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BOARD OF DIRECTOR INCENTIVE ALIGNMENT AND THE DESIGN OF EXECUTIVE COMPENSATION CONTRACTS

A DISSERTATION SUBMITTED TO

THE FACULTY OF THE GRADUATE SCHOOL OF BUSINESS

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DOCTOR OF PHILOSOPHY

BY

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TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

LIST OF TABLES

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ABSTRACT

In this study I empirically examine how cross-sectional and inter-temporal differences in characteristics measuring the board of director's ability to monitor and evaluate top management in the interests of the firm's shareholders ('director incentive alignment') are associated with differences in the design of executive compensation contracts. Recent studies provide evidence of a dramatic increase in the use of equity-based incentives, resulting in an increase in the sensitivity of executive pay to firm performance over the last 20 years (e.g., Hall and Liebman [1998]). Given this documented increase in the use of managerial incentive pay, I first examine whether board governance has also changed over the past two decades in a direction consistent with improved monitoring and evaluation of the firm's top management. Since I expect that the effectiveness of the board of directors in monitoring and evaluating management will be a function of the extent to which the directors' incentives are aligned with the shareholders' goal of firm value maximization, I also investigate whether the degree of director incentive alignment is associated with the use of incentive pay.

I document a significant shift over the past 20 years in board characteristics measuring director ownership, independence, and effectiveness in the direction consistent with a general increase in directors' incentive alignment. This shift in director incentive alignment is also accompanied by an increase in measures of the incentive-intensity of CEO pay. Even after controlling for hypothesized determinants of the firm's monitoring environment and alternative monitoring mechanisms, I find that director incentive

alignment and the incentive-intensity of CEO pay have both increased over time and are positively associated with each other. My results suggest that board and compensation structures are complementary monitoring mechanisms that have evolved over time in order to mitigate an increasing managerial moral hazard problem.

CHAPTER 1

INTRODUCTION

1.1 Motivation:

The separation of ownership and control in large modern corporations gives rise to an incentive problem generally referred to as the agency problem (Jensen and Meckling [1976]). A firm's owners delegate many of the control and decision rights to a group of managers who often hold insignificant ownership positions. Managers may therefore have the incentive to pursue activities that maximize their own utility, but decrease the shareholders' return on their investment (e.g., growth via 'empire-building' acquisitions). The owners can alleviate the agency problem by directly monitoring management or by designing managerial incentive contracts that align the incentives of managers with the firm's shareholders.

Since the corporation's equity is generally diffusely held, owners have neither the incentive nor the ability to effectively monitor and evaluate top management. Instead, the owners delegate these roles to a group of elected directors. Due to their fiduciary responsibility and access to proprietary information, the board of directors potentially represents the most efficient method of monitoring and evaluating top management. However, directors have received substantial criticism for a lack of effective governance and for designing managerial contracts with a weak relation between managerial pay and firm performance (e.g., Lorsch [1989]). In an attempt to improve managerial oversight, institutional investors and other stakeholder groups

have placed pressure on firms to institute specific governance policies aimed to increase board accountability and independence (e.g., Lesser et al. [1998]).

Recent studies provide evidence of a dramatic increase in the use of equity-based incentives, resulting in an increase in the sensitivity of executive pay to firm performance over the last 20 years (e.g., Hall and Liebman [1998]). This finding suggests that managerial incentives are arguably more closely aligned with the shareholders' goal of firm value maximization now than in the past.

Given this documented increase in the use of managerial incentive pay, I first examine whether board governance has also changed over the past two decades in a direction consistent with improved monitoring and evaluation of the firm's top management. Since I expect that the effectiveness of the board of directors in reducing the agency problem will be a function of the extent to which the directors' incentives are aligned with the shareholders' goal of firm value maximization, I also investigate whether the degree of director incentive alignment is associated with the use of incentive pay.[1] A positive association would suggest that directors with more highly aligned incentives design CEO incentive contracts that attempt to provide a stronger link between managerial and shareholder wealth.[2] Alternatively, a negative association may suggest that the use of high-powered incentive contracts is a substitute for direct monitoring by the board of directors.

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[1] I refer to the extent to which a board of directors exhibits characteristics consistent with the ability and incentive to monitor and evaluate top management in the interests of the firm's shareholders as the degree of incentive alignment.

[2] Since the level of direct monitoring is not observable, I am unable to conclude whether directors with higher incentive alignment both increase the use of incentive pay and increase their monitoring of top management.

1.2 Overview of Results:

For two sub-samples of firms, one from the late 1970s/early 1980s and one from the mid 1990s, I aggregate characteristics measuring board composition and policies into a proxy for the extent the directors' objective function is aligned with the shareholders' goal of firm value maximization. These two points in time are chosen so that I can examine pay practices before and after the development of widespread concern over board governance and the relation between CEO pay and firm performance.[3] The board characteristics represent measures of director accountability, independence, and effectiveness suggested by academics and shareholder advocacy groups as leading to improved monitoring and evaluation of top management.[4] I argue that these characteristics proxy for the unobservable level of director monitoring and for the incentive of directors to act in shareholders' interests in designing executive incentives.

I document a significant shift over the past 20 years in board characteristics measuring director accountability, independence, and effectiveness in the direction consistent with a general increase in directors' incentive alignment. I also confirm and

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[3] The first widespread criticism of the board of directors coincided with the emergence of institutional investor activist groups in 1984 (Monks and Minnow [1995]). This first wave of activism focused on overturning antitakeover mechanisms that favored incumbent directors and management at the expense of current shareholders. Once the hostile takeover wave subsided in the late 1980s, however, activists shifted their attention to focus on issues of board composition, policy and executive compensation.

[4] As discussed further in Chapter 4, measures of director accountability include significant ownership and frequent elections. Measures of director independence include the proportion of independent directors (i.e., not current or former employees or relatives of employees) and directors free from business dealings or other conflicts of interest. Measures of director effectiveness include experience in the industry, high attendance and smaller board size.

extend prior findings that both the use of incentive pay and the sensitivity of the value of the CEO's equity-based incentives to fluctuations in firm value (i.e., incentive-intensity of CEO pay) have increased significantly over the two time periods. Furthermore, the increase in both directors' incentive alignment and the intensity of CEO pay remain statistically significant even after controlling for firm and executive-specific factors expected to be determinants of the firm's monitoring environment.

Univariate correlations show that the incentive-intensity of CEO pay is positively associated with the degree of board incentive alignment. Two additional monitoring mechanisms suggested by corporate governance advocates, ownership by institutional investors and the CEO, have also increased over time.[5] Furthermore, both board of director incentive alignment and the incentive-intensity of pay are positively correlated with outside block-holder ownership and are negatively correlated with existing levels of CEO ownership. Thus, I control for the presence of these two alternative monitoring mechanisms in my regression analyses.

Several of the same firm- and executive-specific factors suggested by agency theory to be determinants of the incentive-intensity of managerial pay also affect the degree of board of director incentive alignment. After controlling for the hypothesized determinants of the monitoring environment and the two alternative monitoring mechanisms, both incentive-intensity and board incentive alignment remain positively associated. Further analysis suggests that this association results from a positive relation between the use of incentive pay by firms whose directors have a higher

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[5] I proxy for institutional investor holdings with total ownership by large (>5%) outside block-holders.

degree of accountability (i.e., higher ownership or incentive pay and more frequent elections) and a higher degree of independence (i.e., who are not current or former employees and are free from conflicts of interest). A Hausman [1978] test cannot reject the hypothesis that the incentive-intensity of CEO pay and board incentive alignment are simultaneously determined.

My results support the hypothesis that monitoring by the board of directors and the use of incentive pay are complementary mechanisms employed to control the managerial moral hazard problem. Based on my findings, I cannot infer a causal relation between changes in firms' board and compensation structures. However, these two governance mechanisms have both evolved over time in a direction consistent with improved monitoring and evaluation of top management.

1.3 Contributions to the Literature:

This study contributes to the extant literature in several ways. My methodology differs significantly from most prior studies that examine the cross-sectional relation between various individual factors posited to impact the effectiveness of a firm's governance structure and the level or composition of executive pay (e.g., Mehran [1995] and Core, Holthausen, and Larcker [1999]).[6] Unlike previous studies, I aggregate numerous characteristics of board composition and policy to develop rankings of boards in terms of their independence, accountability and effectiveness. I also document that the determinants of the firm's monitoring environment are

[6] One exception is Bushman, Chen, Engel and Smith [1999].

generally not stable over time. Thus, results from studies which pool observations over long time periods should be interpreted with care.

This is the first large-sample academic study to document that the board of directors has changed over time to reflect many of the structural and policy suggestions put forth by academics and governance advocates. Specifically, boards that exhibit these characteristics design compensation contracts that attempt to create a stronger link between managerial effort and firm value maximization. Thus, at least superficially, the board of directors has become a more effective monitor and evaluator of the firm's management.[7]

This is also one of the first studies to demonstrate that characteristics measuring the ability of the board of directors to monitor and evaluate top management are associated with the design of executive compensation contracts.[8] Finally, my finding that the design of incentive pay is simultaneously determined with the degree of board incentive alignment is consistent with theoretical predictions of the endogeneity of governance, compensation and ownership structures (e.g., Demsetz and Lehn [1985], Hermalin and Weisbach [1998]).

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[7] However, some critics argue that while many companies have instituted changes in board composition and policy designed to enable more effective monitoring, today's directors still do not have sufficient power to exert significant influence over a dominant CEO (e.g., Parker [1996]).

[8] See also Bushman, Chen, Engel, and Smith [1999] and Core, Holthausen, and Larcker [1999].

1.4 Limitations:

It is important to emphasize that there are several limitations to this study. While I find that significant changes in governance and compensation policies over the last 20 years are a general phenomenon, my empirical design cannot identify whether particular events brought about these changes within my sample of firms. The results of Denis and Saran [1999] suggest large changes in a firm's governance structure may be due to economic shocks, changes in a firm's business structure, corporate control threats, or changes in top management.

In addition, my sample firms are large in size (i.e., mostly Fortune 1000) and my sample selection procedures result in the inclusion of firms that were survivors of the 1980s hostile takeover waves. Thus, my findings of secular trends in these firms may not generalize to the population as a whole. In Chapter 9 I document that the exclusion of firms that were survivors over the approximately twenty-year period does not affect the interpretation of the results for the recent sub-period. However, it would be interesting to analyze the governance characteristics of survivor versus non-survivor firms in order to shed light on the efficiency of the takeover market as a means of corporate governance.

Another limitation of this study is the inability to infer causation between changes in the board structure and changes in the design of compensation contracts. In Chapter 9 I conduct tests that attempt to control for the simultaneity in the design of compensation and board structures. However, these tests are weak due to the inability to develop powerful instrumental variables for the director incentive alignment and incentive-intensity of CEO pay variables.

In this study I rely on the board characteristics and policies advocated by governance experts to measure the degree of alignment between directors and stockholders' incentives. As noted by previous studies (e.g., Bhagat and Black [1998], Bushmen, Chen, Engel and Smith [1999]), however, the same set of board governance characteristics may not be appropriate for all types of firms. For example, Bhagat and Black [1998] argue that board independence alone may not lead to better monitoring since directors may not have the ability (e.g., inside or industry knowledge/experience) or the incentive to effectively monitor management. The results of their study suggest that firm performance is higher for companies with independent directors who also have high ownership stakes, while performance is lower for independent boards in general. The results of my study suggest that the use of CEO incentive pay is positively associated with both the degree of director independence and the degree of director accountability (one component of which is the directors' ownership). Thus, director independence and accountability appear to be factors that contribute to the board's ability to better monitor and evaluate top management, as well as to improved overall firm performance.

This paper proceeds as follows. In Chapter 2 I discuss the moral hazard problem, the role of the board of directors as a monitor and evaluator of the firm's management and present my empirical hypotheses. Chapter 3 presents my empirical proxies for the hypothesized determinants of the monitoring environment. In Chapter 4 I discuss the criteria I use to measure board of director incentive alignment. In Chapter 5 I discuss changes over time in the design of executive incentives and my empirical measures of the incentive-intensity of CEO pay. Chapter 6 describes the

empirical design, sample selection process and presents descriptive statistics. In Chapter 7 I empirically examine the determinants of the degree of board of director incentive alignment. In Chapter 8 I examine the inter-relation between board, compensation and ownership structures. Chapter 9 presents the results of several sensitivity analyses, while Chapter 10 summarizes the results and discusses potential extensions.

CHAPTER 2

THE FIRM'S MONITORING ENVIRONMENT

2.1 The Moral Hazard Problem

As noted first by Berle and Means [1932], the classic modern industrial corporation can be characterized by a separation of ownership and control; a situation that produces both costs and benefits. One benefit arises from the owners' ability to hire agents with specialized managerial skills, and thus delegate the operation of the company. The conflict arises out of the owners' inability to directly monitor and evaluate all actions taken by management, and thus to prevent managers from taking actions that maximize their own utility while lowering firm value. This conflict, referred to as the agency or moral hazard problem, can be alleviated by aligning managers' interests with those of the firm's shareholders through effective incentive compensation contracts.[1]

Agency theory examines the determinants of the optimal compensation contract in the presence of managerial moral hazard. The design of managerial contracts involves a fundamental trade-off between providing sufficient incentives to elicit shareholder value maximizing actions and imposing unnecessary risk on the

[1] More specifically, moral hazard refers to the agency problem resulting from the situation where the agent has asymmetric information after the contract is signed (but before the action is taken) and the level of effort he exerts is not verifiable (and thus, cannot be contracted upon). Instead, the principal is forced to write a contract in terms of observable measures of the agent's output or performance (Milgrom and Roberts [1992]).

manager. The theory suggests that the board of directors, if behaving optimally from the shareholder's perspective, will choose to include and weight performance measures in the contract based on their usefulness in evaluating managerial actions and aligning the incentives of managers with those of shareholders.[2]

A simple principal-agent model illustrates how the optimal compensation contract can be written to maximize both the principal's and the agent's expected wealth (e.g., Milgrom and Roberts [1992].[3] The model examines the determinants of just *one* measure of managerial performance. I use this simple model to illustrate what I refer to as the *overall* incentive-intensity of the compensation contract. Furthermore, the model enables me to generate predictions for the hypothesized determinants of the construct incentive-intensity. The linear compensation contract (W)

$$W = \alpha + \beta X \tag{2.1}$$

consists of the manager's base salary (α) and a variable component (βX), where $X = (e + \varepsilon)$ is an aggregate measure of managerial performance, e is managerial effort, ε is the random noise in the performance measure, and β is the marginal effect

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[2] The *informativeness principle* (Holmstrom [1979]) states that a performance measure will only be included in a compensation contract if it has incremental information content with respect to the manager's effort over and above other available measures. The improvement in information with respect the manager's effort allows the principal to filter out unnecessary risk. The reduction in risk will lower the risk premium, and thus reduce the total cost of compensating the manager.

[3] The model assumes that the principal (i.e., shareholders) is risk-neutral, the agent (i.e., manager) is risk-averse with a constant absolute risk aversion (i.e., negative exponential utility function), and that the contract is a linear function of one aggregate measure of managerial performance (e.g., Holmstrom and Milgrom [1987]).

on managerial wealth of a change in the performance measure (i.e., incentive-intensity). It can be demonstrated that the optimal incentive-intensity of pay is as follows (Milgrom and Roberts [1992]):

$$\beta = \frac{P'(e)}{1 + r\sigma^2 C''(e)} \tag{2.2}$$

where $(P'(e))$ is the marginal return to the agent's effort, (r) is the level of managerial risk aversion, (σ^2) is the noise in the performance measure as a measure of managerial effort, and $\left(1/C''(e)\right)$ is the responsiveness of managerial effort to incentives.

Thus, this model suggests that the incentive-intensity of pay (β) will be decreasing in the noise in any performance measure as a measure of managerial effort (σ^2) and in managerial risk-aversion (r), and will be increasing in the marginal return to effort $(P'(e))$ and in the responsiveness of managerial effort to incentives $\left(1/C''(e)\right)$. In Chapter 3 I discuss empirical proxies for these agency-theoretic determinants of incentive-intensity and the results of prior empirical studies.

2.2 The Role of the Board of Directors

The board of directors represents the most direct, and potentially most efficient, method of monitoring and evaluating the actions taken by a firm's top

management. The shareholders elect a board of directors to serve as their agent in overseeing top management and guiding the strategic direction of the firm. The directors have a fiduciary duty to protect the shareholders' investment in the company. Furthermore, directors' access to strategic and proprietary information not available to outside stakeholders enables them to be informed evaluators of top management's actions.

Since directors meet only several times per year and managerial actions are often unobservable, I expect that boards cannot exclusively rely on direct monitoring. Instead, the board designs incentive contracts to motivate managers to take firm-value maximizing actions, and then evaluates the managers primarily through the achievement of accounting and stock market-based measures of firm output and predetermined strategic goals. I expect, however, that many of the same characteristics and board policies which enable directors to effectively monitor management also result in the design of incentives that provide a stronger link between managerial effort and shareholder value maximization (i.e., higher incentive-intensity or β from equation (2.1)).[4] Thus, I examine whether characteristics that proxy for the degree of board of director incentive alignment are associated with the board's design of executive compensation contracts with a higher degree of incentive-intensity. A positive association would suggest that directors with more highly aligned incentives

[4] The board of directors (or the subset of directors who form the compensation committee) may not actually design managerial incentives, but instead hire an outside compensation consulting firm to design the compensation package. I argue that the same characteristics which measure directors' ability to design contracts that align managers' incentives with shareholders' incentives to maximize firm value will be associated with the ability of directors to hire consultants and approve compensation packages which achieve these same goals.

design CEO incentive contracts that attempt to provide a stronger link between managerial and shareholder wealth.[5] Alternatively, a negative association may suggest that the use of high-powered CEO incentive contracts is a substitute for direct monitoring by the board of directors.

In Chapter 4, I discuss the board characteristics and policies suggested by governance advocates to improve the ability of the board to be a more independent, accountable and effective monitor of top management. I use these characteristics to measure the extent directors' incentives are aligned with the shareholders' goal of firm value maximization. In order to understand what factors affect the extent of director monitoring, I examine the cross-sectional and inter-temporal determinants of the degree of board of director incentive alignment. Since the principal-agent framework only provides predictions for the incentive-intensity of pay, I rely on empirical proxies suggested by prior theoretical and empirical corporate governance studies to be determinants of the firm's monitoring environment. These determinants, which proxy for the costs and benefits of monitoring by the board of directors, are discussed in Chapter 3. I then examine the relation between the degree of board monitoring and the incentive-intensity of pay, after controlling for these hypothesized determinants of the firm's monitoring environment.

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[5] Milgrom and Roberts [1992] illustrate that β is positively associated with the degree of monitoring, where monitoring refers to the effort made to reduce the noise in the performance measure (i.e., the variable λ) in measuring managerial effort. The idea is that is the higher the desired incentive-intensity of CEO pay, the more effort the board will make to insure that the performance measure is a less noisy and more sensitive indicator of managerial effort.

2.3 Changes Over Time in the Role of the Board of Directors

Underlying the previous discussion is the expectation of both cross-sectional and inter-temporal differences in the ability of the board of directors to be independent, accountable and effective monitors of top management. Consistent with prior literature (e.g., Hermalin and Weisbach [1998]), I view firms' governance and monitoring structures as a function of the costs and benefits of controlling the managerial moral hazard problem. I argue that changes in firms' operating environments over the past 20 years have increased the complexity of the CEO's responsibilities, and thus broadened the scope of managerial moral hazard. In this section, I discuss these changes and other factors that have resulted in increased pressure on firms to institute board governance structures designed to facilitate more active monitoring and evaluation of managers' stewardship of the firm's assets.

The board of directors acts as an intermediary between the owners and managers. The existence of this intermediary implies that there may be conflicts between the interests of owners and directors. One potential conflict arises from the fact that most boards include several members of the management team and the chairman is often the corporation's chief executive officer.[6] Another potential conflict arises from the directorial nomination and election process. The incumbent group of directors submits the slate of directors to be elected each term. Over 99% of the time those nominated directors run opposed (Monks and Minnow [1996]), so there is no alternative slate available for the shareholders to elect. Furthermore, individual

[6] Approximately 80% of U.S. public companies (Lorsch [1989]) and the S&P 400 (Blair [1995]) have combined the positions of CEO and chairman of the board.

shareholders often do not even vote their shares. And it is not clear whether those individual investors who do vote critically evaluate the directors on the election slate. These institutional arrangements may result in the election of a board of directors with incentives more closely linked to management than to the shareholders they are elected to represent.[7]

Board actions came under increasing legal scrutiny following the approval of anti-takeover devices such as poison pills, greenmail, golden parachutes and classified boards in attempts to fend off hostile bids during the mid 1980s. Directors argued that these actions were taken to maintain the long-term viability of the corporation. However, the provisions preserved the incumbent management and directors' jobs and often resulted in a loss in firm value.[8] The resulting court rulings highlighted a shift in directors' oversight responsibilities and reinforced directors' duty to protect the interests of shareholders, with the majority of these cases stressing shareholder value maximization as the directors' primary consideration in choosing to oppose or accept a hostile acquisition offer.[9] Furthermore, lawyers often cite the fact that courts tend to

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[7] Consistent with this view, critics note that board service has been traditionally viewed as more of a privilege than a duty and directors have been accused of being the pawns of the firm's top management (e.g., Lorsch [1989]).

[8] See Shleifer and Vishny [1997]) for a review of the empirical evidence on the shareholder value effects of antitakeover devices.

[9] Two notable cases where boards approved anti-takeover measures which were opposed by the shareholders were Unocal v. Mesa Petroleum [1985] and Revlon, Inc. v. MacAndrews & Forbes Holdings [1986]. In the Van Gorkom decision (Smith v. Van Gorkom [1985]), the directors were held personally liable for losses to shareholders who claimed the directors did not act with sufficient diligence prior to accepting a takeover bid. See Blair [1995] or Gaughan [1996] for a review of these court cases.

defer to the judgment of directors when the board is dominated by outsiders as one motivation for the shift in board structure toward outside director-dominated boards by the late 1980s (Blair [1995]).

Institutional investor groups also became actively involved in governance issues based on the perception that boards and management were destroying firm value by instituting anti-takeover measures. Individual pension fund groups such as CalPERS and TIAA-CREF began to monitor their investments more closely, first by seeking meetings with the board and top management to discuss governance issues (beginning in 1984) and publishing annual lists of under-performing corporations (late 1980s).[10] Proposals included separating the functions of chief executive officer and chairman of the board, increasing the proportion of outside directors, and eliminating inside directors from key committees (e.g., compensation and nominating committees).

By the early 1990s, the takeover wave had declined and the focus of corporate stakeholders shifted to the board's evaluation of managerial performance. Evidence of increasing executive pay around the time of stagnant worker wages and recession led to increased pressure on regulators and the government to curb excessive CEO pay (Monks and Minnow [1995], Murphy [1998]). Furthermore, critics began to cite U.S. corporate governance structures and financial markets as encouraging 'short-term'

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[10] More recent activist institutional investor groups such as the United Shareholders Association (1986-1993), and its replacement the Investors' Rights Association (formed in 1994), often file shareholder resolutions and publicize their grievances against targets in the media in attempts to resolve governance issues (Blair [1995], Brancato [1997]). The Council of Institutional Investors and the Teamsters Union go one step further and publish lists of directors who rate unfavorably in terms of ownership, attendance and independence.

investment horizons, and thus contributing to U.S. firms' lack of global competitiveness (e.g., Porter [1992]). Directors specifically were criticized for their lack of oversight and strategic guidance, and for designing executive compensation plans which rewarded short-term financial results (Lorsch [1989] and Blair [1995]).

