

Industry Product Market Competition and Corporate Governance

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Abstract

This study explores the relation between industry product market competition and internal corporate governance. Using three determinants of competition for a given level of concentration, namely, product substitutability, market size, and entry costs, this study contributes to the literature by showing that (a) firms in more competitive industries have stronger governance mechanisms, (b) competition and governance are multi-dimensional in their relation to each other, and (c) industry characteristics play a major role in influencing corporate governance strength across firms.

JEL classification: D4; G34; J33; L1; M40; M41; M46

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1. Introduction

While most prior research treats corporate governance as exogenous, evidence from a few studies suggests that it can be regarded as endogenous and that several factors can influence the variation in governance strength across firms (e.g., Smith and Watts, 1992; Kole and Lehn, 1997, 1999). For example, Kole and Lehn show that an increase in deregulation in the airlines industry in the 1990's led to an increase in governance strength for these firms. In another study, Gillan, Hartzell, and Starks (2003) provide comprehensive evidence that governance across firms can be influenced by a number of firm and industry factors. They argue that this variation in governance strength is due to the heterogeneity in agency costs across firms. Since monitoring is costly, the benefits of monitoring must outweigh its costs for firms to decide to monitor their leadership (Hart, 1995).¹ Furthermore, Gillan et al. show that industry factors dominate firm factors in explaining total governance strength across firms.² If industry attributes affect monitoring costs and benefits, it is conceivable that firms may choose governance mechanisms based on these attributes. However, to the best of my knowledge, little research has examined this relation empirically.

One factor that may affect monitoring is the level of competition in an industry. Prior research has shown that product market competition (hereafter “competition”) is pivotal in influencing firm profitability and hence strategy (e.g., Porter, 1990). This suggests that competition may influence firm monitoring of their leadership as these leaders are pivotal in devising and executing firm strategy. A recent study by Karuna (2007) shows that firms in more

¹ In my study, “leadership” refers to all managers and officers (including directors) of a firm.

² In an initial exploratory analysis, I find that industry dummy variables explain 20% to 34% of the variation in governance strength across a representative sample of firms (e.g., adjusted R^2 for board size = 34%; proportion of independent directors on board = 20%; corporate by-laws and charter provisions index = 20%; and total governance index = 22%). In separate regressions, when I regress several governance variables on firm-level variables and industry dummy variables, the adjusted R^2 ranges from 26% to 51%. This suggests that industry factors may dominate firm factors, on average, in explaining the cross-sectional variation in governance strength.

competitive industries provide stronger CEO equity incentives than those in less competitive industries. While this suggests that competition may be related to firm governance, it is not possible to make a directional prediction on the relation between competition and overall governance based on this finding for three reasons.³ First, CEO incentive compensation is only one of several governance mechanisms (Gillan and Starks, 1998) and it is not clear whether these different governance mechanisms complement or substitute for each other (Rediker and Seth, 1995; Gillan, Hartzell, and Starks, 2006).⁴

Second, evidence from recent studies suggests that while equity incentives may motivate the CEO to act in the firm's best interests, it may also lead to incentives to manipulate earnings (e.g., Cheng and Warfield, 2005). In their survey, Graham et al. (2005) find that the dominant reason for senior executives manipulating earnings to meet or beat earnings benchmarks relate to stock prices (admitted by more than 80% of the executives surveyed). Collectively, evidence from these studies suggests that additional governance mechanisms beyond CEO equity incentives may be necessary to curb the CEO's opportunistic actions.

Finally, in addition to the agency relationship between the CEO and the board of directors/firm examined in Karuna (2007), there are several other agency relationships in a firm, for example, those among employees, managers, directors, and shareholders.⁵ Karuna assumes that the board of directors acts in the shareholders' best interests. However, it is conceivable that the directors may act to maximize their own personal welfare and that of the CEO's or top management's, and which may be detrimental to shareholders' interests. Moreover, CEOs may be able to influence their boards to act in their interests, which may also be against the

³ Governance can be simply defined as the system of laws, rules, and factors that define the boundaries of operations.

⁴ Such ambiguity is also shown by Hermalin (2005). In particular, he shows that an inverse relation between incentive compensation and board diligence can exist in cross-sectional data even though the two variables are positively related in time-series data.

⁵ The firm, and governance, can be regarded as a nexus of such contracts (Fama and Jensen, 1983).

shareholders' interests. These generate agency costs beyond those encountered in the relationship between the CEO and the firm.⁶ Such agency costs can be expected to vary across firms. On the one hand, directors may be concerned about their reputations and about being replaced by shareholders and therefore act in the shareholders' interests, say by monitoring CEOs closely and removing them if necessary (Fama, 1980). This leads to lower agency costs between the shareholders and directors, and less need for additional stronger governance mechanisms. On the other hand, directors may not want to lose favor with the CEO or top management for fear of not resuming office, as the CEO and top management play a key role in their election or reelection. This may lead to higher agency costs between the shareholders and the directors, and a greater need for additional stronger governance mechanisms. Agency costs may also arise from the agency relationship between senior management and their subordinates.⁷ Collectively, these hierarchical agency relationships found in firms (Hirshleifer and Thakor, 1998) suggest that additional governance mechanisms are necessary beyond CEO incentive compensation.⁸

This study extends Karuna (2007) by examining the impact of competition on several governance mechanisms and also aggregate governance in a firm. While evidence from some prior studies suggests that competition increases agency costs, evidence in other studies suggest a negative relation between the two. Collectively, these studies suggest that competition can have either a positive or a negative relation with governance. In this study, I test these competing hypotheses.

⁶ These agency costs explain the occurrence of shareholder activism, such as proxy fights and 'vote no' campaigns, through which shareholders attempt to remove directors who fail to perform their duties properly.

⁷ Although much of the discussion on governance in this study pertains to the agency relationship between shareholders and directors, this discussion can be extended to the other agency relationships that exist in a firm.

⁸ The collapse of WorldCom, for example, can be attributed to a breakdown in several agency relationships.

This paper contributes to the literature on corporate governance by considering the fundamental economics of the industries in which firms operate. In this study, I provide a direct test of the relation between competition and governance based on three dimensions of competition for a given level of concentration: product substitutability, market size, and entry costs. These three dimensions of competition allow for more precise findings on the relation between competition and corporate governance, as most prior research has used only one measure of competition—the level of concentration (Raith, 2003; Karuna, 2007). Consistent with prior research, I define product substitutability as the extent to which close substitutes exist for a particular product in an industry; I define market size as the extent of demand for a particular product in that industry; and I define entry costs as the costs that firms incur in entering an industry. On a broader level, I define competition as the extent to which firms attempt to win business from their rivals. By using the determinants of competition, I study how the structural aspects of the product market affect the extent of monitoring of leadership across firms.

To test the association between governance and product substitutability, market size, and entry costs for a given level of industry concentration, I use data obtained from the Segments, Annual Industrial, and Execucomp databases in Compustat; the CRSP database; the Census of Manufactures report in the 1992 Economic Census compiled by the U.S. Census Bureau; and the Investor Responsibility Research Center (IRRC). To capture governance, I use board strength, extent of shareholder rights, and total governance strength. These dimensions of governance have often been used singly in prior research, but only a few recent studies consider all three dimensions (e.g., Gillan et al., 2003, 2006). To measure board strength, I use board size, separation of CEO and chairman roles, director independence, director attendance at board

meetings, and an aggregate board index (ranked in order of increasing board strength based on the different board characteristics used in this study). Consistent with prior research, I identify greater levels of board strength, and hence governance, by the presence of smaller boards, separate CEO and chairman roles, greater director independence, greater director attendance at board meetings, and a larger board index. To measure the extent of shareholder rights, I use an aggregate index (commonly denoted as the g-score) of 24 corporate by-laws and charter provisions that are either management- or shareholder-friendly (Gompers et al., 2003). Consistent with prior research, a smaller index reflects greater shareholder rights, and hence stronger governance. Finally, to measure total governance strength, I form an aggregate governance index by computing an average of percentiles (ranked in order of increasing governance strength) of the following: (a) board characteristics, (b) the 24 corporate by-laws and charter provisions, and (c) an index aggregating six state laws reflecting varying levels of antitakeover protection. In this case, a larger aggregate index reflects stronger corporate governance.

To measure the degree of product substitutability, I use the price-cost margin (see Demsetz, 1997; Nevo, 2001). To measure market size, I use the amount of industry sales. In this study, the minimum level of investment needed to enter an industry proxies for entry costs and is measured by the acquisition value of property, plant & equipment in that industry.

Using these multi-dimensional characterizations of competition and corporate governance, I find that firms in more competitive industries have stronger governance mechanisms and overall governance. This relation is generally consistent across all the dimensions of governance used in this study. My overall findings are robust to including industry random effects, alternative explanations, and several other sensitivity checks.

This study makes three specific contributions to the literature. First, it provides empirical evidence on how competition influences corporate governance through an examination of several determinants of competition and governance; thus it also provides additional evidence that governance is endogenous. Second, it shows that competition and governance are multi-dimensional in their relation. Finally, it provides additional evidence that industry characteristics play a major role in influencing the variation in governance strength across firms.

The rest of the paper is organized as follows. In the next section, I provide the theoretical background leading to my hypotheses. Section 3 describes the sample selection procedure; in Section 4, I describe the methodology used in this study and discuss my results. I conduct additional tests in Section 5. Section 6 describes robustness checks, while Section 7 concludes this study.

2. Theoretical Background

Although Karuna (2007) shows that greater competition leads to stronger CEO equity incentives, he does not consider how competition influences other governance mechanisms and overall governance in firms.⁹ Karuna studies the agency relationship between the firm and the CEO. Thus he ignores other agency relationships that exist in a firm like that between a firm's shareholders and its board of directors, that between the CEO and his top management team, and that between the top management (including the CEO) and subordinate managers and other employees. Additional control mechanisms may be necessary to ensure that the agency costs that arise from these different relationships are minimized.

⁹ The reader is referred to Karuna (2007) for a thorough discussion of the theoretical literature on the relation between competition and managerial incentives.

