
- University Scholarship, Qingdao University, 1992-1996
- Good Citizenship Award, Qingdao University, 1996