The Securities and Exchange Commission responded to stakeholder and political pressures in 1991 by allowing shareholder resolutions on executive pay and in 1992 by requiring more disclosure of executive pay within company proxy statements.[11] Section 162(m) of the Internal Revenue Code (enacted in 1994) required that in order for compensation to be deductible for tax purposes, it must qualify as performance-based (i.e., be determined by objective, pre-determined standards) and be determined by a compensation committee composed entirely of outside directors. Finally, anecdotal evidence suggests that directors have responded to these pressures. For example, Foulkes [1991] quotes former Gulf+Western director James Fisher Jr.: "Directors today have a heightened awareness of the responsibilities...of board membership, and are increasingly serious about their duties as compensation committee members." The collective force of these events increases the likelihood that the board of directors has the incentive and ability to be an effective monitor and evaluator of management's stewardship of the firm's assets.

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[11] For example, the compensation committee of the board of directors is now required to provide a discussion of the basis for determining the compensation of top executives within the proxy statement. The proxy statement must also present a comparison of recent firm performance to an industry peer group and the market as a whole so that investors can judge the reasonableness of executive compensation in light of firm performance.

2.4 Alternative Methods of Controlling Managerial Moral Hazard

Monitoring by the board of directors is only one of several control mechanisms suggested by the corporate governance literature (e.g., Shleifer and Vishny [1997]). Other methods of alleviating the managerial moral hazard problem include higher levels of managerial ownership, monitoring by outside stakeholders (e.g., large equity block-holders, institutional investors, bond-holders), labor and product market competition and the market for corporate control.

Fama [1980] and Fama and Jensen [1983] argue that ownership of the firm's stock by top management may act as a substitute for monitoring by the board of directors and outside stakeholders. Increasing ownership aligns the managers' interests with those of the firm's equity shareholders, but may lead to additional costs. For example, increasing the proportion of managerial wealth that is held in shares of the firm (i.e., decreasing the portion of the manager's wealth that can be held in a diversified portfolio) may lead a risk-averse manager to reject positive net present value (but risky) projects. Similarly, the presence of a CEO with high ownership may be a signal of CEO influence over the board. A CEO with undue influence over the board may be more likely to pursue projects that maximize their own utility (e.g., 'empire-building' acquisitions) without the scrutiny or criticism of the board of directors. Thus, there are limits to the value of managerial ownership as a monitoring and control mechanism.

Institutional investors have increasingly become more actively involved in governance issues. Activist institutional investors, however, rarely own a large

proportion of any individual security.[12] In fact, many outside block-holders are investment management firms who are generally passive in corporate governance issues. A recent study by Gompers and Metrick [1998] suggests that these institutions invest in the securities of larger, older, more stable firms with a liquid market for their shares, thus rendering active involvement in the firm's governance issues unnecessary. Nevertheless, Gompers and Metrick [1998] document a significant increase over the period 1980-96 in both the portion of total institutional ownership and the concentration of ownership by the five largest institutional owners of a firm's stock. In addition, they cite anecdotal evidence of activism by traditionally passive institutions (e.g., investment management companies).

Prior studies provide some evidence consistent with improved monitoring when an outside block-holder owns greater than 5% of the firm's equity (e.g., Core, Holthausen, and Larcker [1999]). I expect, however, that the primary impact of activism on board governance is achieved through indirect pressure and proposals to change governance policies and the composition of the board of directors, not through direct monitoring of the firm's management.

Three additional related, but indirect, mechanisms exist for controlling the managerial moral hazard problem. First, the threat of dismissal may serve as a check on managerial misbehavior. Managers who are fired suffer large costs in terms of lost wages (e.g., salary and the value of stock options and restricted stock forfeited).

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[12] Many activist institutional investors (e.g., CalPERS, TIAA-CREF) generally hold far less than five percent of any individual corporate security, and thus their ownership is not disclosed in company proxy statements. Since I rely on proxy statement disclosures, institutional investors generally will not be categorized in my analysis as outside block-holders.

Moreover, managers suffer a loss in reputation and future job opportunities (Warner, Watts and Wruck [1988]). Poorly performing managers also receive indirect pressure from product market competition. The decline in a firm's market share or size may lead to losses in both current and future CEO wealth (i.e., through decline in value of stock-holdings) and a loss of reputation and future job opportunities. Furthermore, the probability of a takeover (and the replacement of the board of directors and top management) is higher if the firm under-performs relative to its peers (Shivdasani [1993]). Therefore, the market for corporate control can be thought of as a control mechanism of 'last resort' (Fama [1980]). That is, a takeover will result when all other monitoring mechanisms have failed to remove a substandard management team.

My tests control for the effect of two of these alternative monitoring mechanisms (i.e., ownership by the CEO and by large outside block-holders) on the relation between board of director incentive alignment and the incentive-intensity of CEO pay. I expect that the use of CEO incentive pay will be negatively associated with the CEO's existing level of equity ownership. In effect, the board will issue incentive-based pay (versus a fixed salary) only to the extent the CEO's incentives are not sufficiently aligned through his current ownership position. Based on the discussion in the previous section, I expect that outside stakeholders such as large equity owners or institutional investors do not directly monitor management. Instead they have been vocal advocates of improved board governance and increasing the use of CEO incentive pay. Therefore, I expect that the presence of outside block-holders will be positively associated with the incentive-intensity of CEO pay.

CHAPTER 3

DETERMINANTS OF THE FIRM'S MONITORING ENVIRONMENT

3.1 Overview

In Chapter 2 I present a simple model from the agency literature to illustrate that the incentive-intensity of managerial pay is a function of the following four factors: the noise in the performance measure, managerial risk aversion, the return to managerial effort, and the sensitivity of effort to incentives. Existing studies provide cross-sectional evidence that ownership and board structures are correlated with one another and are related to common observable firm characteristics (e.g., Demsetz and Lehn [1985] and Agrawal and Knoeber [1996]). Denis and Sarin [1999] provide evidence that ownership and board structures are not stable over time, and vary both cross-sectionally and inter-temporally by many of the same factors.[1] In this section, I discuss the characteristics I use to proxy for these hypothesized determinants of the extent to which monitoring by the board of directors, incentive contracts and managerial ownership are used as alternate methods of controlling the managerial moral hazard problem.[2]

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[1] This study finds that large changes in board and ownership structure are associated with CEO changes, corporate control threats and poor stock price performance.

[2] Similar to prior studies (e.g., Agrawal and Knoeber [1996], Himmelberg, Hubbard and Palia [1999]) I treat these firm characteristics as exogenous, both for tractability and in order to focus on the potential endogeneity of board and ownership structure. In Chapter 9 I conduct sensitivity analyses to investigate whether board and compensation structures are endogenously determined using a simultaneous equations framework.

3.2 Empirical Proxies

3.2.1 CEO Tenure (*CEO_TEN*)

The accumulation of equity incentives is positively associated with tenure (Gibbons and Murphy [1992]). Thus, the level of managerial ownership should be increasing, while the use of incentive-based pay should be decreasing in the number of years the CEO has been employed by the firm.[3] To the extent CEO tenure is a measure of CEO influence, however, I expect the board will be a less effective monitor. An alternative explanation is that board monitoring is less necessary when the CEO's incentives are sufficiently aligned via high ownership positions (which is positively associated with longer tenure).

3.2.2 Firm Size *(SIZE)*

Larger firms generally have more diversified, complex operations and a higher marginal return to effort. Since large firms also may have a greater scope for managerial discretion, there is more need for direct monitoring or incentive-based compensation (Smith and Watts [1992]). In addition, the managerial moral hazard problem is exacerbated by the higher cost (due to wealth constraints and reduced diversification) of managerial ownership. Thus, I expect that executives in larger firms will have lower existing ownership and will receive a higher proportion of incentive

[3] Core and Guay [1999] document a negative (positive) association between the pay-performance sensitivity of new option grants (total CEO wealth) and CEO tenure.

pay.[4] Furthermore, I expect the boards of larger firms to exhibit characteristics consistent with a greater ability to monitor top management.

3.2.3 Investment Opportunity Set *(GROW)*

Firms with high growth opportunities have an increased scope for managerial moral hazard and a higher return to effort (Smith and Watts [1992]). The board of directors or shareholders may have more difficulty monitoring top management in firms with a high investment in intangible assets since the decisions made by management tend to be non-routine and to have a longer time horizon. Furthermore, traditional accounting-based performance measures may not be a timely reflection of managerial actions. Thus, I hypothesize that firms with high growth opportunities will have higher equity-based incentives and higher managerial ownership in order to align the interests of managers with the firm's shareholders. I also expect that these firms will have a higher demand for directors with better monitoring skills. My proxies for the extent of the moral hazard problem relating to the firm's investment opportunity set are as follows: the presence of growth opportunities (high ratio of market to book value of equity) and investments in intangible versus tangible assets (high R&D expense relative to total assets).[5]

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[4] This prediction is consistent with the findings of Core and Guay [1999] that the pay-performance sensitivity of option grants (when measured as the change in option value for a *percentage* change in firm value) is higher for larger firms. Prior studies, which measured pay-performance sensitivity including existing stock levels and relative to a *dollar* change in firm value (e.g., Jensen and Murphy [1990], Hall and Liebman [1998] and Murphy [1998]), find a negative relation between pay-performance sensitivity and firm size.

[5] Core and Guay [1999] find a negative association between a firm's book to market ratio and the pay-performance sensitivity of new option grants.

3.2.4 Firm Risk *(RISK)*

The model in Chapter 2 predicts a negative association between the incentive-intensity of managerial pay and the noise in which a performance measure (e.g., stock returns) captures managerial effort. Ceteris paribus, higher risk in the form of stock price volatility results in a higher cost to investors and managers of holding large ownership or stock option positions. Higher risk may also increase the scope for managerial discretion and the tendency of managers to take actions that yield short-term benefits at the expense of long-term performance. Thus, I expect that firm risk will be positively associated with the extent of monitoring by the board of directors and negatively associated with the use of incentive pay or ownership as an incentive alignment device.[6] My proxies for firm risk relate to the volatility of two common measures of managerial performance: the variance of stock returns and the variance of changes in accounting earnings.

3.2.5 Regulated Environment *(UTIL)*

Regulation may serve as an additional monitoring and control mechanism. For example, regulatory agencies monitor companies directly and through the requirement of specific filings and accounting standards. Regulated firms also tend to have a more stable operating environment, further limiting the scope for managerial discretion. Finally, to the extent that more risk-averse managers are attracted to the more stable

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[6] Aggarwal and Samwick [1999] find a negative association between stock price volatility and incentive intensity. Note, however, that prior studies have found evidence consistent with a positive association between firm risk and the use of incentive pay or managerial ownership (e.g., Demsetz and Lehn [1985], Smith and Watts [1992]). The results of these studies would suggest that the benefits of aligning managerial incentives outweigh the cost of increased risk placed on the manager.

jobs generally found in regulated environments, I expect to find less use of incentive pay. Consistent with these hypotheses, prior studies have found that firms in the utilities industry use less incentive pay (Murphy [1998]) and have a lower concentration of managerial ownership (Demsetz and Lehn [1985], Smith and Watts [1992]). I proxy for the presence of a regulatory environment with an indicator variable that takes on the value of one if the firm is in the utilities industry (two-digit SIC code 49).

3.2.6 Prior Financial Performance *(PERF)*

I expect that poor financial performance may result in increased monitoring by the board of directors and outside stakeholders. In addition, directors may increase the use of incentive pay to motivate future managerial actions to improve firm performance. On the other hand, incentive pay is sometimes used to reward past performance (e.g. Core and Guay [1999]). Furthermore, it may be costly to pay managers options when prior performance is poor (i.e., managers may require a risk premium). Thus, while I expect a negative association between board monitoring and prior performance, it is unclear how prior performance will affect the use of incentive pay.

3.2.7 Leverage *(LEV)*

Higher leverage may serve to reduce the scope for managerial discretion both through a relative reduction in free cash flow and the presence of debt covenants. This suggests less of a benefit to monitoring- either in terms of equity incentives or direct

monitoring by the board of directors.[7] My proxy for leverage is the average ratio of total debt to total assets over the current and prior two years.

3.2.8 Other Control Variables

As discussed in Chapter 7, I also add industry fixed effects in an attempt to control for the effect of cross-sectional differences in labor and product market competition and the market for corporate control. Furthermore, in sensitivity tests in Chapter 9 I add the industry average of the degree of board of director incentive alignment and the incentive-intensity of CEO pay as additional controls for omitted determinants of these two monitoring mechanisms.

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[7] Denis and Saran [1999] find a negative association between leverage and ownership by directors and top officers.

CHAPTER 4

MEASURES OF BOARD OF DIRECTOR INCENTIVE ALIGNMENT

4.1 Overview:

I use guidelines advocated by institutional investor and corporate governance advocacy groups (e.g., CalPERS [1998], TIAA-CREF [1992], National Association of Corporate Directors (NACD [1995])) to develop a set of characteristics to measure the extent directors' incentives are aligned with the shareholders' goal of firm value maximization. I classify the measures of board of director incentive alignment into three broad categories: independence, accountability, and overall board effectiveness.

My measure of director incentive alignment is an aggregate of these various director characteristics and not a measure of the incentive-intensity of the directors' pay for several reasons. Although the use of incentive pay for directors has increased significantly over time, directors' incentive contracts are highly homogeneous at a given point in time. For example, as documented later in this study, in the late 1970s/early 1980s no firms offered equity incentives to directors and director ownership levels were very low. In contrast, in recent years virtually all firms offer directors either stock options or restricted stock, and the value of shares owned by directors has risen dramatically. However, many board characteristics and policies are heterogeneous across firms.

Finally, I argue that a primary motivation for directors to effectively monitor management is not remuneration. Many directors are current or retired executives

whose earnings from their primary employer substantially exceed the pay received from board service. Board service provides directors with non-pecuniary benefits such as the prestige of being a director of a successful corporation. Furthermore, a positive reputation can generate additional directorships.

4.2 Measures of the Degree of Board of Director Incentive Alignment:

4.2.1 Board Independence (*INDEP*)

Academic studies and shareholder activists stress the importance of director independence, claiming that directors who are affiliated with the corporation are more easily influenced by the CEO. While several different definitions of independence exist, most corporate governance advocates suggest that the board should be comprised of a super-majority of directors who are not current or former employees, are unrelated to top management, are not advisors or consultants to the corporation, and whose primary employer does not have a significant business relationship with the corporation (Lesser et al. [1998]). Several institutional investor groups also suggest that interlocking directorships, situations where inside directors sit on the boards of the employers of outside directors, are a violation of outside director independence.

While regulations now restrict firms from placing inside directors on the audit and compensation committees,[1] stakeholder groups also advocate eliminating inside directors from the firm's nominating committee in order to minimize the election of

[1] Beginning in 1978, the New York and American Stock Exchanges required listed firms have an audit committee made up of independent directors. The NASDAQ exchange required firms to have a majority of outside directors on the audit committee beginning in 1987.

outside directors who are influenced by the CEO. Another recent suggestion is the elimination of director perquisites such as retirement benefits that treat directors as employees, and thus may align their incentives more closely with the firm's management team.

4.2.2 Board Accountability (*ACCOUNT*)

Stakeholder groups cite several guidelines for increasing the accountability of directors. First, in order to align the interests of directors with those of shareholders, directors should have a significant economic stake in the performance of the firm. Two methods suggested for aligning directors' incentives are the requirement of significant director ownership and the payment of (at least a portion of) director fees in stock or stock options in lieu of cash. In addition, governance advocates have called for the elimination of multi-class boards to ensure that all directors are subject to annual election by the shareholders.

4.2.3 Board Effectiveness (*EFFECT*)

The final category relates to board characteristics and policies not specifically relating to board independence or accountability, and thus I refer to as contributing to overall board effectiveness. Some institutional investors suggest firms impose mandatory retirement and term limits in order to ensure director turnover and reduce the tendency of boards to be complacent. In addition, shareholder advocates claim that larger boards are less likely to critically debate issues and more easily influenced by the CEO. Stakeholder groups also argue that boards will be more likely to scrutinize

management's proposals, as well as more involved in strategic decision making, when outside directors have experience in the company's core business or industry. Finally, investor groups suggest that directors whose attendance is low or who sit on too many other boards cannot possibly dedicate sufficient time to their board duties.[2]

4.3 Calculation of the Degree of Board of Director Incentive Alignment

In order to compare board governance across the two time periods (late 1970s/early 1980s versus middle 1990s), I calculate a board incentive alignment measure (*ALIGN*) for each firm by first calculating a percentile rank of each of the following board characteristics relative to *all* sample firms in *both* sub-periods. Each board characteristic is ranked so that it has a positive effect on the degree of board of director incentive alignment. I then take an equal-weight aggregate of the 14 ranked board characteristics to form *ALIGN*. The fourteen board characteristics and their association with director incentive alignment are as follows:[3]

Board Independence

(-) Percentage of inside (employee) directors (*%INSIDE*);
(-) Percentage of outside directors who are affiliated- former employees, relatives of directors, have consulting or business relationship with company or interlocking directorship (*%Outside Affiliate*);
(-) At least one insider on key (audit, nominating or compensation) committees (*IONCOM*);
(-) Directors receive pensions (*PENS*);

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[2] Fama and Jensen [1983] suggest, however, that the number of outside directorships may be a function of the labor market's demand for the director's services, and thus a measure of director quality.

[3] The specific criteria are based on those advocated by governance critics (e.g., Lesser et al. [1998]) and those used in prior studies (e.g., Core et al. [1999]).

Shareholder Accountability:

(+) Total outside director ownership percentage (*Outside %OWN*);
(+) Proportion of outside directors with ownership >$100,000 (*%OWN>100K*);
(+) A portion of director pay is equity-based (*STOCK*);
(+) Directors are subject to annual election (*ANNUAL);*

Board Effectiveness

(-) Proportion of directors over age 69 (*%OVER69*);
(-) Proportion of directors with tenure greater than 15 years (*%TEN>15*);
(-) Board size (*BD_SIZE*);
(-) Percentage of directors who attend less than 75% of board meetings (*ATTEND<75%);*
(+) Percentage of directors with experience in firm's core business (*%EXPER*);
(-) Percentage of directors with greater than 3 (if employed) or 5 (if retired) additional corporate directorships (*%BUSY*).

CHAPTER 5

THE DESIGN OF MANAGERIAL INCENTIVES

5.1 Changes in the Design of Executive Incentives

The design of executive incentive contracts has changed significantly over the past twenty years. Although the use of incentive pay is not a new phenomenon, the contracts designed twenty years ago focused on rewarding executives for achieving (past) accounting performance goals. Most executive compensation programs consisted of a base salary, annual bonus based on accounting earnings and, beginning in the middle 1970s, a long-term performance plan. These long-term bonuses were generally in the form of performance shares or units, and thus, usually linked rewards to achievement of accounting performance goals (McLaughlin [1991]).

One of the most dramatic changes in the design of executive incentives is the shift in focus from rewarding past performance to motivating the achievement of improvements in financial performance and the achievement of specific strategic goals (Foulkes [1991]). Furthermore, contracts are now increasingly designed to promote shareholder value creation, both by tying executives' incentives to changes in firm value as well as by broadening the choice of performance measures in an attempt to better measure managers' contribution to firm value. In place of traditional accounting growth or profitability measures companies often base executive bonuses on improvements in non-financial measures (e.g., customer satisfaction, strategic initiatives, new product introductions), subjective individual performance evaluation,

or metrics that adjust accounting returns to reflect a charge for the cost of capital employed (e.g., EVA).[1] Due to this increasing tendency to design contracts that take into account firm-specific goals, there is a much wider variation in executive compensation practices today than in the past (Foulkes [1991]).

Recent studies document changes over time in the design of executive incentives. For example, Bushman et al. [1998] documents that the relative weight placed on earnings versus stock returns in determining changes in annual compensation has declined over the period 1971-1995. Furthermore, studies have documented an increase in the use of stock returns (relative to traditional accounting performance measures) as a performance measure through the increased granting of stock options. This shift toward equity-based pay has resulted in an increase in firms' pay for (stock price) performance sensitivities (Murphy [1998] and Hall and Liebman [1998]).[2]

5.2 Measures of Compensation Design

The agency-theoretic framework discussed in Chapter 2 provides predictions for both the determinants of the overall incentive-intensity of pay. Following prior literature, I measure the incentive-intensity of CEO pay as the sensitivity of the value of equity-based incentives to fluctuations in firm value (e.g., Jensen and Murphy

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[1] See, e.g., Bushman, Indjejikian and Smith [1996], Ittner, Larcker and Rajan [1997], Ittner and Larcker [1998], and Wallace [1998].

[2] For a sample of S&P 500 firms, Hall and Liebman [1998] documents that annual pay (salary plus bonus) as a portion of total direct compensation (annual pay plus the value of stock option grants) ranged from a high of 80.9% in 1980 to a low of 51.6% in 1994.

[1990], Core and Guay [1999]). Ideally tests of the incentive-intensity of pay would examine the sensitivity of all elements of an executive's incentive pay to changes in firm value (i.e., annual bonus, long-term bonuses, and the value of grants of restricted stock and stock options). Only beginning in 1992, however, were firms required to separately disclose the portion of annual pay relating to salary versus bonuses. While annual and long-term bonuses often represent up to 50% of a CEO's total compensation, the pay-performance sensitivity of non equity-based compensation is generally less than 5% of the pay-performance sensitivity of total CEO wealth (Murphy [1998]). Thus, in all analyses I restrict my attention to the pay-performance sensitivity of average annual grants of stock options.[3] By excluding the pay-performance sensitivity of annual and long-term accounting-based bonuses, my measures understate the actual pay-performance sensitivity of executive pay.[4]

Consistent with prior studies (e.g., Yermack [1995], Murphy [1998]), I value executive stock options using the Black-Scholes [1973] model, as modified to account for dividend payouts by Merton [1973]:

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[3] Since I am interested in the factors determining the design of new incentives and their relation with board incentive alignment and existing CEO ownership, I exclude the pay-performance sensitivity of unexercised options and current CEO ownership and instead control for current levels of ownership in my regression specifications. My regressions do not explicitly control for the incentive effect of unexercised options due to data constraints. However, this omission is somewhat mitigated by the use of annualized option grant values (i.e., averaged over several years).

[4] Since accounting-based performance measures were used to determine a larger portion of total pay in my early sample period, this will result in an overstatement of the increase over time in firms' calculated pay-performance sensitivities. However, based on the above-cited results of Murphy [1998], I expect this understatement to be minimal.

$$SOPTION = \left[Se^{-dT} N(Z) - Xe^{-rT} N\left(Z - \sqrt{\sigma^2 T}\right)\right] \text{ where}$$

$$Z = \left[\log\left(S_{X}\right) + T\left(r - d + \sigma^{2}{}_{2}\right)\right] \Big/ \sqrt{\sigma^2 T}$$, N is the cumulative probability distribution, S is the year end stock price and X is the exercise price of the option (obtained from the proxy statement).

I annualize option grants over a three-year period (years t-2 to t) in order to allow for the fact that some firms do not grant options in every year.[5] Specifically, I use the average number of options granted and calculate a weighted-average option (exercise) price for those grants. I assume that all options have a 10 year life (T). This assumption is consistent with the findings of Hall and Liebman [1998] and Murhpy [1998] that the vast majority of options have a 10 year duration. I use the annualized interest rate on a 10-yr treasury bond to proxy for the risk free rate (r). I estimate the expected stock return volatility (σ^2) using the standard deviation of stock returns over the grant period.[6] The firm's expected dividend yield (d) is measured by the average annualized dividend yield (i.e., the ratio of dividends per share to year-end stock price) over the grant period.

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[5] For firms in the 1977-82 sample, I use the number of option grants and exercise price from the available proxy statement. In 29% of these observations, the firm reported the total number of options granted and weighted average exercise price corresponding to a multi-year (mostly 4 or 5 year) period. If no options were granted in the proxy year and there were no unexpired options (almost 50% of these observations), the value of option grants and sensitivity of option grants is assumed to be zero.

[6] Specifically, I annualize the standard deviation of monthly stock returns as follows:

$\sqrt{12} \times \sigma^2(\log(1 + RET))$, where RET is the monthly stock return.