Moreover, an assumption in Karuna's study is that the board of directors acts in the best interests of the shareholders in monitoring the CEO and the top management in firms. However, the board of directors may either be vigilant or lax in its monitoring of the CEO (Hirshleifer and Thakor, 1998). On the one hand, directors care about their reputations, about remaining and being reelected to office, and about maintaining or enhancing their labor market appeal (Fama, 1980). To achieve this, they may act in the shareholders', and therefore the firm's, best interests. On the other hand, however, if they do not wish to lose favor with the CEO because he is influential in their reelection to office, they have a close relationship with him, or for some other reason, they may be lax in their monitoring of the CEO. Similarly, a CEO who has power over his board of directors and does not act in the firm's best interests may not only negotiate less monitoring by the board but may also not be vigilant in his monitoring of his subordinate managers or other employees. Alternatively, it may be optimal from the shareholders' perspective for agents not to be closely monitored in certain situations. For example, if agents are required to be creative or innovative, or if they possess higher ability, they may have to be given greater latitude to engage in the activities they see fit; close monitoring may not be beneficial to the shareholders (Boot, Gopalan, and Thakor, 2006). In other situations, when complexity is greater, the nature of the agency relationships may be more advisory than monitoring (Adams and Ferreira, 2007).¹⁰

It is conceivable that certain factors may influence the extent to which boards are able or willing to monitor the CEO/top management, and the extent to which agents are monitored in general in the firm. This leads to a variation in the magnitude of these agency costs across firms. To the extent that competition influences these agency costs, it may influence the strength of

¹⁰ Adams and Ferreira state that boards have advisory and monitoring roles and that there is a tradeoff between these roles. The less the extent of monitoring by the boards, the more willing are CEOs to divulge necessary information so that boards can advise them. This may be especially more useful in more complex or uncertain environments.

governance mechanisms in these firms. Prior studies show that greater competition leads to greater marginal value of effort in firms (e.g., Schmidt, 1997; Hermalin, 1992) and also acts as a disciplinary mechanism to leadership in firms (e.g., Hart, 1983; Scharfstein, 1988; Schmidt, 1997). Collectively, these studies suggest that competition can have a positive or a negative relation with governance. Next, I provide the theoretical reasoning leading to these competing hypotheses.

2.1 Competition and marginal value of effort

An increase in competition increases the marginal value of effort in firms in two ways. First, it increases uncertainty in the environment in which firms operate, and thus increases the need for managers to engage in more complex forward-looking activities such as innovation and differentiation.¹¹ Such activities use intangible assets to gain a competitive position through cost reduction or quality improvements (Kole and Lehn, 1997, 1999; Raith, 2003, 2005).

Interestingly, increased competition may also make managerial performance less observable, as managers engage in a range of different complex activities to achieve a competitive edge.¹²

Second, an increase in competition requires managers with greater skills or talent (Hubbard and Palia, 1995). Such managers are necessary to be able to perform the more complex activities associated with increased competition.

According to Prendergast (2002), the skills required of managers in uncertain environments lead firms to delegate more authority to these managers. Prendergast claims that due to the firms' decreased ability to monitor their managers in such environments, firms should

¹¹ For example, an increase in competition could increase the (i) rate of firm entry and exit in an industry or (ii) level of innovation by rival firms, both increasing instability and uncertainty for a given firm in the industry.

¹² Greater instability and uncertainty associated with increased competition make it harder to distinguish the effects of managerial decisions on firm performance from the effects of other factors.

encourage the managers to make relevant tradeoffs among available options while constraining the managers' extraction of private benefits at the expense of shareholders. Similarly, Rosen (1982) claims that managers receive greater authority when they are required to engage in complex forward-looking activities or have higher talent.

Christie, Joye, and Watts (2003) argue that competition generates a demand for speed in decision making (immediacy) and thus greater specialized knowledge to make such decisions. Thus firms in more competitive industries provide their managers with greater authority and discretion as such firms require talented managers who need to respond quickly to competitive pressure. Consequently, due to the increased instability, uncertainty, and managerial discretion associated with increased competition, it becomes necessary to have stronger governance mechanisms in place to encourage forward-looking activities while discouraging actions that are against shareholders' interests.¹³

Another line of reasoning is that the greater discretion and authority which CEOs possess with greater competition lead to greater CEO power.¹⁴ Consequently, these CEOs may be able to influence their boards to act in their interests that may be detrimental to the shareholders'. To curb such negative consequences of CEO power, shareholders have to employ stronger governance mechanisms.

Another possibility is that boards may not be able to understand the complex activities of the CEO, leading to less monitoring. Moreover, if they wish to be in favor with the CEO, they

¹³ Roychowdhury (2006) finds evidence that managers manipulate earnings to avoid losses through real activities like offering price discounts to temporarily increase sales, engaging in overproduction to lower cost of goods sold, and reducing discretionary expenditures aggressively to improve margins. He also finds that industry factors (e.g. manufacturing versus non-manufacturing) influence the extent of such earnings manipulation. Furthermore, Graham et al.'s (2005) survey finds that executives are willing to manipulate real activities to meet earnings targets, even though the manipulation reduces firm value. It is conceivable that competitive pressure in an industry may also induce these executives to engage in real activities manipulation.

¹⁴ Managers of higher ability in more competitive industries may also possess greater bargaining power over their boards (Hermalin and Weisbach, 1998). These managers may be able to negotiate less monitoring by boards.

may use the uncertain environment due to greater competition as an excuse for monitoring the CEO less intensely. Consequently, stronger governance mechanisms have to be put in place by the shareholders to compensate for this decreased efficiency in monitoring.

It is conceivable that, due to greater uncertainty that results from greater competition, directors may need to assume a greater advisory role to the CEO/top management, and consequently, a lesser monitoring role. It may therefore be optimal from the shareholders' perspective for the CEO/top management to be monitored less intensely to encourage the CEO/top management to share important information that will aid the board's advisory function. This suggests that there is therefore less of a need for the boards to be vigilant and consequently less controls on the boards, leading to weaker governance.

A related argument is that since firms in more competitive industries have managers with higher ability (Hubbard and Palia, 1995), as discussed earlier, it may be optimal from the shareholders' perspective to monitor the managers, and therefore the boards, less closely, thereby giving the managers greater latitude to undertake their complex activities. Therefore, weaker governance may be optimal in this context.

2.2 Competition as a disciplinary mechanism

Several studies show that competition acts as a disciplinary mechanism to the leadership in firms. Some studies show that competition provides greater performance evaluation information (e.g., Holmstrom, 1982; Nalebuff and Stiglitz, 1983). Specifically, if industry shocks affecting each firm's costs are correlated, then an increase in competition generates additional information which the firms' owners can use to mitigate moral hazard problems.

Other studies show that greater competition leads to a higher threat of a firm's liquidation if the firm faces slack by its leadership and costs are high (e.g., Schmidt, 1997).

This disciplinary role of competition provides implicit incentives for leadership in firms to avoid shirking. For example, to maintain or enhance their reputation, or to be able to assume, maintain, or reassume office, directors may be vigilant in their monitoring of the CEO/top management. This suggests that weaker governance mechanism may suffice as monitoring is costly.

Alternatively, in order to minimize the impact of competition as a disciplinary mechanism, boards and the CEO/top management may collude.¹⁵ For example, if greater competition leads to a higher takeover threat by another firm, boards may not fire their CEOs for poor performance as this may indicate their inability to select a good CEO (if they were involved in selecting the CEO), triggering a takeover (Graziano and Luporini, 2003).¹⁶ Graziano and Luporini analytically show that when the board is in charge of both hiring and firing the CEO, and the type of the board is private information, internal (say through board vigilance) and external (say through competition) monitoring are substitutes. Here, when the external threat is high, the board prefers to retain the CEO irrespective of his quality. However, when the type of board is publicly known, internal and external monitoring are complements if the board is stricter in its retention decision (i.e., efficient) and are substitutes if the board is not as strict (i.e., inefficient). In contrast, Hirshleifer and Thakor (1998) shows that the board becomes stricter when it is most concerned with the possibility of being displaced, say due to a takeover. The opposite findings of these two studies may be due to the fact that in Hirshleifer and Thakor

¹⁵ This reasoning is an extension to the bargaining between the CEO and his board (Hermalin and Weisbach, 1998).

¹⁶ Greater competition through higher product substitutability or greater number of firms in the industry increases the takeover threat (Raith, 2003). In turn, a takeover, especially a hostile one, may lead to the board's dismissal by the acquirer.

(1998), the board only has a monitoring task, whereas in Graziano and Luporini (2003), the board has both hiring and monitoring tasks. In this case, the board hides its inability to accomplish the first tasks by distorting the second one, leading to collusive behavior between the board and the CEO. Taken together, these studies suggest an ambiguous directional prediction on the relation between competition and governance.

2.3 Hypotheses

The above discussion suggests that competition may be positively or negatively related to firm governance. This leads to the following two-fold prediction on the relation between competition and governance strength:

Governance strength = f(product substitutability, market size, entry costs, concentration, other)

The purpose of this study is to provide empirical evidence on the relation between competition and governance using the determinants of competition used in Karuna (2007). Consistent with other cross-sectional studies on competition, I assume that industries have attained their long-run equilibrium positions.¹⁷ Thus, I study how long-run equilibrium differences in the intensity of competition across industries affect governance strength across firms in these industries. The next section outlines the sample selection procedure I adopt and the measures I use in my tests.

¹⁷ It is conceivable that industries, on average, would have attained their long-run equilibrium positions during the sample period in this study.

3. Sample Selection and Measures Used

3.1 Sample

To study the relation between competition and governance, I use data from Compustat, CRSP, and the Investor Responsibility Research Center (IRRC), from 1992-2003.¹⁸ To be included in the sample, data for a firm must be complete across the Segments, Annual Industrial, and Execucomp databases in Compustat, CRSP, and IRRC. Further, firms must have identical four-digit Standard Industrial Classification (SIC) codes across all the databases for observations to be included in the final sample. I delete industries with SIC codes ending in zero to avoid ambiguity.¹⁹

From the IRRC director and governance databases, I collect data on board characteristics, shareholder rights, and state antitakeover laws. I collect data on CEO characteristics from the Execucomp database in Compustat, and data on other firm characteristics from the Industrial database in Compustat and CRSP. For the CEO's option and stock holdings, I collect data from Execucomp. Where there is a change in CEO in a particular year, I include data for the incoming CEO for that year and exclude data for the outgoing CEO.

To test the relation between the dimensions of competition and governance, I generate three samples of observations in this study across all industrial sectors in the economy.²⁰ The first sample (hereafter "board sample") is based on governance measures constructed using data

¹⁸ Due to the availability of industrial segments data in Compustat, my sample period ends in the year 2003 for the main analysis. In a later section, I include observations from 1992 to 2005 for additional tests using an alternative dataset to the segments data.

¹⁹ Compustat assigns a zero value for the fourth digit in a SIC code when it is not sure which four-digit industry a firm has as its primary industry.

