

Co-opted Boards: Costs, Benefits, Causes, and Consequences

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May 2008

Abstract

We develop a measure of board co-option – the proportion of directors who joined the board after the CEO assumed office – and analyze whether this measure captures the extent to which the CEO can exert control over the board. We find that the sensitivity of CEO turnover to performance decreases in board co-option. CEO pay and pay hikes increase with co-option but there is no offsetting increase in pay-performance sensitivity. On the other hand, R&D intensity increases in co-option. Observed co-option increases in the importance of firm-specific human capital and measures of CEO power. Finally, Tobin's q increases in co-option for firms that benefit from CEO investment in firm-specific human capital while for other firms there is no relation between q and co-option. All results are robust to controlling for the proportion of independent directors on the board, CEO tenure, and alternative measures of co-option. We conclude that independent directors who join the board after the CEO assumes office are at least partially aligned with the CEO. In contrast, independent directors who joined before the CEO appear effective at monitoring the CEO.

JEL Classifications: G32; G34; K22

Keywords: Corporate governance; Board co-option; CEO entrenchment; Board composition

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For insightful comments, the authors are grateful to an anonymous referee, Rachel Diana, Dave Denis, Diane Denis, Ben Hermalin, Antonio Macias, John McConnell, Darius Palia, Raghu Rau, Partha Sengupta, Mike Weisbach, and seminar participants at the AFA conference at New Orleans, the Corporate Governance and Fraud Prevention Conference at George Mason University, Northeastern University, Purdue University, Rutgers University, and the SEC.

1. Introduction

The board of directors of a corporation plays a critical role in the internal governance of a firm. One view is that the board monitors the CEO more effectively the larger the fraction of independent directors on the board.¹ In practice, however, CEOs are likely to exert considerable influence on the selection of board members. They select – or at least approve – the slate of directors, and this slate is almost always approved by shareholders (Hermalin and Weisbach, 1998). Consequently, some question whether the CEO’s role in director selection compromises the independence of the board (Mace, 1971; Lorsch and MacIver, 1989; Crystal, 1991; and Bebchuk and Fried, 2003). Finkelstein and Hambrick (1989) suggest that CEOs can co-opt the board by appointing “sympathetic” new directors.² Shivdasani and Yermack (1999) provide evidence that CEOs involved in the selection of new board members tend to appoint weaker monitors (such as affiliated and inside directors).

In this paper, we propose a new measure of board co-option based on the number of directors appointed after the CEO assumes office. Our measure is defined as the ratio of number of such *new directors* to total board size. The idea is that directors, regardless of whether they are legally independent, are more likely to be sympathetic to the CEO if the CEO is involved in or enables their appointment. Thus our measure, which we term *Co-opt*, is likely to reflect the extent to which the CEO has co-opted the board. *Co-opt* ranges from 0 to 1 with higher values indicating greater co-option. In our sample, average *Co-opt* is 0.54, implying that over half of the directors on the board are new. Also, for more than half of the firm-years in our sample, new directors constitute the majority of the board.

¹ See for example, Weisbach (1988), Byrd and Hickman (1992), Brickley, Coles, and Terry (1994), Dahya, McConnell, and Travlos (2002), Dahya and McConnell (2006), and Dahya, Dimitrov, and McConnell (2006).

² Along the same lines, activist investor, Carl Icahn, recently commented that “members of the boards are cronies appointed by the very CEOs they’re supposed to be watching.” (Business Week Online, 11/18/2005).

We examine four related questions. (i) Does co-option of the board lead to costly CEO entrenchment? (ii) Are there any offsetting benefits to shareholders from ceding power and discretion to the CEO through a co-opted board? (iii) Does co-option vary predictably with firm and CEO characteristics that would reasonably proxy for the costs and benefits associated with co-option? (iv) Are firm value and co-option related?

We examine these questions using a sample of firms from the Investor Responsibility Research Center (IRRC) database from 1996-2005. First, we test for evidence of entrenchment by analyzing CEO turnover and CEO compensation. We find that the sensitivity of CEO turnover to performance decreases with co-option. CEO pay levels and CEO pay hikes increase with co-option, but there is no corresponding increase in pay-performance sensitivity. In sum, board co-option is associated with more lenient CEO turnover and compensation policies and with greater CEO entrenchment. Of course, these findings do not necessarily imply that directors meekly rubber-stamp all decisions made by the CEO. As Murphy (1999, pg. 25) points out, while directors approach their jobs with integrity, perhaps “judgment calls tend to systematically favor the CEO” and “(F)aced with the choice of a sensible compensation plan and a slightly inferior one proposed by the CEO, the committee will defer to management.” This may be especially so for directors selected by the CEO.