The partial derivative of the change in option value ($DELTA = e^{-dT} N(Z)$) is then multiplied by the number of options granted and by the firm's stock price and divided by 100 to obtain my primary measure of incentive-intensity: $INCENT = e^{-dT} N(Z) \times \#OPTIONS \times \left(S/100\right)$. This variable measures the sensitivity of the value of option grants to a one percent change in stock price (e.g., Core and Guay [1999]). Note that this measure of pay-performance sensitivity differs from the calculation used in some prior studies (e.g., Jensen and Murphy [1990], Hall and Liebman [1998]) in that it is calculated directly versus estimated via regression. For example, Jensen and Murphy [1990] regress changes in the natural logarithm of total compensation on logged stock market and accounting returns to obtain estimates of the sensitivity of compensation to stock market and accounting returns. Since I am assuming that most of the sensitivity comes from equity incentives, I can use the information disclosed in the firm's proxy statement to directly calculate the pay-performance sensitivity.

5.3 Alternative Measures of Incentive-Intensity

I test the sensitivity of my main results to the use of several alternative measures of incentive-intensity. Core and Guay [1999] also calculate a measure of the change in CEO wealth to a one percent change in firm value as follows:

$$STK\&OPT\_PPS1 = \left[\left(CEO\_OWN\% + (DELTA * \%OPT)\right) \times \left(S/100\right)\right]$$

where *%OPT* represents the number of options granted divided by the number of shares of the firm's stock outstanding. This measure of CEO incentive-intensity is similar to a more common measure used in prior studies (e.g., Jensen and Murphy [1990]), which reflects the change in value of CEO wealth to a $1,000 change in shareholder wealth:

$$STK\&OPT\_PPS2 = \left[\left(CEO\_OWN\% + \left(DELTA * \%OPT\right)\right) \times 1{,}000\right].$$

Similar to Core and Guay [1999], I calculate this measure of pay-performance sensitivity (*STK&OPT_PPS2*) directly, as opposed to estimating via regression. As noted by Core and Guay [1999], these two measures differ in their interpretation of the principal-agent problem. *STK&OPT_PPS2* assumes that the principal designs incentives in order to eliminate perquisite consumption by a risk-neutral manager. In contrast, *STK&OPT_PPS1* assumes that the principal seeks to motivate a risk-averse and wealth-constrained manager to take firm value-maximizing actions. Thus, *STK&OPT_PPS1* and its component *INCENT* are more consistent with the theoretical framework presented in Chapter 2. Furthermore, since compensation tends to be increasing in firm size (e.g., Murphy [1998]), managers of large firms may own a small percentage of the firm, but have a large portion of their total wealth sensitive to firm value.

Finally, I conduct sensitivity analyses to a relatively simple measure of the incentive-intensity of pay employed in prior studies- the proportion of the value of

equity-based pay to total compensation, *%INCENT* (e.g., Mehran [1995], Core, et al. [1999]).[7]

[7] Total compensation is calculated as the amount of annual compensation (salary, annual bonus and other annual compensation) plus the value of equity-based pay (stock option and restricted stock grants).

CHAPTER 6

SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

6.1 Sample Selection Process

I select two samples of firms in order to examine how the relation between board governance and the design of executive compensation has changed following the increased concern over firms' governance and compensation policies over the past twenty years. The early sample consists of firm observations in the late 1970s and early 1980s, a period of time when few explicit incentives were in place to ensure that either executives' or directors' objectives were aligned with the shareholders' goal of firm value maximization. I contrast these firms' compensation and governance practices to those of firms in recent years (middle 1990s).

I first begin with the sample of firms with ownership and board governance information from Hewitt Associates' 1996 Proxybase database and compensation data for 1996 from Standard and Poor's Execu-Comp database.[1] This first screen results in a maximum potential sample of 858 firms. I then require that the firm also have sufficient accounting data on Compustat and stock return data from CRSP over either

[1] The Proxybase database consists of data coded from the publicly available proxy statements of over 1,500 large, publicly-traded companies, but contains only a subset of the board and ownership characteristics discussed in Chapter 4. For example, the database contains information on the number of directors, their status as insiders vs. outsiders, ownership, committee membership, and the number of meetings. However, the database does not disclose director attendance, membership on other boards, interlocking directorships, or business relationships between directors and the company.

of the two sub-periods (1975-82 and 1994-96).[2] This results in a maximum potential sample of 741 firm observations: 254 observations in the early sub-period and 487 observations in the recent sub-period, with 223 of these firms having an observation in both sub-periods.[3]

I collect the remaining governance and ownership data from proxy statements corresponding to one fiscal year over the period 1977-82 and in 1996, the most recent year all data is available.[4] Thus, while I hypothesize there are changes over time in board and ownership characteristics, I am assuming these characteristics are relatively stable within the six years of the first sub-period. While data constraints prohibit the use of multiple years of governance data in the early sub-period, I find the assumption that governance characteristics are relatively stable over the sub-period 1994-96 is reasonable.[5]

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[2] I require that the firm have Compustat and CRSP data available in the two years prior to the proxy statement year in order to calculate many of the explanatory variables.

[3] My sample selection procedure introduces a survivorship bias since I require firms included in the early sub-sample to still be in existence in 1996. I present descriptive statistics later in this chapter and also conduct sensitivity tests in Chapter 9 to examine whether the sub-set of firms that have observations in both sub-periods differ from the full sub-sample of firms in recent years in terms of their governance and compensation practices. Also note that 31 of the firms with observations in the early sub-period do not have sufficient accounting, stock return or compensation data to be included in the more recent sub-sample.

[4] The sample selection criteria used to select firms for the early sample period is as follows. For the firms meeting the initial data requirements discussed above, I obtained the company's proxy statement for one year (closest to fiscal year 1980) within the five year period 1976-1980. However, proxy statements were available from the University of Chicago library only beginning in fiscal year 1977. Since proxy statements were missing for many firms, I expanded the sample period through fiscal year 1982 in order to obtain a larger sample of firms.

[5] I conducted an analysis of year-to-year changes over the period 1994-96 using governance characteristics available on the Proxybase database. The only governance characteristics that changed

I was able to obtain governance and ownership data from the corporations' proxy statements for 680 of the potential 741 firm observations. This final sample includes 209 firms in the early sub-period (1977-82) and 471 firms 1996, with 178 firms having one observation in both sub-periods. Table 1, Panel A presents the sample distribution by year. Approximately sixty percent of the observations for the early sub-period are in the years 1979-80.

Table 1, Panel B documents the distribution of sample firms across four broad industry groupings: manufacturing firms (two-digit SIC codes less than 40), transportation, communications and utilities firms (40-49), wholesale and retail firms (50-59), and service firms (60-78). The proportion of manufacturing firms in the sample decreases from 67% to 53%, while the proportion of service firms increases from 8% to 18% across the two sub-periods. The other two industry groups remain stable over the two time periods.[6]

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significantly during that time period were declines in the prevalence of pension plans for directors and changes in CEO tenure (as a result of CEO succession). Furthermore, a recent study by Denis and Saran [1999] finds that governance characteristics remain relatively stable over short time periods. For a sample of firms over the period 1983-92 their study finds that less than 15% of firms experience significant annual changes (in any given year) in the three board characteristics they examine: total ownership by officers and directors, fraction of independent outsiders on the board, and total number of directors.

[6] In both sub-periods, my samples have a larger proportion of manufacturing and transportation/communications/utilities firms and a smaller proportion of service firms than does the broader Compustat population. For example, in 1996 the proportion of firms with data on Compustat in these four categories was as follows: manufacturing (46%), transportation/communications/utilities (9%), wholesale/retail (10%) and services (35%).

6.2 Descriptive Statistics of Firm Performance Characteristics

Table 2, Panel A presents descriptive statistics of the firm performance characteristics hypothesized to be determinants of the firm's monitoring and incentive environment. The first (second) column presents the mean and median values of each variable for the 1970s (1990s) sub-samples. The second column also reports the results of non-parametric tests of the difference in mean and median values across the two sub-samples. There has been an increase over the two time periods in firm size (*SIZE*), market to book ratios (*MTB*), prior stock returns (*PERF*) and the variance of earnings changes (*Var_EARN*). On the other hand, there has been a decline in CEO tenure (*CEO_TEN*) and the variance of stock returns (*Var_RET*) and no change in R&D expenditures (*R&D*), leverage (*LEV*) and the proportion of firms in the utilities industry (*UTIL*- 15% in both sub-periods).

The third column presents the mean and median change in each variable over time for the 178 firms with observations in both time periods. Consistent with the full sample, there is a decline in *CEO_TEN* and *Var_RET*, and an increase in *SIZE*, *MTB*, *Var_Earn* and *PERF*. There has also been a significant increase in *LEV* and *R&D* for this sub-sample of firms. Overall, the results of Panel A suggest an increase over time in many of the characteristics proxying for a benefit to monitoring top management.

The lower diagonal of Table 2, Panel B presents a correlation matrix of the hypothesized determinants of the firm's monitoring and incentive environment for the pooled sample of 680 firms. Since the two proxies for investment opportunities (*R&D* and *MTB*) and the two proxies for firm risk (*Var_RET* and *Var_Earn*) are significantly positively correlated (0.26 and 0.27, respectively), I use principal components analysis

to construct the variables *GROW* and *RISK*. [7] Several of the other hypothesized determinants of the monitoring environment are significantly correlated. Therefore, I will examine whether multicollinearity affects the interpretation of my multivariate regression analyses.

The upper diagonal of Table 2, Panel B presents a correlation matrix of *changes in* the hypothesized determinants of the firm's monitoring and incentive environment for the sub-sample of 178 firms with observations in both sub-periods. Similar to the pooled sample, changes over time in both *R&D-MTB* and *Var_RET-Var_Earn* are significantly positively correlated. The other significant correlations among variables in the pooled sample remain significant in the changes analysis. One exception is *LEV-MTB*, which reverses to a positive association. In addition, changes over time in CEO tenure are generally not significantly associated with changes in the other firm performance characteristics.

6.3 Descriptive Statistics of Alternative Monitoring Mechanisms

Table 3 presents a comparison across the two sub-periods of the individual board characteristics that comprise the measure *ALIGN*. The first column presents summary statistics for the 1970s sub-sample, while the second column presents summary statistics for the 1990s sub-sample along with a non-parametric test of the

[7] I use a principal component analysis in order to reduce multicollinearity and measurement error among the proxies in capturing the unobservable constructs (i.e., firm risk and growth opportunities). *RISK* is a factor formed as the first principal component of *Var_RET* and *Var_EARN*, while *GROW* is a factor formed as the first principal component of *MTB* and *R&D*. In both cases the first principal component explains over 50% of total variability of the underlying proxies. See Johnson and Wichern [1992] and Bollen [1989] for further discussion of the use and benefits of principal components analysis.

difference in mean (two sample F-test) and median (Wilcoxon rank sum test) values across the two sub-samples. There is a general change over time in the individual board characteristics consistent with an increase in director independence, accountability and effectiveness. Several characteristics, however, have shifted in the direction opposite that suggested by higher incentive alignment. For example, directors in the recent sub-period are less likely to be subject to annual election and are more likely to receive pensions. The former is likely due to the fact that many firms instituted staggered boards as an anti-takeover measure during the 1980s (Blair [1995]). The latter is due to the fact that director pensions were relatively non-existent prior to the 1980s (e.g., in only 1.9% of my early sub-sample firms). In addition, outside director ownership percentage and director tenure do not differ significantly across the two time periods.

The third column in Table 3 presents a test of whether each governance characteristic has changed significantly over the two time periods for the sub-sample of 178 firms with observations in both sub-periods. The results of this analysis are qualitatively similar to the test of changes across the two sub-samples in column 2, with the one exception that there is no significant change over time in the average total ownership by outside directors.

The final column in Table 3 presents a test of whether each governance characteristic has changed significantly over the two time periods, after controlling for the hypothesized determinants of the firm's monitoring environment documented in Table 2. The test involves estimating the following pooled multiple regression equation:

$$BD\_CHAR_{it} = \alpha_0 + \alpha_1 TIME_{it} + \alpha_2 CEO\_TEN_{it} + \alpha_3 SIZE_{it} + \alpha_4 GROW_{it} + \alpha_5 RISK_{it} + \alpha_6 LEV_{it} + \alpha_7 PERF_{it} + \alpha_8 UTIL_{it} + \sum_{j=9}^{26} \alpha_j IND_{it} + \varepsilon_{it} \quad (6.1)$$

where *BD_CHAR* represents each of the 14 board characteristics, *TIME* = 0 (1) if the observation corresponds to the 1970s (1990s) sub-sample, and the remaining explanatory variables are defined in Table 2. Column 4 presents the coefficient on the *TIME* indicator variable and the t-statistic (in parenthesis) from the estimation of equation (6.1) as a test of whether each board characteristic has changed over the two sub-periods. The multiple regression results document a significant change over the two sub-periods in all of the individual board components, even after controlling for the hypothesized determinants of the monitoring environment. Thus, the results in column 4 provide additional support for the univariate comparisons documented in column 2.

Table 4 presents descriptive statistics on the various monitoring mechanisms. The first column presents summary statistics for the 1970s sub-sample, while the second column presents summary statistics for the 1990s sub-sample along with a non-parametric test of the difference in mean (two sample F-test) and median (Wilcoxon rank sum test) values across the two sub-samples. The final column presents the results of estimating the following multiple regression equation to test the shift in the average value of each variable (*MONITOR*) across the two time periods:

$$MONITOR_{it} = \alpha_0 + \alpha_1 TIME_{it} + \alpha_2 CEO\_TEN_{it} + \alpha_3 SIZE_{it} + \alpha_4 GROW_{it} + \alpha_5 RISK_{it} + \alpha_6 LEV_{it} + \alpha_7 PERF_{it} + \alpha_8 UTIL_{it} + \sum_{j=9}^{26} \alpha_j IND_{it} + \varepsilon_{it} \quad (6.2)$$

Table 4, Panel A presents a comparison over the two sub-periods of aggregate *ALIGN* and its components (*INDEP*, *ACCOUNT*, and *EFFECT*). Each of the board characteristics presented in Table 3 is ranked so that it has a positive association with the extent that the directors' incentives are aligned with the shareholders' goal of firm value maximization.[8] I then take an equal weight aggregate of the 14 ranked board characteristics to form *ALIGN*. Similarly, I also form proxies for the three components of *ALIGN* (*INDEP*, *ACCOUNT*, and *EFFECT*) by taking an equal-weight aggregate of the board characteristics within each of the three categories.

Both *ALIGN* and each of its components have increased significantly over time. While the median firm in the 1970s sub-sample has an *ALIGN* ranking in the 53rd percentile (relative to all firms in both sub-periods), the median firm in the 1990s sub-sample has an *ALIGN* ranking in the 65th percentile. This increase over the two sub-periods of 12 percentile points is similar to the median change for the changes sub-sample of 11.5 percentile points. The relative percentile rank has increased most dramatically for *INDEP*; the median firm increased by 21.4 points across the two sub-periods and by 19 points for the changes sub-sample. The multiple regression results in column 3 show that even after controlling for the hypothesized determinants of

[8] The percentile rank (i.e., 0-100%) is calculated for each of the fourteen board characteristics. If the board characteristic has a positive association with *ALIGN* (e.g., *Total Outside %OWN*), a ranking of 0 (100%) would indicate the firm with the lowest (highest) director ownership percentage. In contrast, if the board characteristic has a negative association with *ALIGN* (e.g., *%INSIDE*), a ranking of 0 (100%) would indicate the firm with the highest (lowest) percentage of inside directors.

board monitoring, *ALIGN* and its components have increased over the two sub-periods by an average of over 10 percentile points.

Table 4, Panel B presents descriptive statistics on managerial and outside block-holder ownership. Outside block-holder and CEO ownership also both increased over time. While the total percent owned by all top officers (*MGRL_OWN%*) has not changed significantly across the two sub-periods, the inflation-adjusted dollar value of managerial ownership has increased from a median value of $32 to $60 million (*MGRL_OWN$*). For the changes sub-sample, *MGRL_OWN%* has significantly declined yet the mean (median) *MGRL_OWN$* has increased by $150 ($24.6) million. This finding of a significant increase in the dollar value of ownership is consistent with the large increase over time in firms' market capitalizations fueled by the surging stock market. The multiple regression results in column 4 document that both outside block-holder and CEO ownership have increased significantly over time. However, measures of total managerial ownership (*MGRL_OWN$* and *MGRL_OWN%*) have not changed significantly over time.

Table 4, Panel C presents descriptive statistics on the measures of incentive-intensity and several key inputs to the calculation of the Black-Scholes value of stock option grants. The portion of firms granting equity-based incentives (*GRANT*) increased from 48% to 88% over the two sub-periods (and by 44.3% for the changes sub-sample). Two key inputs into the Black-Scholes valuation formula are the standard deviation of stock returns (σ _ *RET*) and the expected dividend yield (*DIV_YLD*). Similar to the variance of stock returns documented in Table 2, σ _ *RET* has not changed significantly over the two sub-periods. The dividend yield has declined significantly from 5 to 3.1% (and by 1.6% for the changes sub-sample),

suggesting that equity holders receive less of their total return in the form of dividend payments. The ratio of the year-end stock price relative to the strike (or exercise) price of option grants, a measure of the extent options are granted in the money, has declined from 1.61 to 0.87. This suggests that options were granted in the early sub-period as a reward for past performance. In contrast, recent grants of options that are 'out of the money' provide a way to motivate managers to improve stock price in order to realize any income from the option grant.

The inflation-adjusted dollar value of grants of equity incentives (*SEQUITY*) and the proportion of equity-based to total compensation (*%INCENT*) have both increased dramatically over time. For my full sample, the value of equity incentives represented 11% (*%INCENT*), or less than $100,000 of total compensation (*SEQUITY*), in the early sub-period versus 41% or $2.7 million in recent years. For the changes sub-sample, the value of equity incentives increased over time by 33% or $3.4 million.[9] The partial derivative of the option value to the firm's stock price (*DELTA*) increased from 0.30 to 0.71. My primary measure of incentive-intensity of pay, the value of changes in pay to a 1% change in stock price (*INCENT*), is also significantly higher in recent years. The mean value of *INCENT* increased from approximately $3,500 to $76,300 and by $105,200 for the changes sub-sample.

I also present descriptive statistics for measures of the sensitivity of total CEO wealth to a 1% change in firm value (e.g., Core and Guay [1999]) and to a $1,000

[9] In contrast, Hall and Liebman [1998] document that their sample of S&P500 firms had a higher average value of *%INCENT*; in 1980 the value was 19.1% whereas in 1994 *%INCENT* had increased to 48.4%. This difference is most likely due to the larger size of their sample firms since incentive intensity is positively associated with firm size (see Table 4).

change in firm value (e.g., Jensen and Murphy [1990]). Since these measures are highly skewed I focus on the median values, which have increased significantly over the two sub-periods for both the pooled sample and the changes sub-sample. The median change in CEO wealth of $212,000 for every 1% change in firm value (*STK&OPT_PPS1*) in the most recent sub-period is higher than the $110,500 sensitivity documented by Core and Guay [1999]. The difference is likely due to the larger size of my sample firms (median natural log of sales of 8.0 versus 6.8) given that Core and Guay [1999] demonstrate a positive association between this pay-performance sensitivity measure and firm size. The median change in CEO wealth of approximately $6.00 for a $1,000 change in firm value (*STK&OPT_PPS2*) is similar to the $6.05 pay-performance sensitivity documented in Murphy [1998] for a sample of S&P500 firms in 1996.[10] Furthermore, the multiple regression results in column 4 confirm the finding that all measures of incentive-intensity have increased significantly over the two time periods.

The lower diagonal of Table 5 presents a correlation matrix of board monitoring, CEO incentive, and ownership measures for the pooled sample of 680 firms. Each board incentive alignment component is significantly positively correlated with the aggregate measure *ALIGN*. Board independence is positively correlated with both accountability and effectiveness, yet board effectiveness and accountability are not significantly correlated. CEO ownership is not significantly negatively correlated

[10] Murphy [1998] documents a pay-performance sensitivity for S&P 500 firms with above (below) median sales (his proxy for firm size). I take the average of these two values to arrive at the $6.05 figure. Sixty three percent of the firms in my more recent sub-period are members of the S&P 500.

with the aggregate board incentive alignment measure, but is negatively correlated with board independence. In contrast, CEO ownership is positively correlated with board accountability. Outside block-holder ownership is positively correlated with aggregate board incentive alignment, independence and accountability (but not effectiveness), and with CEO ownership. This finding is consistent with the idea that the presence of institutional investors (directly or indirectly) pressures boards to improve governance. Note that the three components of aggregate *ALIGN* appear to measure distinct board characteristics that are not necessarily found in a given firm. This finding motivates my sensitivity analyses in Chapters 8 and 9 examining how *ACCOUNT, INDEP* and *EFFECT* are associated with the incentive-intensity of CEO pay.

CEO incentive-intensity (*INCENT*) is positively correlated with *%INCENT*, with each measure of board incentive alignment except effectiveness and with outside block-holder ownership, but is negatively correlated with CEO ownership. The correlation between *INCENT* and the two measures of the sensitivity of total CEO wealth to firm performance, *STK&OPT_PPS1* and *STK&OPT_PPS2*, are 0.30 and -0.01, respectively. *STK&OPT_PPS1* and *STK&OPT_PPS2* are significantly positively correlated (0.56) and are very highly correlated with *CEO_OWN* (0.65 and 0.94, respectively), suggesting that much of total CEO incentive-intensity is generated through direct ownership.

The upper diagonal of Table 5 presents a correlation matrix of board monitoring, CEO incentive, and ownership measures for the changes sub-sample of 178 firms. In contrast with the pooled sample, *ΔALIGN* is negatively associated with *ΔINCENT*. Similar to the pooled analysis, however, *ΔALIGN* is positively associated

with *Δ%INCENT*, but is not significantly associated with *ΔCEO_OWN* or either of the incentive-intensity measures that incorporate stock ownership. Finally, changes over time in *INDEP*, *EFFECT* and *ACCOUNT* are not significantly correlated, providing further evidence that these three components of board incentive alignment measure distinct board characteristics.

CHAPTER 7

DETERMINANTS OF THE DEGREE OF BOARD OF DIRECTOR INCENTIVE ALIGNMENT

7.1 Methodology

In order to empirically examine the determinants of the degree of board of director incentive alignment, I estimate the following regression equation:

$$ALIGN_{it} = \alpha_0 + \alpha_1 CEO\_OWN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 RISK_{it} + \alpha_7 LEV_{it} + \alpha_8 PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (7.1)$$

where *ALIGN* corresponds to the overall degree of board incentive alignment as well as the components of *ALIGN*: *ACCOUNT*, *INDEP*, and *EFFECT*. The independent variables are the firm and executive-specific variables defined in Chapter 3.

The results of estimating equation (7.1) for the two sub-periods are presented in Table 6 Panels A - D.[1] Each regression specification includes industry fixed-effects for each industry with at least 10 observations in both sub-periods and at least 5 observations in each sub-period. I report the coefficient estimates for the utilities industry (*UTIL*). The coefficients on the remaining 18 industry indicator variables are generally insignificant and are omitted for presentation purposes. In addition to the adjusted R^2 from the regression equation, I also present the incremental adjusted R^2

[1] In Chapter 9 I present an analysis of the determinants of changes in the degree of board of director incentive alignment.

which represents the increase (or decrease) in adjusted R^2 gained by including the industry indicator variables in the regression equation. I provide this measure to demonstrate how much of the total variation in the dependent variable is explained by the hypothesized determinants as opposed to industry factors, represented by the industry fixed effects.[2]

In each of the regression analyses presented in this chapter and the next, I examine whether the estimations are influenced by the following econometric issues: heteroskedasticity, outliers and influential observations, and multicollinearity.[3] First, I conduct the White [1980] test for heteroskedaticity. In virtually all cases I find that the null hypothesis that all error terms are homoskedastic is rejected. Nonetheless, in each OLS regression I calculate t-statistics using standard errors produced from White's heteroskedastic-consistent covariance matrix. Next I check for outliers and influential observations using the criteria suggested by Belsley, Kuh and Welsch [1980]. Several observations were identified as outliers in the regression specifications presented in Chapter 8. However, the deletion of these observations did not change any inferences. Thus, the regressions that follow present the full sample of firms for each specification. Finally, I employ the multicollinearity regression diagnostics suggested

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[2] The inclusion of industry fixed effects does not qualitatively change the interpretation of any of the explanatory variables.