²⁰ Merging databases to test the relations between competition and board strength, extent of shareholder rights, and total governance leads to three separate samples. In addition, merging the databases results in a considerable loss of observations based on data availability: competition data range from 1992 to 2003; board data range from 1996 to 2004; and shareholder rights data exist for the years 1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006.

on board characteristics only and comprises observations on firm, industry, director, and CEO characteristics for 3,987 firm-years over a eight-year period from 1996 to 2003 based on 1,543 CEOs, 1,206 companies and 209 industries (at the four-digit SIC code level). The second sample (hereafter “shareholder rights sample”) is based on a governance measure determined by only shareholder rights and consists of 2,560 firm-year observations on firm, industry, and CEO characteristics arising from 1,174 companies in 206 industries and encompassing 1,484 CEOs for the years 1993, 1995, 1998, 2000, and 2002. The third sample (hereafter “total governance sample”) is based on a combined governance measure consisting of data on board characteristics, shareholder rights, and state antitakeover provisions, and comprises 1,681 observations on firm, industry, director, and CEO characteristics for the years 1998, 2000, and 2002 for 1,118 CEOs, 971 companies, and 195 industries. All dollar items are CPI-adjusted to year-2005 dollars to adjust for the effects of inflation. Next, I describe the procedures used to construct the measures. The definitions and computation details for these measures are provided in the appendix.

3.2 Measures

3.2.1 Governance measures – dependent variable

Given the multi-dimensional nature of corporate governance, several different measures of governance have been proposed in the literature (e.g., Gillan et al., 2003, 2006; Larcker, Richardson, and Tuna, 2006). To capture this multi-dimensional nature of governance and firms’ monitoring choices, I use board strength, shareholder rights, and total governance to measure corporate governance. These characteristics are contained in seven measures encompassing 36 different governance mechanisms.²¹

²¹ I do not consider other measures of governance such as institutional ownership, blockholdings, interlocking relationships between the CEO and directors, CEO and director stock and options ownership, etc., because these do

Board strength

To measure board strength, I use five variables: board size, CEO/chairman separation, director independence, director attendance at board meetings, and an overall index that aggregates these board characteristics. I measure board size as the number of directors on the board (BSIZE). Smaller boards reflect greater board strength, as easier communication and coordination allow for more efficient monitoring (Yermack, 1996).

My second board measure, the separation of the CEO and chairman-of-the-board positions (SEPCHAIR), has been argued as beneficial to shareholders and reflective of greater board strength (e.g., Jensen, 1993; Goyal and Park, 2002). I denote the separation of CEO and chairman roles by an indicator variable that equals 1 if the CEO and chairman are not the same in the firm, and 0 otherwise.

The independence of directors who serve on the board (INDEP) is also an important factor in determining board strength (Fama and Jensen, 1983; Weisbach, 1988). I measure director independence by the percentage of independent directors on the board (i.e., outside directors who are not affiliated with the firm).

I include director attendance at board meetings as a reflection of director interest in monitoring the firm; lower attendance reflects less interest in monitoring (Core et al., 1999). I denote director attendance at meetings by an indicator variable that equals 1 if any director on the board does not attend at least 75% of the board meetings in the firm, and 0 otherwise. I label this measure NOT_ATTEND.

not reflect direct firm monitoring choices. In a later section, I control for these factors as they may influence firms' monitoring intensity and hence firms' governance choices.

Finally, I construct an overall index of board strength (BINDEX) by computing an average of the ranked percentiles (ranked in order of increasing board strength) of the different board characteristics in this study. As there may be tradeoffs between the board measures, an overall board index captures aggregate board strength (Gillan et al., 2006).

Table 1 presents the summary governance statistics for the firms in our sample. From Table 1, we see that there are nine board members on average in firms, 35% of the firms have a separate CEO and board chairman, approximately 63% of the directors on boards are independent, 18% of the directors attend less than 75% of the board meetings, and firms have a percentile ranking on overall board strength of about 69%. This suggests that overall board strength is moderately high on average for the firms in this sample. These statistics are consistent with those found in prior research (e.g., Klein, 2002; Gillan et al., 2003).

Shareholder rights

The g-index measures the nature of the power-sharing relationship between shareholders and management and officers in a firm. Introduced by Gompers et al. (2003), this index has since been used extensively in research (e.g., Cremers and Nair, 2005). The g-index is based on 24 governance provisions that are classified into four categories of management/officer power: (1) tactics for delaying hostile bids, (2) voting rights, (3) director/officer protection; and (4) other takeover defenses.²² Each firm's g-index is the sum of points, where one point is awarded for the presence of each possible governance provision. Thus, a higher g-index indicates lower

²² The 24 provisions include blank check preferred stock, classified board, limits to call special meetings, limits for written consent, advance notice requirements, compensation plans, indemnification contracts, golden parachutes, severance, director indemnification, director liability, limits to amend bylaws, limits to amend charter, cumulative voting, secret ballot, super majority to approve merger, unequal voting, cumulative voting for substantial shareholders, antigreenmail, director's duties-nonfinancial impact, fair price, pension parachutes, poison pills, and silver parachutes.

shareholder rights and greater management/officer power, reflecting weaker corporate governance.

Panel B of Table 1 shows that the mean shareholder rights score for firms in my sample (g-index denoted by CININDEX, the charter provisions index) is 9 out of a possible 24, indicating moderately strong shareholder rights. This value is consistent with those found in prior research (e.g., Gompers et al., 2003).

Total governance strength

I construct a total governance index (denoted TOTINDEX) for each firm by computing an average of the percentiles (ranked in order of increasing governance strength) of my board strength measures, shareholder rights measures, and state antitakeover provisions.²³ Including state antitakeover provisions is important, as such provisions may mean firms in some states do not need to adopt charter provisions. Bebchuk and Cohen (2003) provide evidence that states that offer antitakeover protection are more successful in attracting out-of-state incorporations and in having local firms incorporate in-state.

An overall governance index is preferred as it avoids weighting one provision more than any other. In addition, it better captures total governance, which might otherwise be offset by provision tradeoffs. Panel C of Table 1 shows that the mean total governance strength percentile ranking in Table 1 is around 85%. This statistic shows that the total governance for the firms in my sample is strong on average.

Taken together, the descriptive statistics suggest that governance is moderately strong on average for the firms in my sample. However, with the exception of the charter provisions

²³ The State Law provisions include recapture of profits (antigreenmail laws), business combination law, cash out law, director's duties law, fair price law, and control share acquisition law.

index, the standard deviations for the governance variables are relatively large, suggesting a large variation in governance strength across firms.

3.2.2 Competition measures

As mentioned above, I focus on three determinants of competition: product substitutability, market size, and entry costs. In contrast, much of prior research has been based on a single measure of competition, and has used concentration measures such as the Herfindahl-Hirschman index or the four-firm concentration ratio to measure competition (e.g., Harris, 1998; DeFond and Park, 1999; Engel, Hayes, and Wang, 2003). These studies inherently assume that market structure is exogenous, that prices (and thus unit margins) decline as concentration falls (Bain, 1956), and thus that lower concentration reflects higher competition. However, more recent research suggests that when market structure is assumed to be endogenous, it is not clear whether low values of concentration capture low or high competition, especially in cross-industry analyses (e.g., Demsetz, 1973; Sutton, 1991; Aghion et al., 2001; Symeonidis, 2002; Raith, 2003).

The three determinants of competition illustrate how competition arises from product market fundamentals. There are numerous benefits to analyzing the individual effects of each competition determinant, while controlling for the effect of the other two.²⁴ First, controlling for the other determinants makes it possible to test the incremental effect of each determinant on governance. Second, some industries, such as the tire industry, may defy uni-dimensional labels of competition since both product substitutability and entry costs may be high (Raith, 2003). The role of each of these three determinants in this study will be discussed next.

²⁴ For a more elaborate discussion of the benefits of considering several measures of competition and the weaknesses pertaining to the sole use of concentration measures as proxies for competition, see Karuna (2007).

Product substitutability

Prior studies in the Industrial Organizations literature have used the price-cost margin to measure product substitutability in an industry; the price-cost margin is defined here as the negative reciprocal of the price elasticity of demand (e.g., Carlton and Perloff, 1994; Demsetz, 1997; Besanko et al., 2000; Nevo, 2001). In turn, the price elasticity of demand has a positive relation with the extent of product substitutability (hereinafter “substitutability”). This suggests that the price-cost margin reflects substitutability: low (high) levels of the price-cost margin signify high (low) levels of substitutability. This mirrors economic intuition that the closer to (further away from) perfect competition an industry is, the more (less) price approximates marginal cost. Hence, the greater the intensity of price competition due to higher substitutability, the smaller the price-cost margin. Consistent with prior studies, I calculate the price-cost margin as sales divided by operating costs, all at the four-digit SIC code level. My measure for substitutability, or product differentiation, is labeled DIFF.²⁵ To obtain DIFF, I compute industry sales and operating costs by taking the sum of primary industrial segment sales and the sum of operating costs for firms in a given industry, respectively.

I assume that the price-cost margin depends on firms’ pricing strategies (reflecting market conduct), which in turn partly depend on exogenous factors related to product substitutability. A component of the price-cost margin can be regarded as endogenous, as it can be affected by other industry factors such as market structure. By controlling for these other

²⁵ The higher the value of DIFF, the higher the extent of differentiation, and the lower the substitutability.

factors, I am able to test the effect of the more exogenous portion of the price-cost margin on governance.²⁶

Market size

Market size, which reflects the density of consumers in a market or industry, is measured here by industry sales at the four-digit SIC code level. When market demand for a product increases at a given price, sales of that product also increase. Attracted by the prospects of greater profitability, firms enter the market (industry), and thus competition increases (Sutton, 1991). Although market size is highly skewed to the right, its natural log transformation brings the mean and median values closer together (see Table 1). Hence, I use the log-transformed variable (labeled MKTSIZE) in subsequent statistical analyses.

Entry costs

I define entry costs as the minimal level of investment (exogenous sunk cost) that must be incurred by each entrant firm to an industry prior to commencing production (i.e., set-up costs). To capture the minimal level of investment in a particular industry, I compute the weighted average gross value of the cost of property, plant and equipment for firms for which this is the primary industry (at the four-digit SIC code level), weighted by each firm's market share in this industry. I compute market share by dividing the segment sales figure for the primary industrial segment of a firm by the sum of the segment sales of all firms that have this particular industry as their primary industry. The entry costs measure is highly skewed; its

²⁶ For example, an increase in concentration could raise the price-cost margin in the long-run. Increases in concentration could be the result of an increase in entry costs.

natural log transformation is not, as shown in Table 1. Therefore, I use the log-transformed entry costs measure (labeled ENTCOST) in subsequent statistical analyses.

3.3 Control variables

To control for the level of concentration, I include the four-firm concentration ratio (CONC) for an industry, which reflects the proportion of sales in an industry accounted for by the four largest firms (by sales). I obtain the data to compute CONC from the Segments database.²⁷

In the regressions in Section 4, I include control variables documented in prior research as affecting corporate governance (e.g., Klein, 2002; Gillan et al., 2003, 2006). Specifically, SALE, VOLAT, MTB, RD, TENURE, and STOCKOWN denote the natural log of sales, volatility of monthly stock returns, market-to-book ratio, research and development intensity, CEO tenure in the firm, and the lagged values of CEO stock and options ownership, respectively. SALE proxies for firm size, whereas VOLAT proxies for firm risk. Both MTB and RD proxy for investment opportunities.

3.4 Univariate analysis

Table 2 presents the Pearson correlation matrix for the independent variables. The correlations are generally comparable to those documented in prior research (e.g., Klein, 2002; Gillan et al., 2003). Panel A provides correlations among the variables in the board sample; Panel B provides correlations among variables in the shareholder rights sample; and Panel C provides correlations among variables in the total governance sample. Across all three panels, no significantly high correlations emerge among the independent variables. The correlations that

²⁷ The results in this study are similar when I use the Herfindahl-Hirschman index as the measure of concentration.

do emerge suggest that larger boards are negatively associated with CEO/chairman separation and the board index, but positively associated with the percentage of outside independent directors and the proportion of directors who do not attend at least 75% of the board meetings. The separate CEO-chairman dummy is negatively associated with the proportion of independent directors on the board, but positively associated with the board index. The proportion of independent directors on the board is positively associated with the board index, while the proportion of directors who do not attend at least 75% of the board meetings is negatively associated with the board index. Additionally, the board index is negatively associated with the charter provisions index (g-index) but positively associated with the total governance index. Finally, the charter provisions index is negatively associated with the total governance index.

Collectively, with the exception of the proportion of independent directors, the correlations indicate that (a) the associations among the board variables are as expected; therefore, smaller boards, the separation of the CEO and chairman roles, and the greater the number of board meetings the directors attend reflect stronger governance and (b) firms with a larger board index have a smaller charter provisions index, suggesting that board strength and shareholder rights complement each other in influencing governance. The correlations in Table 2 also suggest that larger firms have weaker governance whereas riskier firms, firms with growth opportunities, and those with greater stock and options holdings have stronger governance.

Panel D in Table 2 presents the correlations among the industry-level variables. In general, no high correlations occur. Interestingly, moderately high correlations are documented between MKTSIZE and ENTCOST (0.56) and between MKTSIZE and CONC (-0.46). A potential explanation for the association between MKTSIZE and ENTCOST is that firms in larger industries or markets also invest in heavy capital stock like plant, machinery, buildings,

etc., which act as barriers to entry in the industry. An explanation for the association between MKTSIZE and CONC is that the higher demand created by larger market size attracts new firms to the industry, which leads to a decrease in the level of concentration. While these correlations appear to be moderately high, standard diagnostic checks indicate that no problems are associated with multicollinearity in the regression analyses below (Belsley, Kuh, and Welsch, 1980).²⁸

Additional significant correlations exist between DIFF and MKTSIZE, between DIFF and CONC, and between ENTCOST and CONC. The negative correlation between DIFF and MKTSIZE could be due to the positive relation between demand and increased firm entry, which in turn increases product substitutability. The positive correlation between DIFF and CONC may reflect the tendency for industries that have differentiated products to be more concentrated on average, enabling firms in these industries to charge higher prices relative to costs. Finally, the positive correlation between ENTCOST and CONC may reflect reluctance by firms to enter an industry with high entry costs.

Overall, the generally low to moderate correlations among the industry variables suggest that these variables may capture different dimensions of competition. As an additional check, I conduct a factor analysis on these variables. The results (not reported) indicate that these variables do not load onto the same latent factor, providing further evidence for the multi-dimensional nature of competition.

To summarize, the correlations in Table 2 are as expected, with the exception of those for INDEP. They are also generally consistent with those of prior research (e.g., Klein, 2002; Gillan et al., 2003). The associations between INDEP and the other governance variables are generally

²⁸ In conducting diagnostic checks for multicollinearity, I compute variance inflation factors and condition indices, using cutoffs of 10 and 30, respectively, as suggested by Belsley, Kuh, and Welsch (1980).

opposite in direction to those among the other governance variables, suggesting that greater director independence may not imply greater board monitoring and hence stronger governance. In addition, the associations between INDEP and the control variables are opposite in direction compared to those between the other governance variables and the control variables. I discuss the ambiguity in the INDEP results below. In the next section, I conduct multivariate analyses to confirm the univariate associations discussed above.

4. Multivariate Analysis

4.1 Methodology

To investigate the relation between the competition determinants and governance, I conduct a regression analysis at the firm level. Conducting the analysis at the firm level incorporates inter-firm differences; it also controls for differences in the industry mix of sample firms over time (Bushman, Engel, and Smith, 2006). I pool observations across firms and time and use the following equation to test the predictions (given immediately below) in this study:²⁹

$$\text{GOVERNANCE PROXY} = \beta_0 + \beta_1 \text{DIFF} + \beta_2 \text{MKTSIZE} + \beta_3 \text{ENTCOST} + \beta_4 \text{CONC} + \beta_5 \text{SALE} + \beta_6 \text{VOLAT} + \beta_7 \text{MTB} + \beta_8 \text{RD} + \beta_9 \text{TENURE} + \beta_{10} \text{STOCKOWN} + \text{YEAR INDICATOR} + \varepsilon$$

(equation 1)

GOVERNANCE	DIFF	MKTSIZE	ENTCOST	CONC
PREDICTED SIGN	-/+	+/-	-/+	?

²⁹ In my regressions, I delete outliers with studentized residuals greater than or equal to two (Belsley et al., 1980).

The definitions for the above variables are given in the appendix. GOVERNANCE PROXY stands for the range of governance variables discussed above. The coefficient β_1 measures how the governance proxy varies with DIFF. The coefficients β_2 and β_3 measure how the governance proxy varies with MKTSIZE and ENTCOST, respectively. As I test competing hypotheses in this study, I offer no specific prediction on the direction of these coefficients. Consistent with prior research, I predict a negative relation between governance strength and SALE and positive relations between governance strength and VOLAT, MTB, RD, and STOCKOWN.³⁰ Year indicator variables are included in the regressions, but are not reported in the table of results for brevity. The next section presents and discusses the results of the tests I conduct in this section.

4.2 Results

Table 3 provides results for OLS and logistic regressions based on equation 1. Column I provides results for an OLS regression where board size (BSIZE) is included as the dependent variable. The coefficients on DIFF, MKTSIZE, and ENTCOST are 0.146, -0.255, and 0.219, respectively, and are statistically significant (1% level). These results indicate when product substitutability is greater, market size is larger, and entry costs are lower, then board size is smaller, reflecting stronger governance. Column II provides results for a logistic regression where the separate CEO-chair dummy (SEPCHAIR) is included as the dependent variable. The coefficients on DIFF, MKTSIZE, and ENTCOST are, -0.140, 0.130, and -0.076, respectively, and are statistically significant (1%, 1%, and 5% levels, respectively). These coefficients indicate when product substitutability is greater, market size is larger, and entry costs are lower,

³⁰ When I replace SALE with log assets or log market value of equity as alternative proxies of firm size, the results are not affected.

then the likelihood that the CEO is not the chairman of the board is greater, reflecting stronger governance.

Column III shows the results for an OLS regression where the proportion of independent directors (INDEP) is included as the dependent variable. Surprisingly, the coefficient on DIFF is insignificant, while those on MKTSIZE and ENTCOST are -2.039 and 1.692, respectively, and are both significant (1% level). These results suggest when the market size is larger and entry costs are lower, then the directors are less independent, reflecting weaker governance. Column IV shows the results for a logistic regression where the director attendance dummy (NOT_ATTEND) is included as the dependent variable. The coefficients on DIFF, MKTSIZE, and ENTCOST are all insignificant. Column V provides results for an OLS regression where the board index (BINDEX) is included as the dependent variable. The coefficient on DIFF is -0.429 and is significant (10% level) whereas those on MKTSIZE and ENTCOST are insignificant. Collectively, the results on board strength show when competition is greater, then board size is smaller and the CEO and chairman roles are more likely to be separate. There is weak evidence of a negative relation between competition and board director independence, no relation between competition and the likelihood of director attendance at board meetings, and weak evidence that competition increases overall board strength.

Column VI provides OLS regression results where the charter provisions index (CINDEX) is the dependent variable. The coefficient on DIFF is insignificant; the coefficients on MKTSIZE and ENTCOST are -0.272 and 0.201, respectively, and are significant (1% level), suggesting that competition is positively related to the extent of shareholder rights and therefore governance strength. Finally, column VII shows that DIFF is insignificantly related to the total governance index (TOTINDEX); however, MKTSIZE is positively related with a coefficient of

0.596, and ENTCOST is negatively related with a coefficient of -0.541, both significant (1% level). Taken together, these coefficients suggest that competition is positively related to total governance strength.

The results for CONC show that higher values of concentration are associated with lower values of BSIZE, higher values of SEPCHAIR, and lower values of INDEP. The coefficients for CONC in the other columns are insignificant. This may reflect the ambiguous nature of concentration discussed above and in other studies (e.g., Raith, 2003; Karuna, 2007).

The coefficients on the other control variables are generally consistent with those found in prior research (e.g., Klein, 2002; Gillan et al., 2003, 2006) and in the univariate analysis discussed in Section 3. These results generally show that larger firms have larger boards, less likelihood of the CEO and chairman roles being separate, a higher proportion of independent directors on the board, greater likelihood that a director does not attend at least 75% of the board meetings, a smaller board index, a larger charter provisions index, and a smaller total governance index. Collectively, they suggest that larger firms have weaker governance. The results also show that firms that operate in riskier environments, those with greater growth opportunities, and those with a greater proportion of CEO stock and options holdings have stronger governance. Greater CEO tenure is generally associated with less board monitoring but more shareholder-friendly provisions.