[3] Heteroskedasticity may result if the error terms are correlated or have unequal variances. Heteroskedasticity is a potential problem in this dataset due to clustering of the data points in time, potential problems with scaling or correlated omitted variables. Outliers or influential observations result from observations with large errors terms or unusual values and may affect the interpretation of the regression results by dramatically changing the estimated regression line, thus affecting both the estimated coefficients and the overall regression fit (i.e., R^2). Any presence of multicollinearity would lead to inflated standard errors, and thus reduce the statistical significance of the hypothesized determinants.

by Belsley, Kuh and Welsch [1980]. I find that none of the regressions estimated in Chapters 7 and 8 are affected by multicollinear independent variables.[4]

7.2 Empirical Results

Table 6, Panel A presents regression results where the dependent variable is *ALIGN*. In the early sub-period, the only significant determinants of *ALIGN* are prior stock price performance and belonging to the utilities industry. The association between *ALIGN* and *PERF* is positive (opposite the prediction), suggesting that financially successful firms also have boards with better monitoring skills. The negative association with *UTIL* is consistent with the hypothesis that there is less need for monitoring in regulated industries. The incremental adjusted R^2 of -0.01 indicates that excluding the industry indicator variables would actually improve the model fit. Thus, very little of the variation in *ALIGN* in the early sub-period is explained by either the hypothesized determinants or the industry indicator variables. In the more recent sub-period, *ALIGN* is negatively associated with CEO tenure and firm size and the addition of the industry indicator variables improves the model fit slightly (incremental adjusted R^2 of 0.02). These results suggest that smaller firms and firms whose CEOs have a lower tenure (and thus, possibly less influence) have boards with better monitoring skills.

Table 6, Panel B presents regression results where the dependent variable is *ACCOUNT*. In the early sub-period, the degree of director accountability (*ACCOUNT*)

[4] In all regression specifications the Variance Inflation Factors for all independent variables are below 30, the cut-off suggested by Belsley, Kuh and Welsch [1980].

is positively associated with CEO tenure and the presence of growth opportunities, while it is negatively associated with firm size and being in the utilities industry. In the recent sub-period, *ACCOUNT* is still negatively associated with being in the utilities industry and is positively associated with outside block-holder ownership, CEO tenure, firm risk and the presence of growth opportunities.

Table 6, Panel C presents regression results where the dependent variable is *INDEP*. In both sub-periods, the degree of director independence (*INDEP*) is negatively associated with CEO ownership. In the early sub-period, *INDEP* is positively associated with firm size and prior stock performance. In the more recent sub-period, *INDEP* is negatively associated with CEO tenure.

Table 6, Panel D presents regression results where the dependent variable is *EFFECT*. In contrast to *ALIGN* and *INDEP*, *EFFECT* is negatively associated with CEO tenure (as predicted) and with firm size (opposite the prediction). In the early sub-period, *EFFECT* is also significantly (positively) associated with prior stock performance and is negatively associated with outside block-holder ownership.

These results suggest that the three individual components of *ALIGN* represent distinct board characteristics that are not all necessarily present in a given firm. In addition, the hypothesized determinants and industry fixed effects provide rather low explanatory power for the observed degree of incentive alignment in all but one regression (adjusted $R^2 \leq 0.10$).

CHAPTER 8

THE RELATION BETWEEN BOARD OF DIRECTOR INCENTIVE ALIGNMENT AND THE DESIGN OF EXECUTIVE PAY

8.1 Methodology

In this chapter I examine the relation between CEO incentives and board incentive alignment, while controlling for other potential monitoring mechanisms (CEO and outside block-holder ownership) and the determinants of the firm's monitoring environment. Similar to Core and Guay [1999], I assume that the board of directors makes two decisions: (1) whether or not to grant options to the CEO, and (2) the value of equity incentives to provide if a grant is made. Using the methodology in Heckman [1979], this process can be summarized as follows:

$$GRANT = \beta_1 X_1 + \varepsilon_1 \qquad (8.1)$$

$$INCENT = \beta_2 X_2 + \varepsilon_2 \text{ if a grant is made, and equal to 0 otherwise} \qquad (8.2)$$

In equations (8.1) and (8.2), X_1 and X_2 are vectors of the hypothesized determinants of the decision to grant options (*GRANT*) and the sensitivity of the value of option grants (*INCENT*), respectively; β_1 and β_2 are the associated coefficient estimates. When $X_1 = X_2$ and β_1 is restricted to equal β_2, the Tobit model results.

The Tobit procedure involves estimating the following cross-sectional regression equation via maximum likelihood methodology:[1]

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.3)$$

As discussed in Chapter 2, I expect that boards with a higher value of *ALIGN* will be both better monitors and evaluators of management. A positive coefficient on *ALIGN* is consistent with the hypothesis that boards with higher incentive alignment design higher-powered incentive contracts (ceteris paribus). On the other hand, a negative association between *INCENT* and *ALIGN* would suggest that monitoring by the board of directors and CEO incentives are substitute monitoring mechanisms.

8.2 Main Empirical Results

The results of estimating equation (8.3) for the two sub-periods using the Tobit regression procedure are presented in Table 7.[2] I take the natural logarithm of the dependent variable *INCENT* since the distribution of values of this measure is highly skewed (see Table 4). *INCENT* is only significantly (positively) associated with

[1] The Tobit estimation procedure is used because the distribution of the dependent variable is truncated at zero (i.e., left censored). Estimation of a truncated distribution via ordinary least squares regression suffers from an omitted variables problem, which will lead to potentially inconsistent and biased coefficient estimates (Greene [1997]).

[2] Each regression specification includes industry fixed-effects for each industry with at least 10 observations in both sub-periods and at least 5 observations in each sub-period. I report the coefficient estimates for the utilities industry (*UTIL*) since this variable is my proxy for a regulated environment.

ALIGN in the more recent sub-period. Also note that in the recent sub-period *INCENT* varies with several of the firm-specific characteristics in the directions hypothesized in Chapter 2, Sections 2 and 3 (e.g., existing CEO ownership, firm size, growth opportunities and regulated environment). However, there is also evidence of inter-temporal variation in the specific determinants of incentive-intensity. For example, *INCENT* is not significantly associated with *SIZE* and *GROW* in the early sub-period, but is significantly positively associated with prior stock performance (*PERF*).

Next I relax the assumption that $\beta_1 = \beta_2$ and present the results of the Heckman [1979] two-stage analysis. The first stage involves estimating the following Probit regression equation:

$$GRANT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.4)$$

where *GRANT* equals 1 if the firm granted any options to its CEO in sub-period *t* and equals zero otherwise. The second stage involves estimating an augmented version of equation (8.3) via OLS for the observations when an option grant is made (i.e., *GRANT* = 1).

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \alpha_{11} LAMBDA_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.5)$$

Note that equation (8.5) includes the variable *LAMBDA* (λ), the inverse of Mill's ratio, which is a decreasing function of the probability that an option grant is made and is defined as follows:

$\lambda = \frac{\phi(\beta_1 X_1)}{\Phi(\beta_1 X_1)}$ where $\phi(\bullet)$ and $\Phi(\bullet)$ are the density and cumulative density, respectively, of the standard normal and $\beta_1 X_1$ are from equation (8.1) (i.e., the fitted values from the estimation of equation (8.4)).

Table 8 presents the results of estimating equations (8.4) and (8.5) for each sub-period. The Probit estimation results in the first two columns generally confirm the results of the Tobit model in Table 7. Similar to the Tobit results, *ALIGN* is only significantly (positively) associated with the decision to make an option grant in more recent years. The only difference from the results in Table 6 is that in the more recent sub-period the coefficient on *GROW* is no longer significant, whereas the coefficient on *RISK* becomes significantly positive. Note, however, that a Likelihood Ratio Test indicates that the goodness of the model fit is low in both sub-periods (Chi-squared value of less than 10%).

The final two columns present the results of the OLS regression estimation of equation (8.5). Unlike the Tobit results in Table 7, the degree of board incentive alignment (*ALIGN*) is positively associated with the sensitivity of the value of equity incentives granted (*INCENT*) in both sub-periods. In addition, many more of the hypothesized determinants are significantly associated with *INCENT* than were in

either the Tobit or Probit estimations.[3] Finally, unlike the Probit model results, the goodness of fit (i.e., adjusted R^2) is high in both sub-periods. The results in Table 8 confirm the findings of Core and Guay [1999] that the restrictions imposed by the Tobit estimation are not valid in this setting. That is, the determinants of the decision to grant options and the value of option grants are not equivalent. Furthermore, my results suggest that the determinants of both *GRANT* and *INCENT* vary inter-temporally.

8.3 Relation between Incentive-Intensity and Individual Components of *ALIGN*

In this section I re-estimate the relation between incentive-intensity and board incentive alignment, replacing the aggregate measure *ALIGN* with its three components: *ACCOUNT*, *INDEP* and *EFFECT*. Following the methodology used in the previous section, I estimate the following three regression equations (Tobit, Probit and OLS, respectively):

$$INCENT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \sum_{j=13}^{30} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.6)$$

$$GRANT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \sum_{j=13}^{30} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.7)$$

$$INCENT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \alpha_{13} LAMBDA_{it} + \sum_{j=14}^{31} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.8)$$

[3] I also re-estimate equation (8.5) omitting the variable *LAMBDA* and find similar results.

Notice that I include all three variables in the same regression; however, results are qualitatively similar if instead I estimate a separate regression for each independent variable. The results of the estimation of equations (8.6) – (8.8) for the two sub-periods are presented in Table 9. The coefficient estimations for all variables other than *ACCOUNT*, *INDEP* and *EFFECT* are omitted as they are qualitatively similar to those presented in Tables 7 and 8. The Tobit regression results demonstrate that *INCENT* is significantly associated with *ACCOUNT* (at the 1% level) and *INDEP* (at the 5% level) only in the recent sub-period. The Probit regression results document that the probability of an option grant is only significantly (positively) associated with *ACCOUNT* (in the recent sub-period). Finally, the OLS regression results provide evidence that each of the components of *ALIGN* (with the exception of *EFFECT* in the early sub-period) is significantly positively associated with the sensitivity of the value of option grants.

Thus, the results in this section suggest that both the degree of board accountability and the degree of board independence are significantly positively associated with use of CEO incentive pay. Furthermore, the results in this chapter document that factors proxying for the board's ability to monitor and evaluate the CEO are positively associated with the decision to grant options only in more recent years, yet are positively associated with the sensitivity of the value of options granted in both sub-periods.

CHAPTER 9

SENSITIVITY ANALYSES

9.1 Changes Over Time in Board and Compensation Structures

Although the cross-sectional regression analysis presented thus far is common in prior corporate governance and compensation studies (e.g., Agrawal and Knoeber [1996], Core, Holthausen and Larcker [1999]), "levels" specification results must be interpreted with care. For example, the regressions cannot distinguish whether the significant explanatory variables are in fact associated with the dependent variable or whether they are just correlated with an omitted variable that is the true source of variation in the dependent variable. While the addition of industry indicator variables help to control for some of the variation due to industry factors, the possibility still remains that firm-specific characteristics not captured by the hypothesized determinants are not controlled for in the regression specification.

An alternative approach would be to estimate the sub-period regressions using a "changes" specification (e.g., Jensen and Murphy [1990]). This approach helps mitigate the omitted variables problem in that taking the change of each variable (e.g., from time $t+1$ to time t) cancels out firm-specific characteristics that are common in both time $t+1$ and time t. However, a changes specification is particularly costly in the current study since it requires collecting multiple years of governance data from company proxy statements. Since obtaining multiple years of governance data was impossible in the early sub-period (i.e., many proxy statements were missing), I have

chosen to present the sub-period analysis subject to the caveat stated above. In addition, in this section I re-estimate the main analyses in Chapters 7 and 8 in order to provide an analysis of changes *between* the two sub-periods for a given firm (for firms with observations in both sub-periods).

First, I re-estimate equation (7.1) for the "changes" sub-sample:

$$\Delta ALIGN_{it} = \alpha_0 + \alpha_1 \Delta CEO\_OWN_{it} + \alpha_2 \Delta OBH\_OWN_{it} + \alpha_3 \Delta CEO\_TEN_{it} + \alpha_4 \Delta SIZE_{it} + \alpha_5 \Delta GROW_{it} + \alpha_6 \Delta RISK_{it} + \alpha_7 \Delta LEV_{it} + \alpha_8 \Delta PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.1)$$

where $\Delta ALIGN$ corresponds to the change over time in the overall degree of board incentive alignment *(ALIGN)* as well as the $\Delta ACCOUNT$, $\Delta INDEP$, and $\Delta EFFECT$. Each dependent and independent variable (with the exception of the industry indicator variables) is calculated as the value of the variable in the recent sub-period less the value in the early sub-period.

The results of estimating equation (9.1) for the four dependent variables are presented in Table 10. Each regression has a low adjusted R^2 and a relatively high incremental adjusted R^2. This finding suggests that more of the inter-temporal variation in the board measures is explained by industry fixed effects than by the hypothesized determinants. In addition, very few of the hypothesized determinants are significantly associated with any of the board monitoring measures and are not consistently significant across dependent variables.

The results of this analysis must also be carefully interpreted. The structure of the sample firms may have changed dramatically over the nearly 20 year period, so that comparing an individual firm over time is not necessarily meaningful. For

example, I would expect that many factors outside my empirical model (e.g., changes in business strategy, focus, level of diversification) also explain much of the change in firms' governance and compensation policies over such a long time period.

9.2 Alternate Measures of Board Incentive Alignment:

In this section I employ an alternative methodology to calculate measures of the individual components of board of director incentive alignment. Specifically, I perform a factor analysis via the principal components method (Johnson and Wichern [1992]) on the 14 individual board components defined in Chapter 4. The first two factors load primarily on variables that measure accountability and independence, while additional factors are difficult to interpret as relating to independence, accountability or effectiveness. Thus, I use only the first two factors (*ACCT_FAC* and *INDP_FAC*) in estimating a series of regression equations analogous to those presented in Chapter 8:

Tobit Regression (9.2):

$$INCENT_{it} = \alpha_0 + \alpha_1 ACCT\_FAC_{it} + \alpha_2 INDP\_FAC_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_OWN_{it} + \alpha_5 CEO\_TEN_{it} + \alpha_6 SIZE_{it} + \alpha_7 GROW_{it} + \alpha_8 RISK_{it} + \alpha_9 LEV_{it} + \alpha_{10} PERF_{it} + \alpha_{11} UTIL_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it}$$

Probit Regression (9.3):

$$GRANT_{it} = \alpha_0 + \alpha_1 ACCT\_FAC_{it} + \alpha_2 INDP\_FAC_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_OWN_{it} + \alpha_5 CEO\_TEN_{it} + \alpha_6 SIZE_{it} + \alpha_7 GROW_{it} + \alpha_8 RISK_{it} + \alpha_9 LEV_{it} + \alpha_{10} PERF_{it} + \alpha_{11} UTIL_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it}$$

OLS Regression (9.4):

$$INCENT_{it} = \alpha_0 + \alpha_1 ACCT\_FAC_{it} + \alpha_2 INDP\_FAC_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_OWN_{it} + \alpha_5 CEO\_TEN_{it} + \alpha_6 SIZE_{it} + \alpha_7 GROW_{it} + \alpha_8 RISK_{it} + \alpha_9 LEV_{it} + \alpha_{10} PERF_{it} + \alpha_{11} UTIL_{it} + \alpha_{12} LAMBDA_{it} + \sum_{j=13}^{30} \alpha_j IND_{it} + \varepsilon_{it}$$

The results of estimating equations (9.2) – (9.4) presented in Table 11 are similar to the results in Table 9. One exception is that the principal component factors for both *ACCOUNT* and *INDEP* (instead of *ACCOUNT* alone) are significantly positive in the recent sub-period Probit regressions (equation (9.3)).

Finally, I examine whether individual board characteristics that proxy for the degree of board accountability (*Total Outside OWN%, %OWN>100K* and *STOCK*) and independence (*%INSIDE, %OutsideAffil* and *IONCOM*) are associated with *INCENT* by estimating the following series of regression equations:

Tobit Regression (9.5):

$$INCENT_{it} = \alpha_0 + \alpha_1 OWN\%_{it} + \alpha_2 \%OWN>100K_{it} + \alpha_3 STOCK_{it} + \alpha_4 \%INSIDE_{it} + \alpha_5 \%OutAff_{it} + \alpha_6 IONCOM_{it} + \alpha_7 CEO\_OWN_{it} + \alpha_8 OBH\_OWN_{it} + \alpha_9 CEO\_TEN_{it} + \alpha_{10} SIZE_{it} + \alpha_{11} GROW_{it} + \alpha_{12} RISK_{it} + \alpha_{13} LEV_{it} + \alpha_{14} PERF_{it} + \alpha_{15} UTIL_{it} + \sum_{j=16}^{33} \alpha_j IND_{it} + \varepsilon_{it}$$

Probit Regression (9.6):

$$GRANT_{it} = \alpha_0 + \alpha_1 OWN\%_{it} + \alpha_2 \%OWN>100K_{it} + \alpha_3 STOCK_{it} + \alpha_4 \%INSIDE_{it} + \alpha_5 \%OutAff_{it} + \alpha_6 IONCOM_{it} + \alpha_7 CEO\_OWN_{it} + \alpha_8 OBH\_OWN_{it} + \alpha_9 CEO\_TEN_{it} + \alpha_{10} SIZE_{it} + \alpha_{11} GROW_{it} + \alpha_{12} RISK_{it} + \alpha_{13} LEV_{it} + \alpha_{14} PERF_{it} + \alpha_{15} UTIL_{it} + \sum_{j=16}^{33} \alpha_j IND_{it} + \varepsilon_{it}$$

OLS Regression (9.7):

$$INCENT_{it} = \alpha_0 + \alpha_1 OWN\%_{it} + \alpha_2 \%OWN > 100K_{it} + \alpha_3 STOCK_{it} + \alpha_4 \%INSIDE_{it} + \alpha_5 \%OutAff_{it}$$
$$+ \alpha_6 IONCOM_{it} + \alpha_7 CEO\_OWN_{it} + \alpha_8 OBH\_OWN_{it} + \alpha_9 CEO\_TEN_{it} + \alpha_{10} SIZE_{it} + \alpha_{11} GROW_{it}$$
$$+ \alpha_{12} RISK_{it} + \alpha_{13} LEV_{it} + \alpha_{14} PERF_{it} + \alpha_{15} UTIL_{it} + \alpha_{16} LAMBDA_{it} + \sum_{j=17}^{34} \alpha_j IND_{it} + \varepsilon_{it}$$

The board characteristics are defined in Chapter 4. The results of estimating equations (9.5) – (9.7) for both sub-periods are presented in Table 12. The table presents the direction each characteristic is associated with the overall measure of board incentive alignment. Due to the positive association documented between *ALIGN* and *INCENT*, I expect the board characteristics to be also associated with *INCENT* in the direction indicated in the table.

In the early sub-period, none of the board characteristics are significant in either the *INCENT* Tobit or *GRANT* Probit regression specifications. However, *OWN%* and *%INSIDE* are both significant in the hypothesized directions in the *INCENT* OLS regression specification. In the recent sub-period, the *INCENT* Tobit and *GRANT* Probit regression specifications provide similar results: all variables are significant in the predicted direction except for *OWN%* and *IONCOM* (which are both insignificantly different from zero). In the *INCENT* OLS regression specification all variables are statistically significant in the hypothesized direction except for *IONCOM* (which is significantly positive contrary to the prediction). These results reinforce the previous findings that individual board characteristics proxying for the degree of director accountability and independence are significantly associated with the incentive-intensity of CEO pay.

9.3 Alternate Measures of Incentive-Intensity

Table 13 Panel A presents the results of re-estimating equations (8.3) and (8.5) for the alternate incentive-intensity measure *%INCENT*. Note that there is no need to re-estimate the Probit model (equation (8.4)) as the dependent variable *GRANT* does not change.

Tobit Regression (9.8):

$$\%INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it}$$

OLS Regression (9.9):

$$\%INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \alpha_{11} LAMBDA_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it}$$

Unlike the results presented in Tables 7 and 8 for the dependent variable *INCENT*, many more of the hypothesized determinants are significant in the hypothesized direction in the *%INCENT* Tobit regression than in the OLS regression. Furthermore, *%INCENT* is significantly positively associated with *ALIGN* in both sub-periods in the Tobit regression, as compared to only in the recent sub-period (at the 10% level) in the OLS regression. Overall, while the significance of *ALIGN* is not as strong, many of the determinants of *INCENT* are also significantly associated with *%INCENT* (e.g., *CEO_OWN*, *CEO_TEN*, *SIZE*, *PERF*, and *UTIL*).

Table 13 Panel B present the results of re-estimating equations (8.6) and (8.8), where *ALIGN* is replaced by its three components:

Tobit Regression (9.10):

$$\%INCENT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \sum_{i=13}^{10} \alpha_i IND_{it} + \varepsilon_{it}$$

OLS Regression (9.11):

$$\%INCENT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \alpha_{13} LAMBDA_{it} + \sum_{i=14}^{11} \alpha_i IND_{it} + \varepsilon_{it}$$

The results are generally weaker than those presented in Table 9. In the Tobit regression, only the coefficient on *INDEP* is significant in the recent sub-period (versus both *ACCOUNT* and *INDEP*). In the OLS regression, *INDEP* is no longer significant in the early sub-period (yet *EFFECT* now is significant), while in the recent sub-period *EFFECT* is no longer significant. The results in Table 13 demonstrate that while there is a positive association between *%INCENT* and *ALIGN*, it is not as strong as the association documented in Tables 6-9, when the dependent variable is defined as *INCENT*.

9.4 Change Over Time in Measures of Incentive-Intensity

Table 14 presents an analysis of changes over time in two measures of the incentive-intensity of CEO pay: *INCENT* and *%INCENT*.

$$\Delta INCENT_{it} = \alpha_0 + \alpha_1 \Delta CEO\_OWN_{it} + \alpha_2 \Delta OBH\_OWN_{it} + \alpha_3 \Delta CEO\_TEN_{it} + \alpha_4 \Delta SIZE_{it} + \alpha_5 \Delta GROW_{it} + \alpha_6 \Delta RISK_{it} + \alpha_7 \Delta LEV_{it} + \alpha_8 \Delta PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.12)$$

$$\Delta\%INCENT_{it} = \alpha_0 + \alpha_1 \Delta CEO\_OWN_{it} + \alpha_2 \Delta OBH\_OWN_{it} + \alpha_3 \Delta CEO\_TEN_{it} + \alpha_4 \Delta SIZE_{it} + \alpha_5 \Delta GROW_{it} + \alpha_6 \Delta RISK_{it} + \alpha_7 \Delta LEV_{it} + \alpha_8 \Delta PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.13)$$

ΔALIGN is not significantly associated with either *ΔINCENT* or *Δ%INCENT*. The results in the first column document that *SIZE* and *GROW* are significant determinants of changes in *INCENT* in the hypothesized direction, while both *CEO_OWN* and *UTIL* are significant at the 10% level in the opposite direction. The incremental adjusted R^2 is high (0.27), suggesting that much of the change in *INCENT* is explained by the industry indicator variables as opposed to the hypothesized determinants. The results in the second column document that neither the hypothesized determinants (with the exception of *UTIL*), nor the industry indicator variables explain much of the inter-temporal variation in *%INCENT*. The results in this table are relatively weak, similar to those presented for *ΔALIGN* in Table 10. As mentioned in Section 1, this finding is not surprising given that the change in each variable is calculated over such a long time period.