Board independence paradox

As noted in Section 3, the overall results on INDEP are puzzling. The coefficients on the variables in Column III where INDEP is the dependent variable are opposite in direction to their counterparts in the other columns in Table 3, with the exception of those for CEO tenure. More

specifically, these coefficients indicate that larger firms have a higher proportion of independent directors on their boards, whereas firms that operate in riskier environments and those with greater growth opportunities, CEO tenure, and CEO stock and options holdings have a lower proportion of independent directors. In a separate analysis (not reported), I find that these results extend to other measures of director independence documented in prior research (e.g., director independence on audit, compensation, and nominating committees studied by Klein, 1998).

One possible explanation for this finding is a potential tradeoff between the proportion of independent directors on the board and the other governance mechanisms (Gillan et al, 2006). Another explanation is that outside directors may not have the time or access to the necessary internal firm information to closely monitor the CEO. In addition, they may have been appointed by the CEO and may prefer not to lose favor with him by closely monitoring him. Evidence on this claim is mixed. While some studies suggest that greater director independence leads to greater monitoring, others show that inside directors are better monitors (e.g., Core, Holthausen, and Larcker, 1999).

Another explanation for the results for INDEP may be a difference in director profiles. For example, independent directors can be segmented into different groups based on age, proportion of stock ownership, busy schedules, interlocking relationships, etc.; these attributes may influence the time, availability of information, and willingness of these directors to closely monitor the CEOs. It is possible that some independent directors may monitor CEOs of firms that operate in more competitive industries more closely whereas others may not because they are either busy, have some association with the CEO, or for some other reason.³¹ This suggests

³¹ In a separate regression, I find that greater competition is associated with a lower likelihood of the CEO having interlocking relationships with board members on average. This is one potential explanation for the negative association between competition and director independence.

that several factors may moderate the relation between competition and director independence. This possibility warrants further investigation but is beyond the scope of this study.

Overall, however, the result on INDEP provides evidence for the multi-dimensional nature of governance, suggesting that studies on governance should not rely on one or a few measures of governance to the exclusion of others. It also suggests that greater board independence may not necessarily imply greater board monitoring. Indeed, some studies question the benefits of greater board independence. For example, Agrawal and Knoeber (1996) and Yermack (1996) find a negative correlation between the proportion of outside directors on a board and Tobin's q , a measure of firm value. Klein (1998) shows that a greater proportion of independent directors is associated with a negative change in market value of equity. She also shows that inside director representation on a board's finance and investment committee correlates with improved firm performance. More recently, Bhagat and Black (2002) find that more independent boards do not achieve improved firm profitability, and that there is some evidence such firms actually perform worse than other firms.

In general, the results for the multivariate analysis conducted in Table 3 support the results for the univariate analysis in Section 3 and show that greater industry competition is associated with greater board strength, more shareholder-friendly charter provisions, and greater total governance strength. Therefore, I conclude that firms in more competitive industries have stronger governance mechanisms in place.

5. Additional Tests

Economic Census Sample

One potential criticism of the Compustat sample is that it does not comprise the universe of firms within a particular industry nor does it cover all the industries in the economy. Indeed, Compustat omits many firms not listed on a stock market index but which may influence competition in their primary industries. Consequently, it is possible that the extent of competition in an industry may be distorted in the above analyses.

To explore whether the results are affected by potential limitations of the Compustat sample, I construct another sample using industry-level data collected from the Census of Manufactures report in the 1992 Economic Census (at the four-digit SIC code level).³² This census provides comprehensive narrowly-defined industry data at the plant level for the manufacturing sector (two-digit SIC codes ranging from 20 to 39) for considerably more firms per industry compared to Compustat.³³ In 1997, the method of classifying industries changed from the Standard Industrial Classification (SIC) scheme to the North American Industrial Classification Scheme (NAICS). To enable comparisons between industries at the four-digit SIC code level in the 1992 Economic Census and the same industries disaggregated at the eight-digit NAICS code level in the 1997 Census, the U.S. Census Bureau developed bridges between the SIC and NAICS codes. However, these bridges are fully complete for only a very small number of industries. Including only industries with fully complete bridges across both Economic Censuses drastically reduces the number of observations. Therefore, to have sufficient observations and maintain continuity in an industry classified at the four-digit SIC code level, I use the 1992 Economic Census data to compute the competition measures in this study. Hence,

³² The 1992 Economic Census data is obtained from the U.S. Census Bureau's website at <http://www.census.gov/epcd/www/92result.html>

³³ As a broad comparison, in the year 1992, the Compustat database includes approximately 3,452 firms from 457 industries from the manufacturing sector (7,430 firms from 880 industries across all industrial sectors), whereas the Economic Census provides aggregate industry data for approximately 459 industries comprising 322,464 firms from the manufacturing sector (1,056 industries comprising 4.6 million firms across all industrial sectors).

in my sample, each competition measure has the same value for each year. As my study is cross-sectional, this lack of variation in years is not a significant limitation.

To be included in the sample, a firm must have complete data across Compustat, CRSP, IRRC, and the 1992 Census of Manufactures report. Further, there must be a match in the four-digit SIC codes between the Compustat data and the Census data for observations to be included in the final sample. The final samples comprise observations as follows: for the board sample, 2,996 firm-years for the years 1996 to 2005 from 617 firms across 110 industries for 927 CEOs; for the corporate by-laws and charter provisions sample, 1,864 firm-years for the years 1993, 1995, 1998, 2000, 2002, and 2004, from 629 firms across 109 industries for 929 CEOs; and for the combined board/corporate by-laws and charter provisions sample, 1,334 firm-years for the years 1998, 2000, 2002, and 2004, from 539 firms across 107 industries for 728 CEOs.

To compute the measures for DIFF and MKTSIZE for these samples, I use similar procedures to those described in Section 3. To measure costs, I take the sum of materials costs and production workers' wages. This price-average variable cost measure has been used in the Industrial Organizations literature (e.g., Domowitz, Hubbard, and Peterson, 1986; Carlton and Perloff, 1994; Besanko et al., 2000; Nevo, 2001). A possible limitation of this measure is that it ignores overhead and other capacity costs. Hence, the price-cost margin may be overestimated for some industries. As a proxy for entry costs, I use the capital stock of the median plant in the industry, as it reflects the minimal level of necessary investment. This investment may vary across industries in proportion to the cost of constructing a single plant of minimum efficient scale. The minimum efficient scale of a plant is defined as the lowest level of output the plant can produce such that its long-run average costs are minimized (Cabral, 2000, page 24). I calculate the minimum efficient scale relative to industry size and multiply it by the total value of

capital stock in the industry (Sutton, 1991). Using the size of the median plant in the industry (measured as the number of employees in the median plant in the industry), I divide this measure by industry size (measured as the number of employees in all plants in the industry) to obtain the inverse of the number of plants in the industry.³⁴

Table 4 provides descriptive statistics for the final sample. These statistics are generally comparable with those in the Compustat sample, with the exception of the industry-level variables and STOCKOWN. The smaller statistics for concentration in the Census sample in Table 4 compared to those for the Compustat sample in Table 1 may reflect the considerably higher number of firms included for each industry in the former.

Table 5 provides the results of regressions similar to those conducted in Table 3 based on the Census sample. The coefficients for DIFF, MKTSIZE, and ENTCOST are generally similar in magnitude to those in Table 3. However, some are now insignificant at the conventional levels of significance, as seen in Table 5. This lack of significance may reflect noise in the competition variables. Although industry characteristics take a long time to change, it is possible that between 1992 and 2005, the last year in my sample, some industries may have changed significantly, affecting the magnitudes of the competition measures I use. In a separate analysis, I rerun the regressions in Table 5 for the 1996 to 1998 period using 1992 values for all the years in this period. The overall findings (not reported) do not change.³⁵ Despite this change in significance for these variables, the magnitudes of the coefficients of interest are generally larger than those in Table 5, and several of the previously insignificant coefficients are now significant.

The results for CONC show that concentration generally has a positive relation with governance, with the exception of INDEP. Using the Census data increases the number of

³⁴ Industry sales can be used to denote industry size instead of the number of employees.

³⁵ Selecting another period, 1996 to 2000, does not change the overall findings.

significant CONC coefficients in the regression analysis. Since the Census data provide more firms per industry for the sample, these results suggest that greater competition may be associated with weaker governance. This finding counters the results obtained using DIFF, MKTSIZE, and ENTCOST, which collectively show that competition has a positive relation with governance. This difference in the results provides additional evidence of the ambiguous nature of concentration as a measure of competition, especially in its relation with governance. Therefore, I conclude that competition has a positive relation with governance. In addition, consistent with Raith (2003) and Karuna (2007), I caution against the use of concentration as the sole proxy for competition.

Random Effects Regression – The Random Coefficients Model

Since the OLS regression does not consider correlations in the regression error terms across or within firms, I also use a second regression model. This second model is a random coefficients model, where I include industry as a random effect and allow the intercept to vary across industries. This allows for the magnitude of governance to differ across industries.³⁶ In this regression, I cluster the observations at the industry level to allow for connections across firms within an industry (Swamy, 1970; Hsiao, 1986). I also allow for an extra layer of clustering at the firm level. This permits observations for a particular firm to be correlated over time. Using this regression model, I find that this study's overall findings remain.

As my sample comprises panel data with variation in all measures over time, a random-effects regression can control for unobserved industry effects that may be constant through time but vary across industries (Wooldridge, 2002, page 169). Failing to control for such effects

³⁶ In a separate analysis (not reported), when I allow the slopes of certain CEO- and firm-level independent variables to vary across industries as well, the overall findings are not affected. The PROC MIXED routine in the SAS statistical software package provides this flexibility (Singer, 1998).

could create heterogeneity bias in the pooled least-squares estimates (Hsiao, 1986). Industry random effects may strip away the association between competition and governance, as these effects control for differences in governance across industries. However, this bias is unlikely to be a major concern in this study for several reasons. First, unlike the fixed-effects procedure, the random-effects procedure does not remove all of the variation between competition and governance; instead, it removes only a fraction of the mean (Greene, 2000, page 569; Wooldridge, 2002, page 287). Second, the random-effects procedure forces the unobserved industry effect to be uncorrelated with from the independent variables in the regression model, including the competition variables, by putting the unobserved effects into the error term (Wooldridge, 2002, page 265). Thus, the random effects do not absorb the variance in governance explained by the competition variables. Third, this procedure maintains variation in governance at the firm level within an industry and over time, enabling me to test whether firms have stronger or weaker governance mechanisms based on industry competition. Finally, my finding of a significant relation between competition and governance given the more stringent random-effects procedure (which biases against the predicted effects) provides stronger confidence in the results.

In summary, the additional tests conducted in this section confirm this study's finding that firms in more competitive industries possess stronger governance mechanisms. The results also provide further evidence of the multi-dimensional nature of competition and governance. The next section describes additional robustness checks conducted in this study.

6. Sensitivity Checks

Prior research has documented several governance measures other than those used in this study. As I focus on firms' monitoring choices, I do not include these as dependent variables in the analysis. However, since these additional governance measures may influence the dependent variables, and hence firms' monitoring intensity, I rerun the regressions in Table 3, controlling for these additional governance variables. I also include other control variables documented in prior studies as influencing monitoring (e.g., Gillan et al., 2003, Hartzell and Starks, 2003). Specifically, I include return on assets (ROA) and stock return (RET); directors' stock holdings (DIRSTOCK); institutional stock holdings (INSTHOLD); debt leverage (LEVERAGE); and short-term CEO incentive compensation mix (INCENTMIX).³⁷ I provide definitions and computation details for these measures in the appendix.

Table 6 presents the results for these regressions. Note that the sample size is reduced as a result of merging databases. In addition, due to missing data, the number of observations used in the regressions is considerably less compared to the number used in Table 3. However, the adjusted R^2 for these regressions are generally larger compared to those in Table 3, showing that these additional variables contribute significantly to explaining the variation in the governance proxies used in this study. The results show that the overall findings in this study remain even after including the additional control variables.³⁸

I also conduct robust regressions on equation 1 using the different governance measures in Tables 3 and 5 as dependent variables. The robust regression weights observations in proportion to their proximity to the mean value of the dependent variable and therefore minimizes the impact of outliers on the results. The results of this regression (not reported)

³⁷ The overall results are unchanged when long-term CEO incentive compensation mix (computed as the sum of the value of restricted stock grants, Black-Scholes value of stock options grants, long-term incentive payouts, and other long-term compensation provided to the CEO divided by total CEO compensation) is included instead of short-term CEO incentive compensation mix.

³⁸ The results are also unaffected when we control for the existence of audit, compensation, and nominating committees (Klein, 1998) in the regressions.

support those provided in Tables 3 and 5. In a separate analysis (not reported), I also conduct median regressions, which yield coefficients similar in magnitude and significance to the robust regressions.³⁹

Several studies in Industrial Organizations research provide alternative measures for entry costs (e.g., Sutton, 1991; Cabral, 2000; Symeonidis, 2002). For instance, some studies include R&D expenditures and/or advertising expenditures in the entry costs measure (e.g., Demsetz, 1982). Including these components in my computation of entry costs does not alter the result for entry costs. This result also does not change when I include the minimum level of firm size in an industry (measured as the lowest value of log total assets for firms in an industry) as a proxy for entry costs.

Furthermore, I consider whether there is a relation between market size and entry costs. For example, a manufacturing firm in a small capital-intensive industry may benefit from reduced competition as the small market size may deter large firms from entering the market. Hence, this implies that I should scale market size by entry costs. A higher combined measure of market size divided by entry costs should imply greater competition. This scaled measure also may affect market structure (Sutton, 1991, page 125). Given some level of sunk cost (entry costs in this study), increases in market size should lead to a disproportionate increase in the number of firms, since unit margins decline with entry. When I use this measure instead of MKTSIZE and ENTCOST in the above regressions, the results are similar to those reported in Tables 3 and 5.

³⁹ Median regressions minimize the sum of absolute deviations rather than sum of squared deviations (as in OLS) and are therefore less sensitive to outliers than are the OLS regressions (Koenker and Bassett, 1982).

Overall, the comprehensive robustness checks yield results that generally support those in Tables 3 and 5. In the next section, I conclude this study, providing suggestions for future research.

7. Conclusion

Although many studies have been conducted on corporate governance, the majority of these studies treat governance as exogenous. However, given a large variation in the strength of internal governance mechanisms across firms, it is conceivable that there are factors that influence the costs and benefits of monitoring managers and officers in firms, and thus the level of governance. Despite this possibility, little research has been conducted in identifying factors that could affect this cross-sectional variation in governance strength. In this paper, I empirically examine the effect of industry product market competition on the strength of governance mechanisms across firms. I find that product substitutability and market size have a positive relation with governance, while entry costs have a negative relation. These relations are robust to several sensitivity checks. Thus I conclude that competition has a positive relation with governance.

This paper contributes to the literature by providing additional evidence that corporate governance can be regarded as endogenous. It also shows that industry attributes can influence the strength of governance mechanisms in firms. Further, consistent with a few recent studies, it shows that governance and competition are multi-dimensional in nature. Finally, it adds to our understanding of the observed heterogeneity in the strength of internal governance mechanisms across firms.

While this study provides insight into the relation between competition and governance, there are two potential limitations. First, I rely on Standard and Poor's primary industrial segment classification to assign firms to industries. However, the primary industry for a firm could change during the sample period in this study. Further, it is not clear whether conglomerates monitor their managers and officers based mainly on the primary segment I identify. This possibility may add noise to the analysis. A second limitation is that some firms may compete with firms in industries with different four-digit SIC codes. In addition, some firms may not compete with other firms in the same industry (at the four-digit SIC code level). For example, the use of the price-cost margin variable assumes a one-to-one correspondence between four-digit SIC codes and product markets. However, this correspondence is not perfect, as some industries may include several products that are not close substitutes for each other. Such an aggregation tends to overstate the true substitutability for a firm's product. Further, some products may be in different four-digit SIC codes and yet may be close substitutes of each other. Such a disaggregation tends to understate the true substitutability for a firm's product. Nonetheless, the mismeasurement due to aggregation or disaggregation is unlikely to be systematically different across industries and is therefore unlikely to bias the empirical results in this study.

An intriguing extension to this study would be an examination of whether the key findings apply intertemporally. In particular, such a study could consider whether changes in industry competition over time affect governance strength in the manner suggested by this study. Such a question may increase our understanding of how corporate governance has evolved over time.

Appendix - Definitions and Computations of Variables

Variables	Definitions	Method of computation
BSIZE	Board size	Number of directors on board (taken directly from database)
SEPCHAIR	Separate CEO-chairman dummy	Equals 1 if CEO is not the chairman; equals 0 otherwise
INDEP	Percentage of independent directors on board	As defined
NOT_ATTEND	Attendance_dummy	Equals 1 if any director on the board does not attend at least 75% of the board meetings; equals 0 otherwise
BINDEX	Board index	Average of ranked percentiles (in order of increasing board strength) of BSIZE, SEPCHAIR, INDEP, and ATTEND
CINDEX	Corporate by-laws and charter provisions index	Obtained directly from data
TOTINDEX	Total governance index	Average of ranked percentiles (in order of increasing governance) of BSIZE, SEPCHAIR, INDEP, ATTEND, all 24 provisions that comprise CINDEX, and 6 state laws that offer antitakeover protection).
DIFF	Extent of product substitutability in industry (at 4-digit SIC code level)	For measure constructed from Compustat data, is equal to sales / operating costs, for each industrial segment; operating costs include cost of goods sold, selling, general, and administrative expense, and depreciation, depletion, and amortization. For measure constructed from Economic Census data, is equal to industry sales / (cost of materials + production workers' wages).
MKTSIZE	Level of market size in industry (at 4-digit SIC code level)	Natural log of industry sales (for measure constructed from Compustat data, industry sales is computed as the sum of segment sales for firms operating in the industry).
ENTCOST	Level of entry costs in industry (at 4-digit SIC code level)	For measure constructed from Compustat data, is equal to natural log of weighted average of gross value of cost of property, plant and equipment for firms in industry, weighted by each firm's market share in industry. For measure constructed from Economic Census (reflecting the capital intensity of the median plant in the industry), is equal to the natural log of [(number of employees in median plant in industry / number of employees in industry) * capital

		stock]; capital stock is equal to the acquisition value (book value) of depreciable assets like buildings, structures, machinery, and equipment.
CONC	Four-firm concentration ratio in industry (at 4-digit SIC code level)	Proportion of sales in the industry accounted for by the four largest firms (by sales) in the industry (for measure constructed from Compustat data, industry sales is as computed in MKTSIZE above).
SALE	Log sales	Natural log of sales
VOLAT	Stock return volatility	Standard deviation of monthly company stock returns
MTB	Log market-to-book ratio	Natural log of [(number of outstanding shares*market price at end of fiscal year) / (total assets – total liabilities)]
RD	Log research and development intensity	Natural log of (R & D expenditure / sales); R&D/sales set to zero for missing values
TENURE	Log CEO tenure	Natural log of number of years the CEO held that position continuously. Number of years is calculated as the difference between the current fiscal year and the year in the 'date became CEO' field.
STOCKOWN	Lagged log CEO stock and options holdings	Lagged natural log of value of stock and options holdings
ROA	Annual return on assets	Earnings before extraordinary items / total assets
RET	Annual stock return	Obtained directly from Execucomp
DIRSTOCK	Natural log of directors' stock holdings as a proportion of outstanding shares in firm	Obtained director from the director database in IRRC
INSTHOLD	Proportion of stock owned by institutional investors	Obtained directly from Thomson Financial database
LEVERAGE	Book leverage	Total liabilities divided by total assets
INCENTMIX	Proportion of short-term incentive compensation	(bonus + other annual compensation) / total compensation where: total compensation = salary + bonus + other annual compensation + value of restricted stock grants + Black-Scholes value of stock options grants + long-term incentive payouts + other long-term compensation

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Table 1 – Descriptive statistics for sample using industry variables generated from Compustat data

Panel A provides statistics for a sample based on governance measures constructed from data on board characteristics reflecting board strength, comprising 3,987 observations for the years 1996 to 2003. Panel B provides statistics for a sample where a governance index reflecting shareholder rights (used in Gompers et al., 2003) is constructed from corporate by-laws and charter provisions data, comprising 2,560 observations for the years 1993, 1995, 1998, 2000, and 2002. Panel C provides statistics for a sample where an aggregate governance index, reflecting total governance strength, comprising ranked percentiles of board characteristics, corporate by-laws and charter provisions, and state anti-takeover provisions, and comprising 1,681 observations for the years 1998, 2000, and 2002. Data on board characteristics and corporate by-laws and charter provisions are obtained from the Director and Governance databases in the Investor Responsibility Research Center; industry data are obtained from the Segments database in Compustat; firm and compensation data are obtained from the Annual Industrial and Execucomp databases in Compustat and from CRSP; and data on CEO characteristics are obtained from Execucomp (where executives are defined as “CEO” based on start and end dates). All dollar items (before transformation) are CPI-adjusted to year-2,005 dollar amounts.