9.5 Measures of Incentive-Intensity that Incorporate CEO Ownership:

Table 15, Panels A through C contain the results of estimating the following regression equation for the pooled sub-sample of firms using three alternate measures

of incentive-intensity (*ALT_INCENT*) that take into account the CEO's equity ownership: *CEO_OWN*, *STK&OPT_PPS1* and *STK&OPT_PPS2*.

$$ALT\_INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.14)$$

I take the log transformation of the latter two variables since each measure is highly skewed (see Table 4). However, unlike the previous regressions, these regressions are estimated via OLS since there is no issue of a truncated distribution (i.e., all CEOs have some level of existing ownership).

Table 15, Panel A presents the results of estimating equation (9.14) where the dependent variable is the CEO ownership percentage (*CEO_OWN*). Similar to the univariate correlations presented in Table 4, CEO ownership is not significantly associated with *ALIGN* in any regression specification. As expected, the level of CEO ownership is significantly positively associated with CEO tenure. The negative predicted association with firm size only holds for the more recent sub-period, while there is a positive association with firm risk in the early sub-period. Finally, the association between changes in CEO ownership and both *RISK* and *UTIL* is negative, however most of the explanatory power in this model is due to the inclusion of industry indicator variables (i.e., incremental adjusted R^2 of 0.14).

Table 15, Panel B presents the results of estimating equation (9.14) where the dependent variable is a measure of the change in total CEO wealth to a one percent change in firm value (*STK&OPT_PPS1*). Similar to Core and Guay [1999], I find this

measure is positively associated with CEO tenure, firm size, growth opportunities and prior performance and is lower for utilities. Unlike Core and Guay [1999], I find no positive association with firm risk. In fact, I find a significant negative association between *STK&OPT_PPS1* and *RISK* in the recent sub-period. Finally, based on the high correlation with *CEO_OWN* reported in Table 5, it is not surprising to find that *STK&OPT_PPS1* is not significantly associated with *ALIGN* in any regression specification.

Table 15, Panel C presents the results of estimating equation (9.14) where the dependent variable is the pay-performance sensitivity measure used in Jensen and Murphy [1990] and Hall and Liebman [1998] (i.e., the change in CEO wealth to a $1,000 change in firm value (*STK&OPT_PPS2*)). Consistent with Core and Guay [1999], I find that this measure is positively associated with CEO tenure and negatively associated with firm size and being a utility. I also find a positive association with outside block-holder ownership, leverage and prior firm performance. The results for the changes sub-sample are similar to those for the sub-period analysis. Finally, similar to *CEO_OWN* and *STK&OPT_PPS1*, this measure is not significantly associated with *ALIGN* in any regression specification.

9.6 Tests for Simultaneity

Several recent studies examine whether various ownership and control mechanisms are associated with firm value while considering that these factors are endogenously determined (e.g., Agrawal and Knoeber [1996], Himmelberg, Hubbard, and Palia [1999] and Palia [1998]). OLS regressions which treat an endogenous variable as an exogenous, independent variable will produce biased estimates if the

variable is correlated with the regression error term. In this situation, simultaneous estimation techniques such as two-stage least squares (2SLS) will produce unbiased (but perhaps not efficient) estimates of the relation between the two endogenous variables. For example, the finding of a positive relation between *INCENT* and *ALIGN* may be due to the fact that both variables are associated with a common omitted variable. If these two endogenous variables are not simultaneously determined, however, the independent variable *INCENT* will not be correlated with the regression error term and OLS will produce unbiased and efficient estimates of the relation between the endogenous variables (Greene [1997]).

I employ a Hausman [1978] test to examine whether board incentive alignment, incentive-intensity, and CEO ownership are simultaneously determined. This test involves two steps. First, I regress each of the three monitoring mechanisms against the potential exogenous determinants of all three of the monitoring mechanisms and save the fitted values of each dependent variable and residual from each regression ('first stage' regression). This regression includes the hypothesized determinants and the alternative monitoring mechanism *OBH_OWN*, since I consider ownership by outside block-holders to be outside the board and management's control (i.e., predetermined).

$$MONITOR_{it} = \alpha_0 + \alpha_1 OBH\_OWN_{it} + \alpha_2 CEO\_TEN_{it} + \alpha_3 SIZE_{it} + \alpha_4 GROW_{it} + \alpha_5 RISK_{it} + \alpha_6 LEV_{it} + \alpha_7 PERF_{it} + \alpha_8 UTIL_{it} + \sum_{j=9}^{26} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.15)$$

MONITOR corresponds to each of the three potentially endogenous monitoring mechanisms: *ALIGN*, *INCENT* and *CEO_OWN*. The usefulness of the fitted values

obtained from the estimation of equation (9.15) as instruments for the actual value of the monitoring mechanism will be positively related to the goodness of fit of the regression equation. However, the adjusted R^2 from the estimations of equation (9.15) are relatively low (especially for the specifications where *ALIGN* is the dependent variable).[1] The low explanatory power suggests that these variables are not particularly good instruments. Thus, the significance of the subsequent two-stage least squares results should be interpreted with caution.

In order for the system of equations to be determined, at least two exogenous variables must be excluded from each equation. I use the discussion in Chapter 3, Section 2 and the results of the 'first stage' regressions to choose which variables to exclude.[2] The resulting equations meet the rank and order conditions for identification as a system of equations (Greene [1997]).

$$ALIGN_{it} = \alpha_0 + \alpha_1 INCENT_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 RISK_{it} + \alpha_7 LEV_{it} + \alpha_8 PERF_{it} + \sum_{j=9}^{26} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.16)$$

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[1] The adjusted R^2 from the estimation of equation (9.15) for each of the dependent variables in the two sub-periods are as follows: *ALIGN* (0.06, 0.06), *CEO_OWN* (0.13, 0.14), and *INCENT* (0.38, 0.36).

[2] *OBH_OWN* is insignificant in each of the 'first stage' regressions, and thus is excluded in the 'second stage'. Similarly, I exclude *UTIL* in the *ALIGN* specification and *RISK* in the *INCENT* specification due to their lack of significance in any sub-period. Finally, I exclude *PERF* in the *CEO_OWN* regression since I do not expect prior performance will influence existing CEO ownership (and the variable is insignificant in the first stage).

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 LEV_{it} + \alpha_7 PERF_{it} + \alpha_8 UTIL_{it} + \sum_{j=9}^{26} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.17)$$

$$CEO\_OWN_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 INCENT_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 RISK_{it} + \alpha_7 LEV_{it} + \alpha_8 UTIL_{it} + \sum_{j=9}^{26} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.18)$$

The Hausman [1978] test consists of estimating equations (9.16) – (9.18), however where each monitoring mechanism appears as an explanatory variable it is replaced with *both* its fitted values and the residual values from each of the respective 'first stage' regressions (i.e., equation (9.15)). I also re-estimate regression equation (9.17), replacing *ALIGN* with *ACCOUNT*, *INDEP* or *EFFECT*. I then conduct an F-test of whether the residuals are jointly equal to zero. If the F-test cannot be rejected (i.e., the residuals are not significantly different from zero), then simultaneous equations estimation techniques are unnecessary and will produce less efficient estimates than OLS.

I conduct these tests and find that the Hausman test (weakly) supports the hypothesis that *INCENT* is simultaneously determined with *ALIGN* and *INDEP* (but not with either *ACCOUNT* or *EFFECT*). Furthermore, the test cannot reject the hypothesis that *CEO_OWN* is exogenous in all regression specifications. Thus, I treat *CEO_OWN* as an exogenous independent variable.

Table 16 presents the results of 'second-stage' two-stage least squares (2SLS) estimation of the relation between *INCENT* and *ALIGN* or each of its components:

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN\_HAT_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 LEV_{it} + \alpha_7 PERF_{it} + \alpha_8 UTIL_{it} + \sum_{j=9}^{26} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.19)$$

In each regression the endogenous explanatory variable (either *ALIGN*, *ACCOUNT*, *INDEP* or *EFFECT*) is replaced by its fitted value from the estimation of equation (9.19). Note that the positive association between *INCENT* and each of the measures of the degree of board incentive alignment becomes insignificant, suggesting that the associations documented in Tables 7-9 are driven by the fact that these two variables are simultaneously determined. As mentioned previously, however, the results of the two-stage least squares estimation should be interpreted with care since the low explanatory power in the first stage regressions suggests that the hypothesized determinants are not particularly good instruments for the endogenous variable *ALIGN*. This lack of power makes it especially difficult to find a statistically significant association between *INCENT* and *ALIGN* in the second stage regression.

9.7 Other Sensitivity Analyses:

I conduct several additional sensitivity analyses of the relation between the incentive -intensity of CEO pay and the degree of board incentive alignment (i.e., equations (8.3) – (8.5) from Tables 7 and 8). Table 17 presents the results of how these sensitivity analyses affect the estimated coefficient on the variable *ALIGN*. The first row in Table 17 presents the coefficient estimates on *ALIGN* from the estimation of equations (8.3) – (8.5). The next row presents the coefficient estimates for *ALIGN*

from a re-estimation of equations (8.3) – (8.5) on the sub-sample of manufacturing firms (i.e., SIC codes less than 40). The results are qualitatively similar to those for the full sample, with the exception that the coefficient on *ALIGN* is no longer significant in the early sub-period OLS regression.

In order to examine the issue of survivorship bias, I next compare the estimation of the three equations for the sub-set of 178 firms with observations in both sub-periods ('Survivors') versus the 293 firms with observations only in the second sub-period ('Non-survivors). I find that the significance of the coefficient estimate on *ALIGN* is slightly lower for the 'Survivors' (and not significant in the Probit model). Thus, the results for firms in the more recent sub-period reported in Chapter 8 are not driven by the presence of firms that remained in existence for the full sample period (i.e., since the middle 1970s).

In an attempt to control for additional omitted determinants of the monitoring environment, I add the industry-average incentive-intensity of CEO pay (*IND_INCENT*) as an additional independent variable to the existing regression.[3] While *IND_INCENT* is significantly positive in each regression estimation (not shown), the results in row 5 demonstrate that the addition of this variable does not change the significance of the coefficient on *ALIGN*. Finally, adding both *IND_INCENT* and *IND_ALIGN* to the regression equations (row 6) does not affect the coefficient estimates on the variable *ALIGN*. Thus, to the extent the industry average

[3] I calculate the industry average as the median value for all firms in the same two-digit SIC code when there are at least five other firms in the same two-digit SIC code. Otherwise, the variable is calculated using the median value for all firms in the same one-digit SIC code.

of *ALIGN* and *INCENT* proxy for omitted determinants, the results in this analysis provide further support that the results documented in Tables 7 and 8 are not spurious.

Next, I repeat the analysis in Tables 6, Panel A (determinants of *ALIGN*) after replacing several of the alternate monitoring mechanisms and hypothesized determinants with alternative proxies. First, I replace *OBH_OWN* with the indicator variable *OBH* and find that the variable remains insignificantly different from zero in both sub-periods. I then repeat all analyses replacing CEO ownership percentage with the natural log of the dollar value of CEO ownership (*$CEO_OWN*), the total managerial ownership percentage (*%MGRL_OWN*), and the natural log of the dollar value of managerial ownership (*$MGRL_OWN*). The results for both sub-periods remain qualitatively similar. Furthermore, if I replace *CEO_TEN* with *CEO_AGE*, the log of total assets with the log of market value of equity as a proxy for *SIZE*, the principal component *GROW* with *MTB*, or the principal component *RISK* with *Var_RET* the interpretation of the coefficient estimates are unchanged.

Finally, I repeat the analyses in Tables 7 and 8, replacing the alternative monitoring mechanisms and hypothesized determinants with the alternative proxies mentioned above. Unlike *CEO_OWN*, the measures of the dollar value of CEO and managerial ownership are significantly positively associated with *INCENT* in the recent sub-period. *CEO_AGE* is significantly negatively associated with *INCENT* in both sub-periods (as hypothesized). All of the other results are qualitatively similar to those presented in Tables 7 and 8. Furthermore, none of the above-mentioned alternative specifications affects the observed relation between *INCENT* and *ALIGN*.

CHAPTER 10

SUMMARY AND POTENTIAL EXTENSIONS

10.1 Summary of Results

I document a significant shift over the past 20 years in board characteristics measuring director ownership, independence, and effectiveness in the direction consistent with a general increase in directors' incentive alignment. In addition, I confirm results documented in prior studies (e.g., Hall and Liebman [1998]) that measures of the incentive-intensity of executive pay have increased over this same time period. Univariate correlations show that measures of incentive-intensity of CEO pay are positively associated with board incentive alignment (and the extent of director accountability, independence and effectiveness). Both board incentive alignment and the incentive-intensity of CEO pay are positively correlated with outside block-holder ownership, and are negatively correlated with existing levels of CEO ownership.

Next, I empirically examine the determinants of cross-sectional and inter-temporal differences in the degree of board incentive alignment. I find that several of the same factors associated with cross-sectional and inter-temporal differences in the incentive-intensity of CEO pay also affect the degree of board incentive alignment (e.g., firm size, prior firm performance, and CEO tenure). However, the individual components of board incentive alignment (accountability, independence and effectiveness) vary significantly. Furthermore, industry factors explain much more of

the observed changes over time in the degree of board incentive alignment than do the hypothesized determinants of the firm's monitoring environment.

My main test examines whether the degree of board incentive alignment and incentive-intensity are significantly associated, after controlling for the hypothesized determinants of the firm's monitoring environment and alternative monitoring mechanisms. I find that the incentive-intensity of CEO pay is positively associated with the degree of board incentive alignment (and the degree of board independence and accountability). I also examine several alternative measures of incentive-intensity and find that the positive association with board incentive alignment holds for measures of incentive pay, but not for incentive measures that include the effects of current share ownership.

My results suggest that board and compensation structures have both evolved over time in a direction consistent with improved monitoring and evaluation of top management. In addition, my results suggest that monitoring by the board of directors and the use of incentive pay are complementary mechanisms employed to reduce the managerial moral hazard problem. Furthermore, I find that the design of incentive contracts is simultaneously determined with the degree of board incentive alignment. I interpret these findings as consistent with theoretical predictions that incentive contracts and board monitoring structures are endogenously determined, and thus have both evolved over time in an attempt to mitigate managerial moral hazard.

10.2 Potential Extensions

In this section I discuss several potential extensions of the current study. Theory suggests that in addition to the slope of the pay/wealth-performance relation,

the convexity of incentives must be managed in order to induce managers to make optimal investing and financing decisions (e.g., Smith and Stultz [1985], Milgrom and Roberts [1992]). Convexity is the sensitivity of managerial wealth (or pay) to the volatility of equity value. Increasing the convexity of the manager's incentives will reduce the likelihood that the manager will pass up valuable, risky projects. Guay [1999] examines the determinants of the convexity of CEO incentives and the relation between convexity and firm risk. His study finds that stock options, but not current stock ownership, significantly increase the sensitivity of CEO's wealth to equity risk (i.e., convexity). Furthermore, the convexity of a CEO's pay is positively associated with stock price volatility and the presence of investment opportunities.

Consistent with my hypothesis that a board with higher incentive alignment will design managerial incentives that attempt to maximize shareholder value, I expect there is a positive association between board incentive alignment and the convexity of incentive pay. Furthermore, Guay's finding that convexity is positively influenced by the presence of stock options suggests that the convexity of CEO pay has also increased over time. Thus, it would be interesting to extend this analysis to examine the association between board of director incentive alignment and other aspects of compensation design, including the convexity of incentive pay.

Another future avenue of research is an examination of the relation between the board governance and compensation structures of firms that were acquisition targets. As discussed in Chapter 6, my sample selection criteria are such that the sample of firms in my early sub-period were 'survivors' of the 1980s and 1990s takeover waves. In fact, many of these firms may have adapted their governance structures to fend off hostile takeover attempts or were themselves acquirers. Denis

and Saran [1999] provide some evidence that large changes in director and officer ownership and in the proportion of independent directors are associated with corporate control threats. My sensitivity analysis does not uncover any significant differences in the relation between the governance structures of these survivors in comparison to the full sample of firms in the recent sub-period. However, an empirical design that focuses on how the governance-compensation relation changes around hostile takeover attempts (or a comparison of takeover versus non-takeover targets) may provide additional evidence on whether the threat of takeover serves as an effective monitoring mechanism.

In this study I hypothesized that the board designs contracts and evaluates managers based on observable firm outcomes. My focus was on the use of firm stock price performance as the primary device the directors use to motivate and evaluate managers. Prior studies have documented that the portion of executive pay determined by accounting performance measures has declined over time (e.g., Bushman, Engel, Milliron, and Smith [2000]). This finding is consistent with the hypothesis that accounting information has become a less useful tool in evaluating and motivating managers. Bushman, Chen, Engel and Smith [1999] posit that accounting information is a less timely measure of managerial performance and find evidence that firms with less timely accounting information have in place governance systems that facilitate direct monitoring of the firm's management[1] and rely more heavily on equity-based incentive plans. Prior studies have documented that the association between current

[1] They categorize boards with fewer directors, a high percentage of inside directors, outside directors with industry experience, and high director ownership as more conducive to direct monitoring.

accounting earnings and stock returns (one measure of the timeliness of earnings) has declined over the past 30 years.[2] Thus, one explanation for the increase in board monitoring and the use of equity-based incentive pay may be a declining relevance in the accounting signals previously used to measure and reward executive performance.

[2] See, for example, Collins, Maydew and Weiss [1997] and Francis and Schipper [1999].

APPENDIX: TABLES

Table 1
Sample Size by Proxy Statement Year and Industry Group

Panel A: *Sample Size by Proxy Statement Year*

	1970s sub-sample	1990s sub-sample
Maximum # observations*	254	487
Missing governance data / proxy statements	(45)	(16)
Final sample**	209	471
Years		
1977	36 (17%)	--
1978	19 (9%)	--
1979	67 (32%)	--
1980	57 (27%)	--
1981	22 (11%)	--
1982	8 (4%)	--
1996	--	471 (100%)
Total	209	471

Panel B: *Sample Size by Industry Group*

Industry Classification (2 digit SIC code)	1970s sub-sample	1990s sub-sample
Manufacturing (0-39)	140 (67%)	251 (53%)
Transp./Comm./Util. (40-49)	37 (18%)	91 (19%)
Wholesale/Retail (50-59)	16 (8%)	44 (9%)
Services (60-78)	16 (8%)	85 (18%)
Total	209	471

* The initial screen required the firm to have governance data on Hewitt Associates' 1996 Proxybase database, compensation data for 1996 on Standard and Poor's Execu-Comp database, and sufficient accounting data on Compustat and stock return data on CRSP to calculate the performance measures in Table 2.

** 178 firms have observations in both sample periods.

Table 2
Descriptive Statistics

Panel A: *Mean and (Median) Values of Firm-Specific Performance Characteristics*

	1970s Sample (N=209)	1990s Sample* (N=471)	Δs Sample** (N=178)
CEO_TEN	9.3 (7)	8.2 (5)[b]	-2.7[a] (-2)[a]
SIZE	7.45 (7.43)	8.38[a] (8.18)[a]	1.24[a] (1.17)[a]
MTB	1.47 (1.13)	2.52[a] (2.02)[a]	1.33[a] (0.93)[a]
R&D	0.02 (0.003)	0.02 (0)	0.002[c] (0)
Var_RET	0.15 (0.11)	0.14 (0.09)[b]	-0.04[a] (-0.02)[a]
Var_Earn	0.004 (0.001)	0.06 (0.001)[a]	0.02 (0.004)[a]
LEV	0.24 (0.21)	0.24 (0.24)	0.03[a] (0.02)[b]
PERF	0.15 (0.12)	0.17 (0.15)[c]	0.02 (0.05)[b]
UTIL	15%	15%	16%

[a,b,c] Significant at the 1, 5 and 10% probability levels, respectively.
* Represents significance of difference across 1970s and 1990s samples of mean (Probability >F from ANOVA test) and median (Probability > |Z| from Wilcoxon rank sum test) values.
** Represents significance of difference across time for the 178 firms with observations in both sub-periods.

Table 2 (Cont'd)
Descriptive Statistics

Panel B: *Correlation Matrix for Changes Sub-Sample (N=178 in upper diagonal) and Pooled Sample (N=680 in lower diagonal)*

	CEO_TEN	*SIZE*	*MTB*	*R&D*	*Var_RET*	*Var_Earn*	*LEV*	*PERF*
CEO_TEN		*0.04*	*0.11*	*0.02*	*-0.08*	*0.08*	*0.01*	*-0.13**
SIZE	-0.07*		*-0.09*	*-0.12*	*-0.20****	*-0.14**	*0.42****	*0.15**
MTB	-0.02	-0.03		*0.18****	*0.10*	*-0.06*	*0.17***	*0.04*
R&D	-0.02	-0.08**	0.26***		*0.09*	*-0.01*	*-0.13**	*0.20****
Var_RET	0.08**	-0.11***	0.02	0.20***		*0.35****	*0.04*	*0.28****
Var_Earn	-0.04	-0.02	-0.05	-0.02	0.27***		*-0.04*	*-0.15**
LEV	-0.08**	0.17***	-0.15***	-0.28***	-0.07*	0.002		*0.12*
PERF	-0.04	0.01	0.05	0.21***	0.21***	-0.01	-0.10***	
UTIL	-0.04	0.04	-0.22***	-0.24***	-0.18***	-0.03	0.42***	-0.09**

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively.

Table 2 (Cont'd)
Descriptive Statistics

CEO_TEN = The number of years the CEO has held the position of chief executive officer as of the proxy statement year;
SIZE = Natural log of total assets averaged over year of the proxy statement and prior two years;
GROW = First principal component based on the following two factors:
MTB = Ratio of the market to book value of equity averaged over year of the proxy statement and prior two years;
R&D = Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;
RISK = First principal component based on the following two factors:
Var_Earn = the variance of changes in earnings for firm *i* over prior 10 years;
Var_RET = the variance of monthly stock returns for firm *i* over prior 30-60 months;
LEV = Ratio of debt to total assets averaged over year of the proxy statement and prior two years;
PERF = Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;
UTIL = 1 if company's two digit SIC code is 49, and = 0 otherwise.

Table 3
Summary Statistics for Components of Degree of Board Incentive Alignment (*ALIGN*)

Board Characteristics	Assoc. w/ *ALIGN*	1970s Sample (N=209)	1990s Sample* (N=471)	Δs Sample** (N=178)	Shift over Time (N=680)***
Accountability					
Total Outside %OWN	(+)	0.02% (0.003%)	0.03% (0.003%)	-0.003% (-0.001%)	0.01% (1.72)[c]
%OWN>100K	(+)	38.6% (33.3%)	72.9%[a] (80.0%)[a]	33.4%[a] (36.4%)[a]	21.7% (11.14)[a]
STOCK	(+)	0% (0%)	68.2%[a] (100%)[a]	71.8%[a] (100%)[a]	66.2% (19.23)[a]
ANNUAL	(+)	84.7% (100%)	41.9%[a] (0%)[a]	-44.1%[a] (0%)[a]	-46.0% (-11.37)[a]
Effectiveness					
%OVER69	(-)	7.9% (0%)	14.5%[a] (11.1%)[a]	4.6%[a] (0.5%)[a]	8.0% (6.47)[a]
%TEN>15	(-)	18.3% (17.6%)	19.5% (17.6%)	-0.9% (-0.9%)	3.6% (2.86)[a]
BD_SIZE	(-)	14.1 (14)	11.7[a] (11)[a]	-2.5[a] (-2)[a]	-3.5 (-8.59)[a]
ATTEND<75	(-)	7.8% (6.7%)	3.8%[a] (0%)[a]	-4.7%[a] (-5.3%)[a]	-3.9% (-5.46)[a]
%EXPER	(+)	18.5% (12.5%	24.8%[a] (22.2%)[a]	8.7%[a] (9.1%)[a]	7.6% (4.21)[a]
%BUSY	(-)	38.0% (23.1%)	25.5%[a] (21.4%)	-6.8%[a] (1.0%)	-16.4% (-5.14)[a]
Independence					
%INSIDE	(-)	32.2% (30.0%)	19.5%[a] (16.7%)[a]	-14.0%[a] (-13.0%)[a]	-11.0% (-10.88)[a]
%Outside Affiliate	(-)	40.9% (40.0%)	24.7%[a] (22.2%)[a]	-18.3%[a] (-18.8%)[a]	-9.6% (-7.83)[a]
IONCOM	(-)	72.2% (100%)	10.3%[a] (0%)[a]	-63.8%[a] (-100%)[a]	-58.7% (-18.57)[a]
PENS	(-)	1.9% (0%)	23.4%[a] (0%)[a]	24.3%[a] (0%)[a]	22.5% (6.93)[a]

Table 3 (Cont'd)
Summary Statistics for Components of Degree of Board Incentive Alignment (*ALIGN*)

[a,b,c] Significant at the 1, 5 and 10% probability levels, respectively.
* Represents significance of difference across 1970s and 1990s samples of mean (Probability >F from ANOVA test) and median (Probability > |Z| from Wilcoxon rank sum test) values.
** Represents significance of difference across time for the 178 firms with observations in both sub-periods.
*** Coefficient (t-statistic) on *TIME* from the following multiple regression for the pooled sample of firms (N=680), where *TIME* =0 (1) if the observation is in the 1970s (1990s) sub-sample, *BD_CHAR* corresponds to each of the 14 board characteristics defined below, and the explanatory variables are defined in Table 2:

$$BD\_CHAR_{it} = \alpha_0 + \alpha_1 TIME_{it} + \alpha_2 CEO\_TEN_{it} + \alpha_3 SIZE_{it} + \alpha_4 GROW_{it} + \alpha_5 RISK_{it} + \alpha_6 LEV_{it} + \alpha_7 PERF_{it} + \alpha_8 UTIL_{it} + \sum_{i=9}^{26} \alpha_i IND_{it} + \varepsilon_{it} \quad (6.1)$$

Board Characteristics that comprise the degree of board incentive alignment (*ALIGN*):

- Total outside director ownership percentage (*Total Outside %OWN*);
- Proportion of directors with ownership >$100,000 in 1996 dollars (*%OWN>100K*);
- A portion of director pay is equity-based (*STOCK*);
- Directors are subject to annual election (*ANNUAL*);
- Percentage of directors over age 69 (*%OVER69*);
- Director tenure is greater than 15 years (*%TEN>15*);
- Number of directors on board (*BD_SIZE*);
- Percentage of directors who attended less than 75% of board meetings (*ATTEND<75%*);
- Percentage of directors with experience in firm's core business (*%EXPER*);
- Percentage of directors with greater than 3 (if employed) or 5 (if retired) additional corporate directorships (*%BUSY*);
- Percentage of inside (employee) directors (*%INSIDE*);
- Percentage of outside directors who are affiliated- i.e., former employees, relatives of inside directors, have consulting or business relationship with company, or interlocking directorship (*%Outside Affiliate*);
- At least one insider on audit, nominating or compensation committee (*IONCOM*);
- Directors receive pensions (*PENS*).

Table 4

Descriptive Statistics for Board Incentive Alignment, Alternate Monitoring Mechanisms and Measures of CEO Incentive-Intensity

Panel A: *Mean (Median) Values of Board Incentive Alignment Measures*

	1970s Sample (N=209)	1990s Sample* (N=471)	Δs Sample** (N=178)	Shift over Time (N=680)***
ALIGN	53.7 (53.1)	64.7[a] (65.1)[a]	11.0[a] (11.5)[a]	11.3 (16.79)[a]
INDEP	54.5 (53.1)	73.1[a] (74.5)[a]	19.9[a] (19.0)[a]	10.2 (8.93)[a]
ACCOUNT	56.4 (55.4)	66.3[a] (67.4)[a]	7.8[a] (7.6)[a]	10.2 (13.75)[a]
EFFECT	51.4 (50.8)	57.9[a] (57.6)[a]	7.3[a] (6.8)[a]	10.2 (7.06)[a]

Panel B*: Mean (Median) Values of Managerial and Outside Block-holder Ownership*

	1970s Sample (N=209)	1990s Sample* (N=471)	Δs Sample** (N=178)	Shift over Time (N=680)***
Outside Blockholder(OBH)	28.7%	60.3%[a]	60.0%[a]	35.4% (9.02)[a]
OBH_OWN%	3.5% (0%)	9.9%[a] (7%)[a]	5.3%[a] (0%)[a]	7.85% (9.32)[a]
MGRL_OWN%	5.0% (1.34%)	4.1% (1.61%)	-2.4%[a] (-0.2%)[a]	0.7% (0.97)
$MGRL_OWN (1996 $1000s)	110,474 (31,843)	196,520[c] (59,843)[a]	150,200[a] (24,612)[a]	11,913 (0.22)
CEO_OWN%	0.01% (0.001%)	0.02%[c] (0.005%)[a]	0.002% (0.001%)[a]	0.01% (3.44)[a]
$CEO_OWN (1996 $1000s)	17,702 (2,216)	76,249[a] (16,190)[a]	62,915[a] (8,877)[a]	40,821 (2.19)[b]

Table 4 (Cont'd)
Descriptive Statistics for Board Incentive Alignment, Alternate Monitoring Mechanisms and Measures of CEO Incentive-Intensity

***Panel C**: Mean (Median) Values of Inputs to Incentive-Intensity Measures*

	1970s Sample (N=209)	1990s Sample* (N=471)	Δs Sample** (N=178)	Shift over Time (N=680)***
GRANT	47.8%	88.2%[a]	44.3%[a]	35.8% (10.76)[a]
σ_RET	7.1% (5.5%)	8.4% (5.7%)	2.2% (-0.3%)	--
DIV_YLD	5.0% (5.0%)	3.1%[a] (2.8%)[a]	-1.6%[a] (-1.2%)[a]	--
Stock/Strike	1.61 (0)	0.87[a] (0.93)[a]	0.42[a] (0.39)[a]	--
$EQUITY (1996 $1000s)	177.5 (0)	2,711.4[a] (930)[a]	3,405[a] (1,121)[a]	1,517.9 (2.55)[b]
%INCENT	11.3% (0%)	41.0%[a] (39.8%)[a]	33.4%[a] (34.3)%[a]	24.9% (11.40)[a]
DELTA	0.30 (0)	0.71[a] (0.76)[a]	0.36[a] (0.26)[a]	--
INCENT (1996 $1000s)	3.5 (0)	76.3[a] (26.5)[a]	105.2[a] (34.3)[a]	43.4 (2.20)[b]
STK&OPT_PPS1 (1996 $1000s)	178.0 (24.1)	693.6[a] (212.0)[a]	488.9[a] (160.3)[a]	180.9 (13.60)***
STK&OPT_PPS2 (1996 $s)	22.9 (2.6)	18.5 (6.0)[a]	1.4 (1.6)[a]	1.2 (9.63)***

Table 4 (Cont'd)

Descriptive Statistics for Board Incentive Alignment, Alternate Monitoring Mechanisms and Measures of CEO Incentive-Intensity

[a,b,c] Significant at the 1, 5 and 10% probability levels, respectively.

* Represents significance of difference across 1970s and 1990s samples of mean (Probability >F from ANOVA test) and median (Probability > |Z| from Wilcoxon rank sum test) values.

** Represents significance of difference across time for the 178 firms with observations in both sub-periods.

*** Coefficient (t-statistic) on *TIME* from the following multiple regression for the pooled sample of firms (N=680), where *TIME =0 (1)* if the observation is in the 1970s (1990s) sub-sample, *MONITOR* corresponds to each of the variables defined below, and the explanatory variables are defined in Table 2:

$$MONITOR_{it} = \alpha_0 + \alpha_1 TIME_{it} + \alpha_2 CEO\_TEN_{it} + \alpha_3 SIZE_{it} + \alpha_4 GROW_{it} + \alpha_5 RISK_{it} + \alpha_6 LEV_{it} + \alpha_7 PERF_{it} + \alpha_8 UTIL_{it} + \sum_{j=9}^{16} \alpha_j IND_{it} + \varepsilon_{it} \quad (6.2)$$

TIME= 0 (1) if the observation belongs to the 1970s (1990s) sub-sample;

ALIGN= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed in Chapter 4, Section 2;

INDEP= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Independence' in Chapter 4, Section 2;

ACCOUNT= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Accountability' in Chapter 4, Section 2;

EFFECT= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Effectiveness' in Chapter 4, Section 2;

OBH= 1 if there is at least one unaffiliated person or group of persons that own greater than 5% of the common equity in the proxy statement year; =0 otherwise;

OBH OWN%= Proportion of common equity owned by outside block-holders in the proxy statement year;

MGRL_OWN%= Proportion of common equity owned by all directors and named executive officers as a group in the proxy statement year;

MGRL_OWN$= Inflation-adjusted (to $1996) value of common equity owned by all directors and named executive officers as a group in the proxy statement year;

CEO_OWN%= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;

CEO_OWN$= Inflation-adjusted (to $1996) value of common equity owned by the chief executive officer (CEO) in the proxy statement year;

GRANT= 1 if the firm granted stock options to the CEO in the period covered in the proxy statement year;

σ_RET = Standard deviation of monthly stock returns (annualized), calculated over the period corresponding to the option grant;

Table 4 (Cont'd)

Descriptive Statistics for Board Incentive Alignment, Alternate Monitoring Mechanisms and Measures of CEO Incentive-Intensity

DIV_YIELD= Ratio of the dividends paid on common stock to the market value of equity, averaged over the period corresponding to the option grant;

Stock/Strike= Ratio of the firm's stock price at the end of the proxy statement year to the average strike (exercise) price of the options granted in sub-period *t*;

$EQUITY= Inflation-adjusted (to $1996) value of stock options granted to the CEO in the period covered in the proxy statement year (see Chapter 5, Section 2 for option value calculation (*$OPTION=$EQUITY*);

%INCENT= Proportion of the value of stock options granted to total compensation of the CEO (salary, bonus and other annual compensation plus the value of option grants) in the period covered in the proxy statement year.

INCENT= *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where *DELTA* is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation).

$$STK\ \&\ OPT\_PPS1 = \left[(CEO\_OWN\% + (DELTA * \%OPT)) \times {}^{(PRICE * SHR)}/_{100} \right].$$

$STK\ \&\ OPT\_PPS2 = [(CEO\_OWN\% + (DELTA * \%OPT)) \times 1{,}000]$, where *%OPT* is the number of options issued relative to the total common shares outstanding (*SHR*).

Table 5

Correlation Matrix of Measures of Board Incentive Alignment, Alternate Monitoring Mechanisms and CEO Incentive-Intensity: Changes Sub-Sample (N=178 in upper diagonal) and Pooled Sample (N=680 in lower diagonal)

	ALIGN	*INDEP*	*ACCOUNT*	*EFFECT*	*CEO_OWN*	*OBH_OWN*	*INCENT*	*STK& OPT_PPS1*	*STK& OPT_PPS2*	*%INCENT*
ALIGN		*0.55****	*0.35****	*0.73****	*-0.04*	*-0.03*	*-0.23****	*-0.11*	*0.03*	*0.15**
INDEP	0.65***		*-0.06*	*0.07*	*0.03*	*0.01*	*-0.09*	*-0.10*	*0.03*	*0.11*
ACCOUNT	0.51***	0.11***		*-0.12*	*-0.01*	*-0.12*	*-0.09*	*0.11*	*0.04*	*0.01*
EFFECT	0.70***	0.14***	0.01		*-0.06*	*0.02*	*-0.19***	*-0.15**	*-0.01*	*0.13*
CEO_OWN	-0.01	-0.10***	0.13***	-0.02		*0.06*	*0.03*	*0.34****	*0.99****	*0.01*
OBH_OWN	0.20***	0.13***	0.22***	0.06	0.10**		*-0.03*	*0.09*	*0.04*	*0.03*
INCENT	0.07*	0.09**	0.07*	-0.02	-0.01	-0.01		*0.67****	*0.10*	*0.59****
STK& OPT_PPS1	0.06	0.001	0.21***	-0.06	0.65***	0.11***	0.30***		*0.38****	*0.45****
STK& OPT_PPS2	-0.04	-0.13***	0.12***	-0.03	0.94***	0.09**	-0.01	0.56***		*0.05*
%INCENT	0.43***	0.36***	0.32***	0.18***	-0.06	0.18***	0.56***	0.15***	-0.09**	

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively.

Table 5 (Cont'd)

Correlation Matrix of Measures of Board Incentive Alignment, Alternate Monitoring Mechanisms and Measures of CEO Incentive-Intensity

ALIGN= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed in Chapter 4, Section 2;

INDEP= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Independence' in Chapter 4, Section 2;

ACCOUNT= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Accountability' in Chapter 4, Section 2;

EFFECT= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Effectiveness' in Chapter 4, Section 2;

OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year;

CEO_OWN= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;

INCENT= *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where *DELTA* is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation);

$$STK\ \&\ OPT\_PPS1 = \left[(CEO\_OWN\% + (DELTA * \%OPT)) \times {(PRICE * SHR)}/{100}\right].$$

$STK\ \&\ OPT\_PPS2 = [(CEO\_OWN\% + (DELTA * \%OPT)) \times 1{,}000]$, where *%OPT* is the number of options issued relative to the total common shares outstanding (*SHR*);

%INCENT= Proportion of the value of stock options granted to total compensation of the CEO (salary, bonus and other annual compensation plus the value of option grants) in the period covered in the proxy statement year.

Table 6
Determinants of the Degree of Board of Director Incentive Alignment

$$ALIGN_{it} = \alpha_0 + \alpha_1 CEO\_OWN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 RISK_{it} + \alpha_7 LEV_{it} + \alpha_8 PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (7.1)$$

Panel A: Dependent Variable= ALIGN

		1970s	*1990s*
CEO_OWN	(-)	-4.67 (-0.32)	-13.48 (-1.55)
OBH_OWN	(+)	-0.04 (-0.74)	0.02 (0.69)
CEO_TEN	(-)	-0.08 (-1.47)	-0.12 (-2.58)***
SIZE	(+)	-0.54 (-1.22)	-0.74 (-2.10)**
GROW	(+)	0.44 (0.77)	0.52 (1.16)
RISK	(+)	0.15 (0.32)	0.35 (1.22)
LEV	(-)	-1.83 (-0.39)	-3.50 (-1.11)
PERF	(-)	7.45 (3.34)***	0.47 (-0.19)
UTIL	(-)	-3.21 (-1.69)*	-1.71 (-1.18)
# Obs.		209	471
Adj. R^2		0.06	0.06
Incremental Adj. R^2		-0.01	0.02

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

Table 6 (Cont'd)
Determinants of the Degree of Board of Director Incentive Alignment

$$ALIGN_{it} = \alpha_0 + \alpha_1 CEO\_OWN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 RISK_{it} + \alpha_7 LEV_{it} + \alpha_8 PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (7.1)$$

Panel B: Dependent Variable= ACCOUNT

		1970s	*1990s*
CEO_OWN	(-)	28.19 (0.86)	9.52 (0.64)
OBH_OWN	(+)	0.17 (1.23)	0.10 (1.69)*
CEO_TEN	(-)	0.26 (2.37)**	0.11 (1.45)
SIZE	(+)	-1.45 (-2.10)**	0.01 (0.02)
GROW	(+)	1.54 (1.74)*	1.66 (2.39)**
RISK	(+)	1.00 (1.36)	0.69 (1.72)*
LEV	(-)	1.02 (0.14)	-3.42 (-0.64)
PERF	(-)	0.80 (0.21)	2.55 (0.75)
UTIL	(-)	-8.66 (-3.40)***	-9.25 (-3.76)***
# Obs.		209	471
Adj. R^2		0.19	0.10
Incremental Adj. R^2		-0.02	0.01

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

Table 6 (Cont'd)
Determinants of the Degree of Board of Director Incentive Alignment

$$ALIGN_{it} = \alpha_0 + \alpha_1 CEO\_OWN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 RISK_{it} + \alpha_7 LEV_{it} + \alpha_8 PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (7.1)$$

Panel C: Dependent Variable= INDEP

		1970s	*1990s*
CEO_OWN	(-)	-58.54 (-2.58)**	-36.77 (-2.63)**
OBH_OWN	(+)	-0.06 (-0.45)	0.04 (0.70)
CEO_TEN	(-)	-0.13 (-1.25)	-0.23 (-2.56)**
SIZE	(+)	2.15 (2.38)**	0.26 (0.39)
GROW	(+)	-1.30 (-1.36)	0.10 (0.12)
RISK	(+)	0.50 (0.59)	-0.51 (-1.02)
LEV	(-)	-16.24 (-1.51)	-2.25 (-0.33)
PERF	(-)	9.98 (1.80)*	0.83 (0.24)
UTIL	(-)	1.53 (0.37)	2.19 (0.81)
# Obs.		209	471
Adj. R^2		0.09	0.04
Incremental Adj. R^2		0.03	0.01

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

Table 6 (Cont'd)
Determinants of the Degree of Board of Director Incentive Alignment

$$ALIGN_{it} = \alpha_0 + \alpha_1 CEO\_OWN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 RISK_{it} + \alpha_7 LEV_{it} + \alpha_8 PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (7.1)$$

Panel D: Dependent Variable= EFFECT

		1970s	*1990s*
CEO_OWN	(-)	4.72 (0.20)	-12.26 (-1.16)
OBH_OWN	(+)	-0.17 (-1.72)*	-0.04 (-0.66)
CEO_TEN	(-)	-0.28 (-2.77)***	-0.20 (-2.66)***
SIZE	(+)	-1.70 (-1.86)*	-1.94 (-3.55)***
GROW	(+)	0.88 (0.77)	0.09 (0.14)
RISK	(+)	-0.73 (-0.94)	0.69 (1.55)
LEV	(-)	6.40 (0.72)	-3.70 (-0.70)
PERF	(-)	10.15 (2.98)***	-1.22 (-0.38)
UTIL	(-)	-3.02 (-0.93)	0.89 (0.39)
# Obs.		209	471
Adj. R^2		0.05	0.07
Incremental Adj. R^2		0.00	0.01

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

Table 6 (Cont'd)
Determinants of the Degree of Board of Director Incentive Alignment

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).
ALIGN= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed in Chapter 4, Section 2;
INDEP= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Independence' in Chapter 4, Section 2;
ACCOUNT= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Accountability' in Chapter 4, Section 2;
EFFECT= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Effectiveness' in Chapter 4, Section 2;
OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year;
CEO_OWN= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;
CEO_TEN= The number of years the CEO has held the position of chief executive officer as of the proxy statement year;
SIZE= Natural log of total assets averaged over year of the proxy statement and prior two years;
GROW= First principal component based on the following two factors:
MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;
R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;
RISK= First principal component based on the following two factors:
Var_Earn= the variance of changes in earnings for firm *i* over prior 10 years;
Var_RET= the variance of monthly stock returns for firm *i* over prior 30-60 months;
LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;
PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;
UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise;
IND= 18 2-digit SIC code industry indicator variables.

Table 7

Tobit Regressions of Relation between Incentive-Intensity (*INCENT*) and Board of Director Incentive Alignment (*ALIGN*).

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.3)$$

		INCENT	
		1970s	*1990s*
ALIGN	(?)	0.07 (0.71)	0.07 (11.55)***
CEO_OWN	(-)	-174.1 (10.55)***	-17.06 (17.77)***
OBH_OWN	(+)	-0.04 (0.24)	-0.001 (0.004)
CEO_TEN	(-)	-0.06 (0.78)	0.01 (0.09)
SIZE	(+)	0.78 (2.00)	0.75 (22.44)***
GROW	(+)	0.83 (2.18)	0.62 (9.35)***
RISK	(-)	0.08 (0.02)	-0.02 (0.01)
LEV	(-)	-5.45 (1.15)	1.87 (1.67)
PERF	(?)	6.22 (5.07)**	-0.04 (0.002)
UTIL	(-)	-5.36 (5.24)**	-5.49 (71.27)***
# Obs.		209	471

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively based on the Chi-squared distribution. Note that there is no generally accepted measure of the goodness of fit for Tobit regressions. However, an estimation of equation (8.3) via OLS regression produces an adjusted R^2 of 0.27 and 0.43 in the 1970s and 1990s sub-periods, respectively.

Table 7 (Cont'd)

Tobit Regressions of Relation between Incentive-Intensity (*INCENT*) and Board of Director Incentive Alignment (*ALIGN*).

ALIGN= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed in Chapter 4, Section 2;

INCENT = *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where DELTA is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation).

OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year;

CEO_OWN= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;

CEO_TEN= Number of years CEO has held the position of chief executive officer as of the proxy statement year;

SIZE = Natural log of total assets averaged over year of the proxy statement and prior two years;

GROW= First principal component based on the following two factors:

MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;

R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;

RISK= First principal component based on the following two factors:

Var_Earn= the variance of changes in earnings for firm *i* over prior 10 years;

Var_RET= the variance of monthly stock returns for firm *i* over prior 30-60 months;

LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;

PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;

UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise.

IND= 18 2-digit SIC code industry indicator variables.

Table 8

Two-Stage Regressions (Probit and OLS) of Relation between *INCENT* and *ALIGN*

		GRANT (Probit- eqn (8.4))		*INCENT (OLS - eqn (8.5))*	
		1970s	*1990s*	*1970s*	*1990s*
ALIGN	(?)	0.001 (0.002)	0.03 (5.94)**	0.05 (2.57)***	0.18 (3.48)***
CEO_OWN	(-)	-35.5 (8.55)***	-5.34 (10.32)***	-40.7 (-0.98)	-25.6 (-3.04)***
OBH_OWN	(+)	-0.01 (0.57)	-0.002 (0.04)	-0.03 (-1.25)	-0.13 (-1.95)*
CEO_TEN	(-)	-0.02 (1.09)	-0.01 (0.85)	-0.06 (-1.69)*	-0.05 (-2.56)***
SIZE	(+)	0.14 (1.54)	0.20 (4.56)**	0.82 (3.96)***	1.76 (4.66)***
GROW	(+)	0.17 (2.00)	0.15 (1.38)	0.60 (2.12)**	1.21 (4.60)***
RISK	(-)	0.02 (0.04)	0.47 (3.63)**	-0.01 (-0.08)	2.87 (3.21)***
LEV	(-)	-0.67 (0.46)	0.87 (0.94)	-1.90 (-1.10)	4.48 (2.91)***
PERF	(?)	1.13 (3.21)***	-0.52 (1.16)	3.99 (2.50)**	-2.85 (-2.79)***
UTIL	(-)	-0.91 (4.37)**	-1.19 (13.94)***	-3.48 (-2.38)**	-8.28 (-4.22)***
LAMBDA	(?)	--	--	-2.63 (-1.44)	-6.80 (-3.37)***
# Obs.		209	471	100	416
Adjusted R^2		--	--	0.42	0.40

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. Significance of coefficient estimates for the Probit regression (equation (8.4)) are based on the Chi-squared distribution. T-statistics for OLS regression (equation (8.5)) are calculated using the White heterskedastic-consistent covariance matrix (White [1980]). Note that no one goodness of fit measure is generally accepted for the Probit model. However, a Likelihood Ratio test shows that the Probit models have low explanatory power in both sub-periods (Chi-squared values are not significant at the 10% probability level).

Table 8 (Cont'd)

Two-Stage Regressions (Probit and OLS) of Relation between *INCENT* and *ALIGN*

Probit Regression:

$$GRANT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.4)$$

OLS Regression:

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \alpha_{11} LAMBDA_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.5)$$

where the regression variables are defined as follows:

Dependent Variables:

GRANT= 1 if the CEO received an option grant in sub-period *t*, and =0 otherwise;

INCENT= Natural log of *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where *DELTA* is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation).