Variable	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel A: Board of Directors Sample (N = 3,987 firm-years)					
Board size	9.31	9.00	7.00	11.00	2.73
Separate chair dummy	0.35	0.00	0.00	1.00	0.48
% Independence of Board	62.83	66.67	50.00	76.92	17.64
Attendance dummy	0.18	0.00	0.00	0.00	0.39
Board index	68.68	70.56	60.28	78.28	13.57
Extent of product substitutability	1.38	1.18	1.09	1.38	1.02
Log market size	10.93	11.04	9.86	12.13	1.61
Log entry costs	7.88	7.86	6.80	9.17	1.64
Concentration ratio	0.64	0.64	0.45	0.80	0.21
Log sales	7.35	7.25	6.33	8.40	1.55
Stock return volatility	0.14	0.12	0.08	0.17	0.08
Log market-to-book ratio	1.06	0.95	0.78	1.22	0.40
Log R&D intensity	0.06	0.00	0.00	0.06	0.18
Log CEO tenure	1.46	1.61	0.69	2.30	1.10
Lagged log CEO stock and options holdings	-9.69	14.08	5.84	18.28	86.57
Panel B: Corporate By-laws and Charter Provisions Sample (N = 2,560 firm-years)					
Provisions index (Gompers et al., 2003)	9.19	9.00	7.00	11.00	2.71
Extent of product substitutability	1.32	1.16	1.08	1.35	0.86
Log market size	10.87	10.88	9.78	12.08	1.60
Log entry costs	7.88	7.92	6.76	9.15	1.79
Concentration ratio	0.63	0.63	0.45	0.80	0.21
Log sales	7.45	7.35	6.40	8.50	1.57
Stock return volatility	0.13	0.11	0.08	0.16	0.08
Log market-to-book ratio	1.02	0.92	0.77	1.16	0.36
Log R&D intensity	0.06	0.00	0.00	0.06	0.21
Log CEO tenure	1.44	1.61	0.69	2.30	1.11
Lagged log CEO stock and options holdings	-19.15	12.80	2.00	17.38	101.55

Panel C: Combined Board/Corporate By-laws & Charter Provisions/State Anti-takeover Provisions Sample (N = 1,681 firm years)					
Board size	9.20	9.00	7.00	11.00	2.63
Separate chair dummy	0.35	0.00	0.00	1.00	0.48
% Independence of Board	63.65	66.67	53.85	77.78	17.40
Attendance dummy	0.18	0.00	0.00	0.00	0.38
Board index	68.97	70.57	60.80	78.31	13.36
Provisions index (Gompers et al., 2003)	9.05	9.00	7.00	11.00	2.63
Total governance index	84.55	84.97	80.96	88.79	5.61
Extent of product substitutability	1.38	1.19	1.10	1.42	0.91
Log market size	11.12	11.19	10.11	12.13	1.54
Log entry costs	7.95	7.93	6.92	9.26	1.58
Concentration ratio	0.64	0.64	0.45	0.81	0.20
Log sales	7.35	7.23	6.33	8.40	1.54
Stock return volatility	0.15	0.13	0.09	0.18	0.08
Log market-to-book ratio	1.04	0.91	0.77	1.19	0.40
Log R&D intensity	0.06	0.00	0.00	0.07	0.16
Log CEO tenure	1.44	1.61	0.69	2.30	1.11
Lagged log CEO stock and options holdings	-9.01	14.30	6.37	18.13	85.40

Panel D: Industry variables

	DIFF	MKTSIZE	ENTCOST	CONC
DIFF	1.00***	-0.01***	-0.00	0.02***
MKTSIZE		1.00***	0.56***	-0.46***
ENTCOST			1.00***	0.10***
CONC				1.00***

***, **, & * indicate significance at the
1%, 5%, & 10% levels respectively.

Table 3 – Regression of governance proxies on the determinants of competition using industry data obtained from Compustat

This table provides results for OLS and logistic regressions on several governance proxies. Columns I to V provide results for regressions on board characteristics reflecting board strength. Column I provides results for an OLS regression on board size (BSIZE). Column II provides results for a logistic regression on whether the CEO is not the chairman of the board (SEPCHAIR). Column III provides results for an OLS regression on the percentage of independent directors on the board (INDEP). Column IV provides results for a logistic regression on the likelihood that the directors do not attend board meetings (NOT_ATTEND). Column V provides results for an OLS regression on a board index (BINDEX) reflecting aggregate board strength. Column VI provides OLS regressions on an aggregate index of 24 corporate by-laws and charter provisions (CINDEX) used by Gompers et al. (2003), reflecting shareholder rights. Column VII provides results for an OLS regression on a total aggregate index (TOTINDEX), reflecting total governance strength. The sample for columns I to V comprises data for 3,987 firm-years from years 1996 to 2003; the sample for column VI comprises data for 2,560 firm-years for years 1993, 1995, 1998, 2000, and 2002; and the sample for column VII comprises data for 1,681 firm-years for the years 1998, 2000, and 2002. Data on board characteristics and corporate by-laws and charter provisions are obtained from the Director and Governance databases in the Investor Responsibility Research Center; industry data are obtained from the segments database in Compustat; firm and compensation data are obtained from the Annual Industrial and Execucomp databases in Compustat and from CRSP; and data on CEO characteristics are obtained from Execucomp (where executives are defined as “CEO” based on start and end dates). All dollar items (before transformation) are CPI-adjusted to year-2,005 dollar amounts. Year indicators are included in the regressions but not reported for brevity. Two-tailed tests of p-values are conducted. We run the following regression (for definitions of variables, see the appendix):

$$\text{GOVERNANCE PROXY} = \beta_0 + \beta_1 \text{DIFF} + \beta_2 \text{MKTSIZE} + \beta_3 \text{ENTCOST} + \beta_4 \text{CONC} + \beta_5 \text{SALE} + \beta_3 \text{VOLAT} + \beta_4 \text{MTB} + \beta_5 \text{RD} + \beta_6 \text{TENURE} + \beta_7 \text{STOCKOWN} + \text{YEAR INDICATOR} + \varepsilon$$

	OLS	LOGISTIC	OLS	LOGISTIC	OLS	OLS	OLS
	I	II	III	IV	V	VI	VII
	BSIZE	SEPCHAIR	INDEP	NOT_ATTEND	BINDEX	CINDEX	TOTINDEX
Intercept	5.678***	1.506***	59.828***	-2.487***	86.193***	9.349***	86.055***
DIFF	0.146***	-0.140***	0.423	0.012	-0.429*	-0.084	-0.017
MKTSIZE	-0.255***	0.130***	-2.039***	-0.045	0.258	-0.272***	0.596***
ENTCOST	0.219***	-0.076**	1.692***	-0.004	-0.043	0.201***	-0.541***
CONC	-1.235***	0.488**	-9.014***	0.161	-0.286	-0.192	1.199
SALE	0.940***	-0.338***	2.249***	0.212***	-2.814***	0.370***	-1.047***
VOLAT	-5.879***	0.080	-11.221***	-0.596	14.239***	-4.819***	10.282***
MTB	-0.643***	0.142	-1.841***	-0.168	1.620***	-0.685***	1.170***
RD	1.644***	-0.512**	10.916***	0.416	-2.016*	0.572**	-0.979
TENURE	-0.029	-0.525***	-1.119***	0.018	-1.326***	-0.114**	0.006
STOCKOWN	-0.001***	0.001*	-0.009***	-0.000	0.001	-0.002***	0.003*
No. of Observations	3,785	3,785	3,785	3,785	3,785	2,451	1,604
Adjusted/Pseudo R ²	37.5%	8.5%	7.3%	1.9%	13.3%	11.2%	14.1%

***, **, & * represent significance levels at the 1%, 5%, and 10% levels respectively.

Table 4 – Descriptive statistics for governance and its hypothesized determinants using industry data obtained from the Economic Census

Panel A provides statistics for a sample based on governance measures constructed from data on board characteristics reflecting board strength, comprising 2,996 observations for the years 1996 to 2005. Panel B provides statistics for a sample where a governance index reflecting shareholder rights (used in Gompers et al., 2003) is constructed from corporate by-laws and charter provisions data, comprising 1,864 observations for the years 1993, 1995, 1998, 2000, 2002, and 2004. Panel C provides statistics for a sample where an aggregate governance index, reflecting total governance strength, comprising ranked percentiles of board characteristics, corporate by-laws and charter provisions, and state anti-takeover provisions, and comprising 1,334 observations for the years 1998, 2000, 2002, and 2004. Data on board characteristics and corporate by-laws and charter provisions are obtained from the Director and Governance databases in the Investor Responsibility Research Center; industry data are obtained from the 1992 Economic Census for the manufacturing sector (two-digit SIC codes ranging from 20 to 39); firm and compensation data are obtained from the Annual Industrial and Execucomp databases in Compustat and from CRSP; and data on CEO characteristics are obtained from Execucomp (where executives are defined as “CEO” based on start and end dates). All dollar items (before transformation) are CPI-adjusted to year-2,005 dollar amounts.