Independent Variables:

ALIGN= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics summarized in Chapter 4, Section 2;

OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year;

CEO_OWN= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;

CEO_TEN= Number of years CEO has held the position of chief executive officer as of the proxy statement year;

SIZE= Natural log of total assets averaged over year of the proxy statement and prior two years;

GROW= First principal component based on the following two factors:

MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;

R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;

RISK= First principal component based on the following two factors:

Var_Earn= the variance of changes in earnings for firm *i* over prior 10 years;

Var_RET= the variance of monthly stock returns for firm *i* over prior 30-60 months;

LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;

PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;

UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise;

LAMBDA= Inverse Mill's ratio (see Chapter 8, Section 2 for definition);

IND= 18 2-digit SIC code industry indicator variables.

Table 9

Sensitivity Analysis to Alternate Measures of *ALIGN* (Components Analysis). Each regression controls for alternative monitoring mechanisms and for the firm performance characteristics expected to be determinants of the monitoring environment and two digit SIC code industry fixed effects (coefficient estimates not reported).

	INCENT (Tobit eqn (8.6))		*GRANT (Probit eqn (8.7))*		*INCENT (OLS eqn (8.8))*	
	1970s	*1990s*	*1970s*	*1990s*	*1970s*	*1990s*
ACCOUNT	-0.02	0.04	-0.002	0.01	0.02	0.09
	(0.18)	(8.88)***	(0.03)	(5.37)**	(2.01)**	(3.52)***
INDEP	0.05	0.03	0.01	0.01	0.03	0.06
	(1.49)	(5.13)**	(0.57)	(1.74)	(1.85)*	(3.62)***
EFFECT	0.01	0.01	-0.01	0.01	0.01	0.04
	(0.02)	(1.11)	(0.23)	(0.62)	(0.35)	(3.34)***
#Obs.	209	471	209	471	100	415
Adj. R^2	--	--	--	--	0.42	0.40

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. Significance of coefficient estimates for the Tobit and Probit regressions (equations (8.6) and (8.7)) are based on the Chi-squared distribution. T-statistics for OLS regression (equation (8.8)) are calculated using the White heterskedastic-consistent covariance matrix (White [1980]). Note that no one goodness of fit measure is generally accepted for the Tobit or Probit models. However, a Likelihood Ratio test shows that the Probit models have low explanatory power in both sub-periods (Chi-squared values are not significant at the 10% probability level). Also note that an estimation of equation (8.6) via OLS regression produces an adjusted R^2 of 0 26 and 0.43 in the 1970s and 1990s sub-periods, respectively.

Table 9 (Cont'd)

Sensitivity Analysis to Alternate Measures of *ALIGN* (Components Analysis).

Tobit Regression:

$$INCENT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \sum_{j=13}^{30} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.6)$$

Probit Regression:

$$GRANT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \sum_{j=13}^{30} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.7)$$

OLS Regression:

$$INCENT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \alpha_{13} LAMBDA_{it} + \sum_{j=14}^{31} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.8)$$

Dependent Variables:

GRANT= 1 if the CEO received an option grant in sub-period *t*, and =0 otherwise;

INCENT= Natural log of *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where *DELTA* is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation).

Independent Variables:

INDEP= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Independence' in Chapter 4, Section 2;

ACCOUNT= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Accountability' in Chapter 4, Section 2;

EFFECT= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics listed under the category 'Effectiveness' in Chapter 4, Section 2;

OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year;

CEO_OWN= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;

CEO_TEN= Number of years CEO has held the position of chief executive officer as of the proxy statement year;

SIZE= Natural log of total assets averaged over year of the proxy statement and prior two years;

GROW= First principal component based on the following two factors:

MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;

R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;

RISK= First principal component based on the following two factors:

Var_Earn= the variance of changes in earnings for firm *i* over prior 10 years;

Var_RET= the variance of monthly stock returns for firm *i* over prior 30-60 months;

Table 9 (Cont'd)

Sensitivity Analysis to Alternate Measures of *ALIGN* (Components Analysis).

LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;
PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;
UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise;
LAMBDA= Inverse Mill's ratio (see Chapter 8, Section 2 for definition);
IND= 18 2-digit SIC code industry indicator variables

Table 10
Multiple Regression Analysis of Changes Over Time in *ALIGN* (N=178)

$$\Delta ALIGN_{it} = \alpha_0 + \alpha_1 \Delta CEO\_OWN_{it} + \alpha_2 \Delta OBH\_OWN_{it} + \alpha_3 \Delta CEO\_TEN_{it} + \alpha_4 \Delta SIZE_{it} + \alpha_5 \Delta GROW_{it} + \alpha_6 \Delta RISK_{it} + \alpha_7 \Delta LEV_{it} + \alpha_8 \Delta PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.1)$$

		ΔALIGN	*ΔACCOUNT*	*ΔINDEP*	*ΔEFFECT*
ΔCEO_OWN	(-)	-0.18 (-0.83)	-0.05 (-0.23)	0.28 (0.84)	-0.57 (-1.23)
ΔOBH_OWN	(+)	-0.04 (-0.55)	-0.33 (-2.74)***	0.15 (1.07)	0.03 (0.26)
ΔCEO_TEN	(-)	-0.14 (-1.93)*	0.13 (1.09)	0.03 (0.19)	-0.42 (-3.70)***
ΔSIZE	(+)	-1.03 (-0.77)	-1.91 (-0.89)	2.28 (0.88)	-2.65 (-1.11)
ΔGROW	(+)	1.07 (1.30)	1.44 (1.14)	-1.02 (-0.71)	2.22 (1.57)
ΔRISK	(+)	-0.18 (-0.50)	2.13 (2.60)***	-0.42 (-0.43)	-1.57 (-2.83)***
ΔLEV	(-)	-7.87 (-1.26)	-4.82 (-0.48)	-22.49 (-2.08)**	-0.16 (-0.01)
ΔPERF	(-)	3.79 (1.34)	3.83 (0.70)	5.31 (0.94)	2.74 (0.55)
UTIL	(-)	0.43 (0.16)	2.21 (0.48)	7.51 (1.60)	-5.46 (-1.31)
Adj. R^2		0.09	0.05	0.10	0.13
Incremental Adj. R^2		0.11	0.03	0.13	0.11

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]). *ΔVariable*= the value of the regression variable in sub-period $t+1$ (i.e., 1990s sub-sample) less the value in sub-period t (i.e., 1970s sub-period). See Table 6 for corresponding cross-sectional regressions for each sub-period and variable definitions.

Table 11

Sensitivity Analysis to Alternate Measures of *ALIGN* (Factor Analysis). Each regression controls for alternative monitoring mechanisms and for the firm performance characteristics expected to be determinants of the monitoring environment and two digit SIC code industry fixed effects (coefficient estimates not reported).

	INCENT (Tobit eqn (9.2))		*GRANT (Probit eqn (9.3))*		*INCENT (OLS eqn (9.4))*	
	1970s	*1990s*	*1970s*	*1990s*	*1970s*	*1990s*
ACCT_FAC	0.11 (0.01)	0.93 (17.16)***	-0.04 (0.03)	0.36 (9.73)***	0.45 (1.89)*	2.03 (3.86)***
INDP_FAC	1.02 (1.77)	0.89 (15.06)**	0.18 (1.30)	0.43 (10.73)***	0.76 (1.99)**	2.45 (3.92)***
#Obs.	209	471	209	471	100	415
Adj. R^2	--	--	--	--	0.42	0.41

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. Significance of coefficient estimates for the Tobit and Probit regressions (equations (9.2) and (9.3)) are based on the Chi-squared distribution. T-statistics for OLS regression (equation (9.4)) are calculated using the White heterskedastic-consistent covariance matrix (White [1980]). Note that no one goodness of fit measure is generally accepted for the Tobit or Probit models. However, a Likelihood Ratio test shows that the Probit models have low explanatory power in both sub-periods (Chi-squared values are not significant at the 10% probability level). Also note that an estimation of equation (9.2) via OLS regression produces an adjusted R^2 of 0 26 and 0.43 in the 1970s and 1990s sub-periods, respectively.

Table 11 (Cont'd)

Sensitivity Analysis to Alternate Measures of *ALIGN* (Factor Analysis).

Tobit Regression (9.2):

$$INCENT_{it} = \alpha_0 + \alpha_1 ACCT\_FAC_{it} + \alpha_2 INDP\_FAC_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_OWN_{it} + \alpha_5 CEO\_TEN_{it}$$
$$+ \alpha_6 SIZE_{it} + \alpha_7 GROW_{it} + \alpha_8 RISK_{it} + \alpha_9 LEV_{it} + \alpha_{10} PERF_{it} + \alpha_{11} UTIL_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it}$$

Probit Regression (9.3):

$$GRANT_{it} = \alpha_0 + \alpha_1 ACCT\_FAC_{it} + \alpha_2 INDP\_FAC_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_OWN_{it} + \alpha_5 CEO\_TEN_{it}$$
$$+ \alpha_6 SIZE_{it} + \alpha_7 GROW_{it} + \alpha_8 RISK_{it} + \alpha_9 LEV_{it} + \alpha_{10} PERF_{it} + \alpha_{11} UTIL_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it}$$

OLS Regression (9.4):

$$INCENT_{it} = \alpha_0 + \alpha_1 ACCT\_FAC_{it} + \alpha_2 INDP\_FAC_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_OWN_{it} + \alpha_5 CEO\_TEN_{it}$$
$$+ \alpha_6 SIZE_{it} + \alpha_7 GROW_{it} + \alpha_8 RISK_{it} + \alpha_9 LEV_{it} + \alpha_{10} PERF_{it} + \alpha_{11} UTIL_{it} + \alpha_{12} LAMBDA_{it} + \sum_{j=13}^{30} \alpha_j IND_{it} + \varepsilon_{it}$$

Dependent Variables:

GRANT= 1 if the CEO received an option grant in sub-period *t*, and =0 otherwise;

INCENT= Natural log of *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where *DELTA* is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation).

Independent Variables:

ACCT_FAC and INDP_FAC= Board incentive alignment measures formed via a factor analysis of the 14 board characteristics summarized in Table 3. See Chapter 9, Section 2 for further details;

OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year;

CEO_OWN= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;

CEO_TEN= Number of years CEO has held the position of chief executive officer as of the proxy statement year;

SIZE= Natural log of total assets averaged over year of the proxy statement and prior two years;

GROW= First principal component based on the following two factors:

MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;

R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;

RISK= First principal component based on the following two factors:

Var_Earn= the variance of changes in earnings for firm *i* over prior 10 years;

Var_RET= the variance of monthly stock returns for firm *i* over prior 30-60 months;

LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;

PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;

UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise;

LAMBDA= Inverse Mill's ratio (see Chapter 8, Section 2 for definition);

IND= 18 2-digit SIC code industry indicator variables.

Table 12

Sensitivity Analysis to Individual Board Characteristics. Each regression controls for alternative monitoring mechanisms and for the firm performance characteristics expected to be determinants of the monitoring environment and two digit SIC code industry fixed effects (coefficient estimates not reported).

		INCENT (Tobit eqn (9.5))		*GRANT (Probit eqn (9.6))*		*INCENT (OLS eqn (9.7))*	
		1970s	*1990s*	*1970s*	*1990s*	*1970s*	*1990s*
Total Outside %OWN	(+)	6.90 (0.42)	3.00 (2.12)	3.46 (1.10)	1.68 (1.24)	8.45 (1.78)*	7.05 (2.70)***
%OWN>100K	(+)	3.56 (1.30)	2.13 (7.93)***	0.64 (0.98)	0.66 (2.72)*	1.13 (0.99)	3.86 (3.78)***
STOCK	(+)	-41.89 (0.01)	0.95 (6.79)***	-7.54 (0.01)	0.47 (5.66)**	^	2.21 (3.05)***
%INSIDE	(-)	-6.84 (2.53)	-4.54 (7.48)***	-0.86 (0.94)	-2.93 (9.83)***	-3.63 (-2.38)**	-13.82 (-3.14)***
%Outside Affiliate	(-)	-1.24 (0.10)	-3.41 (7.10)***	-0.11 (0.02)	-1.39 (4.07)**	0.78 (0.78)	-7.24 (-3.45)***
IONCOM	(-)	-0.29 (-.06)	0.10 (0.04)	-0.07 (0.08)	0.52 (1.91)	-0.15 (-0.58)	2.09 (2.65)***
#Obs.		209	471	209	471	100	415
Adj. R^2		--	--	--	--	0.42	0.41

Table 12 (Cont'd)
Sensitivity Analysis to Individual Board Characteristics.

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. Significance of coefficient estimates for the Tobit and Probit regressions (equations (9.5) and (9.6)) are based on the Chi-squared distribution. T-statistics for OLS regression (equation (9.7)) are calculated using the White heterskedastic-consistent covariance matrix (White [1980]). Note that no one goodness of fit measure is generally accepted for the Tobit or Probit models. However, a Likelihood Ratio test shows that the Probit models have low explanatory power in both sub-periods (Chi-squared values are not significant at the 10% probability level). Also note that an estimation of equation (9.5) via OLS regression produces an adjusted R^2 of 0.26 and 0.43 in the 1970s and 1990s sub-periods, respectively.
^ None of the firm's granting options granted equity-based compensation to directors. Thus, this variable was omitted for this regression (i.e., *STOCK* = 0 for all observations).

Tobit Regression (9.5):

$$INCENT_{it} = \alpha_0 + \alpha_1 OWN\%_{it} + \alpha_2 \%OWN>100K_{it} + \alpha_3 STOCK_{it} + \alpha_4 \%INSIDE_{it} + \alpha_5 \%OutAff_{it} + \alpha_6 IONCOM_{it} + \alpha_7 CEO\_OWN_{it} + \alpha_8 OBH\_OWN_{it} + \alpha_9 CEO\_TEN_{it} + \alpha_{10} SIZE_{it} + \alpha_{11} GROW_{it} + \alpha_{12} RISK_{it} + \alpha_{13} LEV_{it} + \alpha_{14} PERF_{it} + \alpha_{15} UTIL_{it} + \sum_{j=16}^{33} \alpha_j IND_{it} + \varepsilon_{it}$$

Probit Regression (9.6):

$$GRANT_{it} = \alpha_0 + \alpha_1 OWN\%_{it} + \alpha_2 \%OWN>100K_{it} + \alpha_3 STOCK_{it} + \alpha_4 \%INSIDE_{it} + \alpha_5 \%OutAff_{it} + \alpha_6 IONCOM_{it} + \alpha_7 CEO\_OWN_{it} + \alpha_8 OBH\_OWN_{it} + \alpha_9 CEO\_TEN_{it} + \alpha_{10} SIZE_{it} + \alpha_{11} GROW_{it} + \alpha_{12} RISK_{it} + \alpha_{13} LEV_{it} + \alpha_{14} PERF_{it} + \alpha_{15} UTIL_{it} + \sum_{j=16}^{33} \alpha_j IND_{it} + \varepsilon_{it}$$

OLS Regression (9.7):

$$INCENT_{it} = \alpha_0 + \alpha_1 OWN\%_{it} + \alpha_2 \%OWN>100K_{it} + \alpha_3 STOCK_{it} + \alpha_4 \%INSIDE_{it} + \alpha_5 \%OutAff_{it} + \alpha_6 IONCOM_{it} + \alpha_7 CEO\_OWN_{it} + \alpha_8 OBH\_OWN_{it} + \alpha_9 CEO\_TEN_{it} + \alpha_{10} SIZE_{it} + \alpha_{11} GROW_{it} + \alpha_{12} RISK_{it} + \alpha_{13} LEV_{it} + \alpha_{14} PERF_{it} + \alpha_{15} UTIL_{it} + \alpha_{16} LAMBDA_{it} + \sum_{j=17}^{34} \alpha_j IND_{it} + \varepsilon_{it}$$

Dependent Variables:
GRANT = 1 if the CEO received an option grant in sub-period *t*, and =0 otherwise;
INCENT = Natural log of *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where *DELTA* is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation).

Independent Variables:
%OWN = Total outside director ownership percentage;
%OWN>100K = Proportion of directors with ownership >$100,000 in 1996 dollars;
STOCK = A portion of director pay is equity-based;
%INSIDE = Percentage of inside (employee) directors;

Table 12 (Cont'd)
Sensitivity Analysis to Individual Board Characteristics.

%Outside Affiliate = Percentage of outside directors who are affiliated- i.e., former employees, relatives of inside directors, have consulting or business relationship with company, or interlocking directorship;
IONCOM = At least one insider on audit, nominating or compensation committee;
OBH OWN = Proportion of common equity owned by outside block-holders in the proxy statement year;
CEO_OWN = Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;
CEO_TEN = Number of years CEO has held the position of chief executive officer as of the proxy statement year;
SIZE = Natural log of total assets averaged over year of the proxy statement and prior two years;
GROW = First principal component based on the following two factors:
MTB = Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;
R&D = Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;
RISK = First principal component based on the following two factors:
Var_Earn = the variance of changes in earnings for firm *i* over prior 10 years;
Var_RET = the variance of monthly stock returns for firm *i* over prior 30-60 months;
LEV = Ratio of debt to total assets averaged over year of the proxy statement and prior two years;
PERF = Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;
UTIL = 1 if company's two digit SIC code is 49, and = 0 otherwise;
LAMBDA = Inverse Mill's ratio (see Chapter 8, Section 2 for definition);
IND = 18 2-digit SIC code industry indicator variables.

Table 13
Sensitivity Analysis to Alternate Measures of *INCENT* (*%INCENT*)

Panel A: Relation between %INCENT and ALIGN

		%INCENT (Tobit- eqn (9.8))		*%INCENT (OLS – eqn (9.9))*	
		1970s	*1990s*	*1970s*	*1990s*
ALIGN	(?)	0.01 (2.86)*	0.004 (5.85)**	0.003 (1.23)	0.01 (1.86)*
CEO_OWN	(-)	-4.01 (3.54)*	-0.60 (2.05)	11.11 (2.51)**	-0.38 (-0.31)
OBH_OWN	(+)	-0.00003 (0.00)	0.0001 (0.01)	0.004 (1.18)	-0.001 (-0.77)
CEO_TEN	(-)	-0.01 (2.75)*	0.002 (0.73)	0.003 (0.90)	-0.001 (-0.34)
SIZE	(+)	0.05 (3.90)**	0.04 (10.77)***	-0.02 (-0.56)	0.10 (1.98)**
GROW	(+)	0.06 (8.17)***	0.04 (7.19)***	0.04 (0.94)	0.10 (2.77)***
RISK	(-)	-0.02 (0.61)	-0.01 (0.90)	-0.004 (-0.40)	0.14 (1.14)
LEV	(-)	-0.19 (0.68)	-0.18 (1.94)	0.15 (0.60)	-0.01 (-0.05)
PERF	(?)	0.45 (15.07)***	0.04 (0.24)	0.15 (0.64)	-0.06 (-0.39)
UTIL	(-)	-0.36 (7.71)***	-0.33 (31.47)***	0.08 (0.71)	-0.53 (-2.15)**
LAMBDA	(?)	--	--	0.27 (1.26)	-0.32 (-1.23)
# Obs.		209	471	100	416
Adjusted R^2		--	--	0.41	0.30

Table 13 (Cont'd)
Sensitivity Analysis to Alternate Measures of *INCENT* (*%INCENT*)

Panel B: Relation between %INCENT and ACCOUNT, INDEP and EFFECT

	%INCENT (Tobit- eqn (9.10))		*%INCENT (OLS – eqn (9.11))*	
	1970s	*1990s*	*1970s*	*1990s*
ACCOUNT	0.003	0.002	0.004	0.01
	(1.22)	(2.15)	(2.50)**	(1.70)*
INDEP	0.001	0.002	-0.003	0.003
	(0.44)	(2.96)*	(-1.64)	(1.77)*
EFFECT	0.003	0.001	0.004	0.003
	(2.40)	(1.38)	(2.45)**	(1.63)
# Obs.	209	471	100	416
Adjusted R^2	--	--	0.44	0.30

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. Significance of coefficient estimates for the Tobit regression (equation (9.10)) are based on the Chi-squared distribution T-statistics for OLS regression (equation (9.11)) are calculated using the White heterskedastic-consistent covariance matrix (White [1980]).

Tobit Regression (9.8):

$$\%INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it}$$

OLS Regression (9.9):

$$\%INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 OBH\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \alpha_{11} LAMBDA_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it}$$

Tobit Regression (9.10):

$$\%INCENT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \sum_{j=13}^{30} \alpha_j IND_{it} + \varepsilon_{it}$$

OLS Regression (9.11):

$$\%INCENT_{it} = \alpha_0 + \alpha_1 ACCOUNT_{it} + \alpha_2 INDEP_{it} + \alpha_3 EFFECT_{it} + \alpha_4 OBH\_OWN_{it} + \alpha_5 CEO\_OWN_{it} + \alpha_6 CEO\_TEN_{it} + \alpha_7 SIZE_{it} + \alpha_8 GROW_{it} + \alpha_9 RISK_{it} + \alpha_{10} LEV_{it} + \alpha_{11} PERF_{it} + \alpha_{12} UTIL_{it} + \alpha_{13} LAMBDA_{it} + \sum_{j=14}^{31} \alpha_j IND_{it} + \varepsilon_{it}$$

Table 13 (Cont'd)

Sensitivity Analysis to Alternate Measures of *INCENT* (*%INCENT*)

%INCENT= Proportion of the value of stock options granted to total compensation of the CEO (salary, bonus and other annual compensation plus the value of option grants) in the period covered in the proxy statement year;

ALIGN, INDEP, ACCOUNT, EFFECT= Board incentive alignment measures based on an equal-weighted ranking of the board characteristics summarized in Chapter 4, Section 2;

OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year;

CEO_OWN= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;

CEO_TEN= Number of years CEO has held the position of chief executive officer as of the proxy statement year;

SIZE= Natural log of total assets averaged over year of the proxy statement and prior two years;

GROW= First principal component based on the following two factors:

MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;

R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;

RISK= First principal component based on the following two factors:

Var_Earn= the variance of changes in earnings for firm *i* over prior 10 years;

Var_RET= the variance of monthly stock returns for firm *i* over prior 30-60 months;

LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;

PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;

UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise;

LAMBDA= Inverse Mill's ratio (see Chapter 8, Section 2 for definition);

IND= 18 2-digit SIC code industry indicator variables.

Table 14
Multiple Regression Analysis of Changes Over Time in *INCENT*

$$\Delta INCENT_{it} = \alpha_0 + \alpha_1 \Delta CEO\_OWN_{it} + \alpha_2 \Delta OBH\_OWN_{it} + \alpha_3 \Delta CEO\_TEN_{it} + \alpha_4 \Delta SIZE_{it} + \alpha_5 \Delta GROW_{it} + \alpha_6 \Delta RISK_{it} + \alpha_7 \Delta LEV_{it} + \alpha_8 \Delta PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.12)$$

$$\Delta\%INCENT_{it} = \alpha_0 + \alpha_1 \Delta CEO\_OWN_{it} + \alpha_2 \Delta OBH\_OWN_{it} + \alpha_3 \Delta CEO\_TEN_{it} + \alpha_4 \Delta SIZE_{it} + \alpha_5 \Delta GROW_{it} + \alpha_6 \Delta RISK_{it} + \alpha_7 \Delta LEV_{it} + \alpha_8 \Delta PERF_{it} + \alpha_9 UTIL_{it} + \sum_{j=10}^{27} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.13)$$

		ΔINCENT	*Δ%INCENT*
ΔALIGN	(+)	0.02 (1.12)	0.003 (0.88)
ΔCEO_OWN	(-)	0.35 (1.65)*	0.01 (1.08)
ΔOBH_OWN	(+)	0.01 (1.06)	-0.001 (-0.17)
ΔCEO_TEN	(-)	-0.02 (-0.95)	-0.002 (-0.70)
ΔSIZE	(+)	0.80 (3.48)***	0.03 (0.56)
ΔGROW	(+)	0.38 (3.00)***	0.03 (1.03)
ΔRISK	(+)	0.02 (0.09)	0.02 (0.42)
ΔLEV	(-)	-0.02 (-0.02)	-0.05 (-0.21)
ΔPERF	(-)	0.49 (0.65)	0.03 (0.23)
UTIL	(-)	2.54 (1.87)*	-0.21 (-2.57)***
#Obs.		82	178
Adj. R^2		0.46	0.01
Incremental Adj. R^2		0.27	-0.03

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]). *ΔVariable*= the value of the regression variable in sub-period *t+1* (i.e., 1990s sub-sample) less the value in sub-period *t* (i.e., 1970s sub-period). See Tables 7 and 13 for corresponding cross-sectional regressions for each sub-period and variable definitions.

Table 15
OLS Regressions of Alternate Measures of *INCENT*

$$ALT\_INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it}$$
$$+ \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.14)$$

Panel A: Dependent Variable= CEO_OWN

		1970s	*1990s*	*All*
ALIGN	(?)	-0.0001 (-0.32)	-0.0004 (-1.56)	0.02 (0.98)
OBH_OWN	(+)	0.0001 (0.18)	0.0002 (0.98)	0.01 (0.29
CEO_TEN	(+)	0.001 (3.49)***	0.001 (5.51)***	0.04 (2.31)**
SIZE	(-)	-0.003 (-1.32)	-0.01 (-3.41)***	-0.18 (-0.56)
GROW	(+)	-0.002 (-0.59)	-0.001 (-0.22)	0.09 (0.45)
RISK	(-)	0.01 (2.60)***	0.0001 (0.03)	-0.41 (-2.87)***
LEV	(-)	-0.01 (-0.53)	-0.03 (-1.84)*	-1.12 (-0.70)
PERF	(?)	0.02 (1.33)	-0.004 (-0.42)	0.51 (0.68)
UTIL	(-)	-0.01 (-0.74)	-0.01 (-0.80)	-0.45 (-0.68)
# Obs.		209	471	178
Adj. R^2		0.12	0.14	0.12
Incremental Adj. R^2		0.01	0.02	0.14

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

Table 15 (Cont'd)
OLS Regressions of Alternate Measures of *INCENT*

$$ALT\_INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.14)$$

Panel B: Dependent Variable= STK&OPT_PPSI

		1970s	*1990s*	*Δs*
ALIGN	(?)	0.01 (0.85)	0.01 (1.15)	0.01 (0.65)
OBH_OWN	(+)	0.03 (1.87)*	0.01 (1.14)	-0.02 (-1.27)
CEO_TEN	(+)	0.09 (6.62)***	0.06 (7.27)***	0.05 (4.02)***
SIZE	(+)	0.02 (0.17)	0.37 (5.85)***	0.31 (1.30)
GROW	(+)	0.32 (2.62)***	0.35 (4.22)***	0.46 (2.97)***
RISK	(-)	-0.01 (-0.06)	-0.27 (-4.42)***	-0.10 (-0.88)
LEV	(-)	0.26 (0.26)	-0.27 (-0.46)	1.35 (1.10)
PERF	(?)	1.81 (3.12)***	0.78 (2.34)**	1.10 (1.91)*
UTIL	(-)	-2.08 (-4.83)***	-1.66 (-5.88)***	1.13 (2.27)**
# Obs.		203	429	155
Adj. R^2		0.46	0.34	0.30
Incremental Adj. R^2		0.03	0.00	0.17

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

Table 15 (Cont'd)
OLS Regressions of Alternate Measures of *INCENT*

$$ALT\_INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.14)$$

Panel C: Dependent Variable= STK&OPT_PPS?

		1970s	*1990s*	*All*
ALIGN	(?)	0.02 (1.15)	0.01 (1.03)	0.01 (0.63)
OBH_OWN	(+)	0.03 (1.80)*	0.01 (2.19)**	-0.01 (-1.15)
CEO_TEN	(+)	0.09 (6.92)***	0.06 (7.28)***	0.06 (4.45)***
SIZE	(-)	-0.86 (-7.34)***	-0.53 (-8.88)***	-0.58 (-2.58)**
GROW	(+)	-0.10 (-0.83)	-0.02 (-0.28)	0.17 (1.19)
RISK	(-)	0.13 (1.21)	-0.20 (-3.56)***	-0.12 (-1.14)
LEV	(-)	1.74 (1.78)*	1.39 (2.57)***	3.35 (2.89)***
PERF	(?)	1.14 (2.07)**	0.66 (2.15)**	1.06 (1.96)**
UTIL	(-)	-1.99 (-4.87)***	-1.31 (-4.99)***	1.25 (2.63)***
# Obs.		203	429	155
Adj. R^2		0.57	0.35	0.27
Incremental Adj. R^2		0.06	0.05	0.13

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

Table 15 (Cont'd)
OLS Regressions of Alternate Measures of *INCENT*

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

CEO_OWN= Proportion of common equity owned by the CEO in the proxy statement year;

$$STK\ \&\ OPT\_PPS1 = \left[(CEO\_OWN\% + (DELTA * \%OPT)) \times {}^{(PRICE * SHR)}/_{1,000} \right].$$

$STK\ \&\ OPT\_PPS2 = [(CEO\_OWN\% + (DELTA * \%OPT)) \times 1,000]$, where *%OPT* is the number of options issued relative to the total common shares outstanding (*SHR*) ;

ALIGN= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics summarized in Chapter 4, Section 2;

OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year.

CEO_TEN= The number of years the CEO has held the position of chief executive officer as of the proxy statement year;

SIZE= Natural log of total assets averaged over year of the proxy statement and prior two years;

GROW= First principal component based on the following two factors:

MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;

R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;

RISK= First principal component based on the following two factors:

Var_Earn= the variance of changes in earnings for firm *i* over prior 10 years;

Var_RET= the variance of monthly stock returns for firm *i* over prior 30-60 months;

LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;

PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;

UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise.

IND= 18 2-digit SIC code industry indicator variables.

Table 16
Two-Stage Least Squares Regressions of Relation between *INCENT* and *ALIGN*
(*ALIGN_HAT*= *ALIGN, ACCOUNT, INDEP* and *EFFECT*)

		Dependent Variable = INCENT							
ALIGN_HAT	=	*ALIGN*		*ACCOUNT*		*INDEP*		*EFFECT*	
		1970s	*1990s*	*1970s*	*1990s*	*1970s*	*1990s*	*1970s*	*1990s*
ALIGN_HAT	(?)	0.25 (0.66)	-0.36 (-1.05)	-0.06 (-0.82)	-0.13 (-1.28)	0.06 (0.40)	-0.04 (-0.54)	0.08 (0.85)	-0.07 (-0.40)
CEO_OWN	(-)	22.04 (1.52)	-2.69 (-0.58)	25.37 (1.67)*	3.44 (1.50)	24.48 (1.45)	0.49 (0.14)	23.08 (1.61)	1.16 (0.42)
CEO_TEN	(-)	-0.02 (-0.53)	-0.03 (-0.72)	-0.02 (-0.86)	0.03 (1.98)**	-0.03 (-0.94)	0.003 (0.15)	-0 02 (-0 65)	0.001 (0.03)
SIZE	(+)	0.65 (2.89)***	0.24 (1.84)*	0.41 (2.48)**	0.50 (7.67)***	0.39 (1.18)	0.54 (8.59)***	0.63 (3.98)***	0.41 (1.22)
GROW	(+)	0.11 (0.53)	0.55 (2.74)**	0.30 (1.99)**	0.57 (3.06)***	0.30 (1.36)	0.37 (5.66)***	0.14 (0.92)	0.38 (5.20)***
LEV	(-)	-0.80 (-0.45)	-1.50 (-1.31)	-1.10 (-0.66)	-0.65 (-1.14)	-0.24 (-0.09)	-0.54 (-0.97)	-1 65 (-1 00)	-0.82 (-0.82)
PERF	(?)	0.05 (0.02)	0.63 (1.71)*	1.99 (3.83)***	0.76 (1.82)*	1.29 (0.79)	0.43 (1.78)*	1.17 (1.14)	0.35 (1.43)
UTIL	(-)	-1.84 (-0.92)	-2.95 (-3.62)***	-3.26 (-1.94)*	-3.56 (-3.18)***	-2.72 (-1.76)*	-2.10 (-4.97)***	-2 48 (-1 61)	-2.10 (-4.54)***
# Obs.		100	416	100	416	100	416	100	416
Adj. R^2		0.39	0.36	0.39	0.36	0.39	0.35	0.39	0.35

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. T-statistics are calculated using the White heteroskedastic-consistent covariance matrix (White [1980]).

Table 16 (Cont'd)

Two-Stage Least Squares Regressions of Relation between *INCENT* and *ALIGN* (*ALIGN_HAT*= *ALIGN, ACCOUNT, INDEP* and *EFFECT*)

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN\_HAT_{it} + \alpha_2 CEO\_OWN_{it} + \alpha_3 CEO\_TEN_{it} + \alpha_4 SIZE_{it} + \alpha_5 GROW_{it} + \alpha_6 LEV_{it} + \alpha_7 PERF_{it} + \alpha_8 UTIL_{it} + \sum_{j=9}^{26} \alpha_j IND_{it} + \varepsilon_{it} \quad (9.19)$$

where the regression variables are defined as follows:

INCENT= Natural log of *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where *DELTA* is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation).

ALIGN_HAT / ACCOUNT_HAT / INDEP_HAT / EFFECT_HAT = Measures of *ALIGN, ACCOUNT, INDEP* and *EFFECT* calculated as the fitted value from the first stage 2SLS regression estimation process discussed in Chapter 9, Section 5.

CEO_OWN= Proportion of common equity owned by the CEO in the proxy statement year;

CEO_TEN= The number of years the CEO has held the position of chief executive officer as of the proxy statement year;

SIZE= Natural log of total assets averaged over year of the proxy statement and prior two years;

GROW= First principal component based on the following two factors:

MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;

R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;

LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;

PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;

UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise.

IND= 18 2-digit SIC code industry indicator variables.

Table 17

Additional Sensitivity Analyses of the Relation between *INCENT* and *ALIGN*.

The table below presents the coefficient estimate and statistical significance of the explanatory variable *ALIGN* in each regression (see next page for base regressions). Each regression controls for alternative monitoring mechanisms and for the firm performance characteristics expected to be determinants of the monitoring environment and two digit SIC code industry fixed effects (coefficient estimates not reported).

	INCENT (Tobit)		*GRANT (Probit)*		*INCENT (OLS)*	
	1970s	*1990s*	*1970s*	*1990s*	*1970s*	*1990s*
Full Sample	0.07 (0.71)	0.07 (11.55)***	0.001 (0.002)	0.03 (5.94)**	0.05 (2.57)***	0.18 (3.48)***
(a) Manuf. sub-sample	-0.03 (0.08)	0.08 (12.08)***	-0.02 (0.79)	0.05 (4.09)**	0.01 (0.27)	0.09 (2.21)**
(b) Survivors	--	0.08 (4.36)**	--	0.03 (1.66)	--	0.10 (1.86)*
(c) Non-Survivors	--	0.07 (8.32)***	--	0.03 (4.85)**	--	0.16 (2.06)**
(d) IND_INCENT	0.07 (0.76)	0.07 (12.39)***	0.003 (0.02)	0.03 (5.49)**	0.05 (2.89)***	0.18 (3.65)***
(e) IND_INCENT & IND_ALIGN	0.05 (0.36)	0.08 (12.78)***	0.000 (0.00)	0.03 (5.34)**	0.04 (2.29)**	0.18 (3.71)***

*,**,*** Significant at the 10, 5, and 1% probability levels, respectively. Significance of coefficient estimates for the Tobit and Probit regressions are based on the Chi-squared distribution. T-statistics for OLS regression (equation (8.5)) are calculated using the White heterskedastic-consistent covariance matrix (White [1980]).

Table 17 (Cont'd)

Additional Sensitivity Analyses of the Relation between *INCENT* and *ALIGN*.

The regression equations provide sensitivity analyses of the base regression equations (8.3)–(8.5) *(Full Sample)*:

Tobit Regression:

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.3)$$

Probit Regression:

$$GRANT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \sum_{j=11}^{28} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.4)$$

OLS Regression:

$$INCENT_{it} = \alpha_0 + \alpha_1 ALIGN_{it} + \alpha_2 OBH\_OWN_{it} + \alpha_3 CEO\_OWN_{it} + \alpha_4 CEO\_TEN_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROW_{it} + \alpha_7 RISK_{it} + \alpha_8 LEV_{it} + \alpha_9 PERF_{it} + \alpha_{10} UTIL_{it} + \alpha_{11} LAMBDA_{it} + \sum_{j=12}^{29} \alpha_j IND_{it} + \varepsilon_{it} \quad (8.5)$$

to the following sub-samples of firms / additional variables:

(a) sub-sample of manufacturing firms (SIC codes <40)- N=140 , 251;

(b) sub-sample of firms in recent sub-period that also have observations in the early sub-period- N= 178;

(c) sub-sample of firms with observations only in the recent sub-period- N= 293;

(d) additional control variable *IND_INCENT* (the industry-average value of the dependent variable to control for omitted determinants of *INCENT*);

(e) additional control variables *IND_INCENT* and *IND_ALIGN* (the industry-average value of the the explanatory variable *ALIGN* to control for the presence of industry-specific board characteristics/practices).

Dependent Variables:

GRANT= 1 if the CEO received an option grant in sub-period *t*, and =0 otherwise;

INCENT= Natural log of *DELTA* multiplied by the number of options granted and the firm's stock price at the end of the proxy statement year (*PRICE*) and divided by 100, where *DELTA* is the partial derivative of the change in option value to a change in stock price (see Chapter 5, Section 2 for option value calculation).

Independent Variables:

ALIGN= Board incentive alignment measure based on an equal-weighted ranking of the board characteristics summarized in Chapter 4, Section 2;

IND_INCENT= median value of *INCENT* for all firms in the same two (one)-digit SIC code if >5 (<5) observations;

IND_ALIGN= median value of *ALIGN* for all firms in the same two (one)-digit SIC code if >5 (<5) observations;

OBH OWN= Proportion of common equity owned by outside block-holders in the proxy statement year;

CEO_OWN= Proportion of common equity owned by the chief executive officer (CEO) in the proxy statement year;

Table 17 (Cont'd)

Additional Sensitivity Analyses of the Relation between *INCENT* and *ALIGN*.

CEO_TEN= Number of years CEO has held the position of chief executive officer as of the proxy statement year;
SIZE= Natural log of total assets averaged over year of the proxy statement and prior two years;
GROW= First principal component based on the following two factors:
MTB= Ratio of market to book value of equity averaged over year of the proxy statement and prior two years;
R&D= Ratio of research and development expenditures to total assets averaged over year of the proxy statement and prior two years;
RISK= First principal component based on the following two factors:
Var_Earn= the variance of changes in earnings for firm *i* over prior 10 years;
Var_RET= the variance of monthly stock returns for firm *i* over prior 30-60 months;
LEV= Ratio of debt to total assets averaged over year of the proxy statement and prior two years;
PERF= Cumulative (annual) stock return averaged over year of the proxy statement and prior two years;
UTIL= 1 if company's two digit SIC code is 49, and = 0 otherwise;
LAMBDA= Inverse Mill's ratio (see Chapter 8, Section 2 for definition);
IND= 18 2-digit SIC code industry indicator variables.

REFERENCES

Agrawal, A. and C. Knoeber. "Firm Performance and Mechanisms to Control Agency Problems between Managers and Shareholders." *Journal of Financial and Quantitative Analysis* 31 (September 1996): 377-97.

Aggarwal, R. and A. Samwick. "The Other Side of the Trade-off: The Impact of Risk on Executive Compensation." *Journal of Political Economy* 107 (1999): 65-105.

Berle, A. and G. Means. *The Modern Corporation and Private Property*. Commerce Clearing House, Inc. (1932): New York.

Bhagat, S. and B. Black. "Board Independence and Long-Term Firm Performance." Working paper, University of Colorado at Boulder and Stanford University, 1998.

Belsley, D., E. Kuh and R. Welsch. *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. New York: Wiley, 1980.

Black, F. and M. Scholes. "The Pricing of Options and Corporate Liabilities." *Journal of Political Economy* 81 (1973): 637-54.

Blair, M. *Ownership and Control: Rethinking Corporate Governance for the Twenty-first Century*. The Brookings Institution, Washington D.C., 1995.

Bollen, K. *Structural Equations with Latent Variables*. New York: Wiley, 1989.

Brancato, C. *Institutional Investors and Corporate Governance*. The Conference Board, 1997.

Bushman, R., Q. Chen, E. Engel and A. Smith. "The Sensitivity of Corporate Governance Systems to the Timeliness of Accounting Earnings." Working paper, University of Chicago, 1999.

Bushman, R., E. Engel, J. Milliron and A. Smith. "An Analysis of the Relation Between the Stewardship and Valuation Roles of Earnings." Working paper, University of Chicago, 2000.

Bushman, R., R. Indjejikian and A. Smith. "CEO Compensation: The Role of Individual Performance Evaluation." *Journal of Accounting and Economics* 21 (1996): 161-193.

California Public Employees Retirement System (CalPERS). *Policy Statement on Corporate Governance*. 1998.

Collins, D., E. Maydew, and I. Weiss. "Changes in the Value-relevance of Earnings and Book Values over the Past Forty Years." *Journal of Accounting and Economics* 24 (1997): 39-67.

Core, J. and W. Guay. "The Use of Equity Grants to Manage Optimal Incentive Levels." *Journal of Accounting and Economics* 28 (1999): 151-184.

Core, J., R. Holthausen and D. Larcker. "Corporate Governance, CEO Compensation, and Firm Performance." *Journal of Financial Economics* 51 (1999): 371-406.

Denis, D. and A. Sarin. "Ownership and Board Structures in Publicly Traded Corporations." *Journal of Financial Economics* 52 (1999): 187-224.

Demsetz, H. and K. Lehn. "The Structure of Corporate Ownership: Causes and Consequences." *Journal of Political Economy* 93 (1985): 1155-77.

Fama, E. "Agency Problems and the Theory of the Firm." *Journal of Political Economy* Vol. 88 No. 21 (1980): 288-307.

Fama, E. and M. Jensen. "Separation of Ownership and Control." *Journal of Law & Economics* 26 (June 1983): 301-25.

Foulkes, F. *Executive Compensation: A Strategic Guide for the 1990s*. Harvard Business School Press. Boston, MA: 1991.

Francis., J. and K. Schipper. "Have Financial Statements Lost Their Relevance?" *Journal of Accounting Research* 37 (Autumn 1999): 319-52.

Gaughan, P. *Mergers, Acquisitions, and Corporate Restructurings*. John Wiley and Sons, Inc. (1996).

Gibbons, R. and K. Murphy. "Optimal Incentive Contracts in the Presence of Career Concerns: Theory and Evidence." *Journal of Political Economy* 100 (1992): 468-505.

Gompers, P. and A. Metrick. "How are Large Institutions Different from Other Investors? Why Do these Differences Matter?" Worker paper, Harvard University, 1998.

Greene, W. *Econometric Analysis.* Macmillan Publishing, 1997.

Guay, W. "The Sensitivity of CEO Wealth to Equity Risk: An Analysis of the Magnitude and Determinants." *Journal of Financial Economics* 53 (1999): 43-72.

Hall, B. and J. Liebman. "Are CEOs Really Paid Like Bureaucrats?" *Quarterly Journal of Economics* CXIII (August 1998): 653-91.

Hausman, J. "Specification Tests in Econometrics." *Econometrica* 46 (1978): 1251-71.

Heckman, J. "Sample Selection Bias as a Specification Error." *Econometrica* 47 (1979): 153-61.

Hermalin, B. and M. Weisbach. "Endogenously Chosen Boards of Directors and their Monitoring of the CEO." *American Economic Review* 88 (1998): 96-118

Himmelberg, C., R.G. Hubbard, and D. Palia. "Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance." *Journal of Financial Economics 53* (1999): 353-84.

Holmstrom, B. "Moral Hazard and Observability." *Bell Journal of Economics* 10 (1979): 74-91.

Holmstrom, B. and P. Milgrom. "Aggregation and Linearity in the Provision of Intertemporal Incentives." *Econometrica* 55 (1987): 303-28.

Ittner, C. and D. Larcker. "Innovations in Performance Measurement: Trends and Research Implications." Working paper, University of Pennsylvania, 1998.

Ittner, C., D. Larcker and M. Rajan. "The Choice of Performance Measures in Annual Bonus Contracts." *The Accounting Review* 72 (1997): 231-255.

Jensen, M. and W. Meckling. "The Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics* 3 (1976): 305-60.

Jensen, M. and K.J. Murphy. "Performance Pay and Top-Management Incentives." *The Journal of Political Economy* 98 (1990): 225-64.

Johnson R., and D. Wichern. *Applied Multivariate Statistical Analysis.* Engelwood Cliffs, NJ: Prentice Hall, 1992.

Lesser, H., K. Guse, and C. Martens. "Board Guidelines: A Survey Across Various Institutional Benchmarks, Stock Exchange Rules, and Company Exemplars." *The Corporate Governance Advisor* Vol. 6, No. 5 (September/October 1998): 1-11.

Lorsch, J. *Pawns or Potentates: The Reality of America's Corporate Boards.* Harvard Business School Press, 1989.

McLaughlin, D. "The rise of a strategic approach to executive compensation" in *Executive Compensation: A Strategic Guide for the 1990s.* Edited by F. Foulkes. Harvard Business School Press. Boston, MA: 1991.

Mehran, H. "Executive Compensation Structure, Ownership, and Firm Performance." *Journal of Financial Economics* 38 (1995): 163-84.

Merton, R. "Theory of Rational Option Pricing." *Bell Journal of Economics and Management Science* 4 (1973): 141-83.

Milgrom, P. and J. Roberts. *Economics, Organization & Management.* Prentice-Hall, Inc. Englewood Cliffs, NJ: 1992.

Monks, R. and N. Minnow. *Corporate Governance.* Cambridge, MA: Blackwell Publishers, 1995.

Monks, R. and N. Minnow. *Watching the Watchers: Corporate Governance for the 21st Century.* Cambridge, MA: Blackwell Publishers, 1996.

Murphy, K. "Pay, Performance, and Executive Compensation." *Handbook of Labor Economics*, 1998.

National Association of Corporate Directors. *Report of the NACD Blue Ribbon Commission on Performance Evaluation of CEOs, Boards and Directors.* Washington D.C., 1995.

Parker, H "Re-Empowering the Board: A Proposed Agenda for Change." *Watching the Watchers: Corporate Governance for the 21st Century*. Cambridge, MA: Blackwell Publishers, 1996.

Porter, M. *Capital Choices: Changing the Way America Invests in Industry*. Council on Competitiveness and Harvard Business School (1992).

Shivdasani, A. "Board Composition, Ownership Structure, and Hostile Takeovers." *Journal of Accounting and Economics* 16 (1993): 167-98.

Shleifer, A. and R. Vishny. "A Survey of Corporate Governance." *Journal of Finance* 52 (1997): 737-83.

Smith, C. and R. Watts. "The Investment Opportunity Set and Corporate Financing, Dividend and Compensation Policies." *Journal of Financial Economics* 32 (1992): 263-92.

Smith, C. and R. Stultz. "The Determinants of Firm's Hedging Policies." *Journal of Financial and Quantitative Analysis* 20 (1985): 391-405.

TIAA-CREF. *Policy Statement on Corporate Governance* (1993).

Wallace, J. "Does EVA beat earnings? Evidence on association with stock returns and firm values" *Journal of Accounting and Economics* 24 (1997): 275-314.

Warner, J., R. Watts, and K. Wruck. "Stock Prices and Top Management Changes." *Journal of Financial Economics* 20 (1988): 461-92.

White, H. "A Heteroskedasticity-consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* 48 (1980): 817-38.

Yermack, D. "Do Corporations Award CEO Stock Options Effectively?" *Journal of Financial Economics* 39 (1995): 237-69.