Variable	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel A: Board of Directors Sample					
Board size	9.20	9.00	7.00	11.00	2.55
Separate chair dummy	0.34	0.00	0.00	1.00	0.47
% Independence of Board	66.36	66.67	57.14	80.00	16.60
Attendance dummy	0.17	0.00	0.00	0.00	0.37
Board index	69.72	71.21	62.08	78.80	12.96
Extent of product substitutability	2.10	1.93	1.59	2.65	0.66
Log market size	10.01	10.02	9.21	10.77	1.07
Log entry costs	7.50	7.24	6.50	7.97	1.56
Concentration ratio	0.37	0.35	0.26	0.45	0.16
Log sales	7.29	7.15	6.27	8.40	1.63
Stock return volatility	0.13	0.11	0.08	0.16	0.08
Log market-to-book ratio	1.12	1.00	0.82	1.30	0.41
Log R&D intensity	0.09	0.04	0.01	0.12	0.20
Log CEO tenure	1.44	1.61	0.69	2.20	1.04
Lagged log CEO stock and options holdings	-62.96	9.95	-77.85	17.26	145.08
Panel B: Corporate By-laws and Charter Provisions Sample					
Provisions index (Gompers et al., 2003)	9.30	9.00	7.00	11.00	2.72
Extent of product substitutability	2.09	1.89	1.58	2.65	0.66
Log market size	10.04	10.05	9.21	10.77	1.08
Log entry costs	7.55	7.24	6.54	7.97	1.61
Concentration ratio	0.37	0.35	0.26	0.46	0.16
Log sales	7.35	7.24	6.33	8.44	1.66
Stock return volatility	0.13	0.11	0.07	0.16	0.08
Log market-to-book ratio	1.07	0.97	0.81	1.24	0.38
Log R&D intensity	0.10	0.04	0.01	0.11	0.27
Log CEO tenure	1.46	1.61	0.69	2.30	1.04
Lagged log CEO stock and options	-69.58	9.08	-89.29	16.73	153.18

holdings					
Panel C: Combined Board/Corporate By-laws & Charter Provisions/State Anti-takeover Provisions Sample					
Board size	9.14	9.00	7.00	11.00	2.47
Separate chair dummy	0.34	0.00	0.00	1.00	0.47
% Independence of Board	67.45	70.00	57.14	80.00	16.22
Attendance dummy	0.16	0.00	0.00	0.00	0.36
Board index	69.96	71.12	62.14	78.77	12.69
Provisions index (Gompers et al., 2003)	9.23	9.00	7.00	11.00	2.67
Total governance index	84.90	85.25	81.27	89.14	5.55
Extent of product substitutability	2.11	1.99	1.61	2.65	0.66
Log market size	10.01	10.02	9.21	10.73	1.06
Log entry costs	7.47	7.24	6.54	7.93	1.52
Concentration ratio	0.37	0.35	0.26	0.45	0.16
Log sales	7.30	7.15	6.30	8.40	1.61
Stock return volatility	0.14	0.12	0.08	0.17	0.09
Log market-to-book ratio	1.09	0.97	0.80	1.29	0.41
Log R&D intensity	0.09	0.04	0.01	0.12	0.19
Log CEO tenure	1.46	1.61	0.69	2.20	1.02
Lagged log CEO stock and options holdings	-56.55	10.53	-68.42	17.16	135.43

Table 5 – Regression of governance proxies on the determinants of competition using industry variables obtained from the Economic Census

This table provides results for OLS and logistic regressions on several governance proxies. Columns I to V provide results for regressions on board characteristics reflecting board strength. Column I provides results for an OLS regression on board size (BSIZE). Column II provides results for a logistic regression on whether the CEO is not the chairman of the board (SEPCHAIR). Column III provides results for an OLS regression on the percentage of independent directors on the board (INDEP). Column IV provides results for a logistic regression on the likelihood that the directors do not attend board meetings (NOT_ATTEND). Column V provides results for an OLS regression on a board index (BINDEX) reflecting aggregate board strength. Column VI provides OLS regressions on an aggregate index of 24 corporate by-laws and charter provisions (CINDEX) used by Gompers et al. (2003), reflecting shareholder rights. Column VII provides results for an OLS regression on a total aggregate index (TOTINDEX), reflecting total governance strength. The sample for columns I to V comprises data for 2,996 firm-years from years 1996 to 2005; the sample for column VI comprises data for 1,864 firm-years for years 1993, 1995, 1998, 2000, 2002, and 2004; and the sample for column VII comprises data for 1,334 firm-years for the years 1998, 2000, 2002, and 2004. Data on board characteristics and corporate by-laws and charter provisions are obtained from the Director and Governance databases in the Investor Responsibility Research Center; industry data are obtained from the 1992 Economic Census for the manufacturing sector (two-digit SIC codes ranging from 20 to 39); firm and compensation data are obtained from the Annual Industrial and Execucomp databases in Compustat and from CRSP; and data on CEO characteristics are obtained from Execucomp (where executives are defined as “CEO” based on start and end dates). All dollar items (before transformation) are CPI-adjusted to year-2,005 dollar amounts. Year indicators are included in the regressions but not reported for brevity. Two-tailed tests of p-values are conducted. We run the following regression (for definitions of variables, see the appendix):

$$\text{GOVERNANCE PROXY} = \beta_0 + \beta_1 \text{DIFF} + \beta_2 \text{MKTSIZE} + \beta_3 \text{ENTCOST} + \beta_4 \text{CONC} + \beta_5 \text{SALE} + \beta_3 \text{VOLAT} + \beta_4 \text{MTB} + \beta_5 \text{RD} + \beta_6 \text{TENURE} + \beta_7 \text{STOCKOWN} + \text{YEAR INDICATOR} + \varepsilon$$

	OLS	LOGISTIC	OLS	LOGISTIC	OLS	OLS	OLS
	I	II	III	IV	V	VI	VII
	BSIZE	SEPCHAIR	INDEP	NOT_ATTEND	BINDEX	CINDEX	TOTINDEX
Intercept	3.845***	1.270***	52.738***	-1.137**	83.034***	9.476***	90.733***
DIFF	0.439***	-0.156**	-0.651	0.122	-1.916***	-0.001	-0.046
MKTSIZE	-0.082**	0.066*	0.011	-0.126***	0.715***	-0.001	-0.054
ENTCOST	0.079***	0.003	-0.296	-0.037	-0.180	-0.095**	0.129
CONC	-0.893***	0.354	-5.496***	0.143	0.359	-1.572***	2.922***
SALE	0.874***	-0.324***	2.040***	0.180***	-2.604***	0.275***	-0.887***
VOLAT	-4.743***	1.665***	-1.167	-0.243	18.224***	-5.231***	8.730***
MTB	-0.516***	0.378	0.435	-0.191	2.785***	-0.187	0.129
RD	1.464***	-0.352*	8.046***	-0.090	-1.495	0.340	-0.276
TENURE	-0.015	-0.509***	-1.653***	-0.008	-1.565***	-0.212***	0.221
STOCKOWN	-0.002***	0.000	-0.013***	0.000	-0.000	-0.003***	0.007***
No. of Observations	2,859	2,859	2,859	2,859	2,859	1,771	1,271
Adjusted/Pseudo R ²	40.2%	7.9%	10.2%	3.8%	14.4%	11.0%	18.7%

***, **, & * represent significance levels at the 1%, 5%, and 10% levels respectively.

Table 6 – Regression of governance proxies on the determinants of competition using industry data obtained from Compustat including additional control variables

This table provides results for OLS and logistic regressions on several governance proxies including several additional control variables. Columns I to V provide results for regressions on board characteristics reflecting board strength. Column I provides results for an OLS regression on board size (BSIZE). Column II provides results for a logistic regression on whether the CEO is not the chairman of the board (SEPCHAIR). Column III provides results for an OLS regression on the percentage of independent directors on the board (INDEP). Column IV provides results for a logistic regression on the likelihood that the directors do not attend board meetings (NOT_ATTEND). Column V provides results for an OLS regression on a board index (BINDEX) reflecting aggregate board strength. Column VI provides OLS regressions on an aggregate index of 24 corporate by-laws and charter provisions (CINDEX) used by Gompers et al. (2003), reflecting shareholder rights. Column VII provides results for an OLS regression on a total aggregate index (TOTINDEX), reflecting total governance strength. The sample for columns I to V comprises data for 3,495 firm-years from years 1996 to 2003; the sample for column VI comprises data for 1,508 firm-years for years 1993, 1995, 1998, 2000, and 2002; and the sample for column VII comprises data for 1,506 firm-years for the years 1998, 2000, and 2002. Data on board characteristics and corporate by-laws and charter provisions are obtained from the Director and Governance databases in the Investor Responsibility Research Center; industry data are obtained from the segments database in Compustat; firm and compensation data are obtained from the Annual Industrial and Execucomp databases in Compustat and from CRSP; and data on CEO characteristics are obtained from Execucomp (where executives are defined as “CEO” based on the start and end dates). All dollar items (before transformation) are CPI-adjusted to year-2,005 dollar amounts. Year indicators are included in the regressions but not reported for brevity. Two-tailed tests of p-values are conducted. We run the following regression (for definitions of variables, see the appendix):

$$\text{GOVERNANCE PROXY} = \beta_0 + \beta_1\text{DJHITS} + \beta_2\text{SALE} + \beta_3\text{VOLAT} + \beta_4\text{MTB} + \beta_5\text{RD} + \beta_6\text{TENURE} + \beta_7\text{STOCKOWN} + \beta_8\text{ROA} + \beta_9\text{RET} + \beta_{10}\text{DIRSTOCK} + \beta_{11}\text{INSTHOLD} + \beta_{12}\text{LEVERAGE} + \beta_{13}\text{INCENTMIX} + \text{YEAR INDICATOR} + \varepsilon$$

	OLS	LOGISTIC	OLS	LOGISTIC	OLS	OLS	OLS
	I	II	III	IV	V	VI	VII
	BSIZE	SEPCHAIR	INDEP	NOT_ATTEND	BINDEX	CINDEX	TOTINDEX
Intercept	5.276***	1.950***	80.280***	-2.319***	88.953***	8.938***	85.332***
DIFF	0.107**	-0.078	-0.150	-0.033	-0.345	-0.019	0.082
MKTSIZE	-0.211***	0.067	-1.595***	0.026	0.036	-0.171**	0.530***
ENTCOST	0.154***	-0.020	1.091***	-0.051	0.136	0.120**	-0.425***
CONC	-1.274***	0.167	-4.603***	0.210	1.078	0.474	1.192
SALE	0.913***	-0.195***	0.298	0.191***	-3.222***	0.341***	-1.081***
VOLAT	-5.500***	0.654	-4.603	-0.976	17.740***	-4.866***	10.039***
MTB	-0.337***	-0.031	-1.802**	-0.188	0.580	-0.600***	0.937**
RD	1.433***	0.072	4.474***	0.352	-2.712*	0.750	-1.404
TENURE	-0.054	-0.573***	-0.106	0.024	-0.965***	-0.106*	0.081
STOCKOWN	-0.001**	0.001	-0.009***	0.000	-0.000	-0.001	0.001
ROA	-0.000	0.004*	0.020	0.002	0.011	0.005	-0.010
RET	-0.025	0.010	-0.238	0.145*	-0.371	0.067	-0.346
DIRSTOCK	0.077***	0.252***	-5.511***	-0.021	-1.854***	-0.312***	-0.110
INSTHOLD	-0.397***	-0.211***	2.017***	-0.253***	2.324***	-0.131	1.103***

LEVERAGE	1.046***	-0.952***	6.405***	0.305	-2.623**	0.945	-1.184*
INCENTMIX	0.419	0.135	-2.594	-0.696*	-0.155	0.722	-1.562
No. of Observations	2,953	2,953	2,953	2,953	2,953	1,434	1,433
Adjusted/Pseudo R ²	40.1%	10.6%	23.5%	2.5%	18.8%	16.8%	17.2%

***, **, & * represent significance levels at the 1%, 5%, and 10% levels respectively.