Second, despite the above-mentioned costs of a co-opted board, there may be benefits to ceding discretion and power to the CEO. For instance, entrenchment arising from a co-opted board could encourage managers to invest in firm-specific human capital and in projects with long-term payoffs (DeAngelo and Rice, 1983; Knoeber, 1986; Stein, 1988; Bizjak, Brickley, and Coles, 1993). Consistent with this, we find that R&D intensity increases with co-option. Co-option appears to be part of an organization design that implements more investment in R&D.

Third, we examine the factors that are associated with co-option. If firms balance the costs and benefits of conferring more discretion and power on the CEO, we would expect to find greater co-option in firms in which discretion and power are more likely to add value. Consistent with this hypothesis, we find that co-option is positively related to R&D expenditures. Firms in which such is important appear to cede more power and discretion to the CEO through a co-opted board. Not surprisingly, per Hermalin and Weisbach (1998), we also find that co-option is positively associated with other measures of CEO power, including CEO tenure and CEO duality (CEO is also the chairman of the board).

Fourth and finally, we examine the value implications of co-option. To provide a framework for our empirical analysis, we develop two models of the relation between firm value and board co-option. One model is based on transaction costs, while the other predicts a relation based on value maximization with no transaction costs. We find that Tobin's q increases in co-option for firms with greater expected benefits from co-option (such as high-R&D firms). Perhaps, for some firms, management-friendly boards can benefit shareholders and co-option represents optimal entrenchment (e.g., Adams and Ferreira, 2007; Almazan and Suarez, 2003). Our findings that firms that value greater investment in firm-specific human capital are associated with a greater degree of board co-option and this, in turn, leads to higher firm value, are consistent with this hypothesis. In contrast, we find little evidence among other firms of a relation between firm value and co-option.

Because inside and affiliated directors may by definition be co-opted by the CEO, we also estimate all empirical specifications using two other measures of board co-option: (i) the fraction of independent directors who joined after the CEO assumed office; and (ii) the sum of independent directors appointed after the CEO took office and all non-independent directors all

as a fraction of board size. Our results are quite similar when we use the first measure, which suggests that new directors, who supposedly are independent, are at least partially aligned with the CEO. Our results are similar (but weaker) when we use the second measure. This suggests that new independent directors are better aligned with the CEO compared to affiliated and inside directors. An additional inference is that the fraction of the board composed of independent directors who joined before the CEO (which equals one minus our second measure above) is a better measure of monitoring intensity than the fraction of all independent directors.

We consider and rule out several alternative explanations for our findings. For instance, our co-option measure could represent either the effect of CEO tenure (since co-option increases with tenure almost mechanically) or the fraction of independent directors. Our results are robust to controlling for CEO tenure and the traditional measure of board independence.

The paper is arranged as follows. Section 2 describes the data used in the study. Section 3 examines the impact of co-option on CEO turnover-performance sensitivity. Section 4 examines the effect of co-option on pay levels, pay hikes, and pay-performance sensitivity. In section 5, we examine potential benefits of co-option. Section 6 considers the factors that affect co-option and Section 7 explores the value implications of co-option. The Appendix 1 provides the two models that support the analysis in Section 7. In Section 8, we explore alternative explanations for our findings and examine the robustness of our results to alternative specifications. Finally, Section 9 concludes.

2. Data and summary statistics

In this section, we describe the data used and present some summary statistics.

2.1. Data

Our starting point is the IRRC database, which covers directors of S&P500, S&P

MidCaps, and S&P SmallCaps firms over the period 1996-2005. For these firms, we obtain compensation data from Execucomp, accounting data from Compustat, and stock return data from CRSP. We exclude firms incorporated outside the US.

Our primary measure of annual compensation is CEO total pay (Execucomp variable: *TDC1*). This includes the Black-Scholes value of annual stock option grants (Execucomp variable: *BLK_VALU*), salary and bonus (Execucomp variable: *TCC*), value of annual restricted stock grants, other annual compensation, long-term incentive payouts, and all other total compensation. CEO pay hike is the dollar change in CEO total pay.

Our principal measure of co-option is based on the number of directors elected after the CEO takes office. We refer to such directors as “new” directors.

$$Co-opt = \frac{\# \text{ new directors}}{\text{board size}}$$

This variable ranges from 0 to 1, with higher values indicating greater co-option. In some specifications, we employ a similar measure that is based on the presumption that all non-independent directors are co-opted, as would be all independent directors appointed since the CEO took office. This alternative measure, *Co-opt_Alt*, is the sum of new independent directors and all non-independent directors, all divided by board size.

$$Co-opt_Alt = \frac{\# \text{ new independent directors} + \# \text{ inside directors} + \# \text{ affiliated directors}}{\text{board size}}$$

Identically, this is the same as one minus the proportion of independent directors on the board who joined prior to the date the CEO was appointed to office.

For each sample firm, IRRC provides the date of the annual meeting and the slate of directors up for election. The directors on the slate almost always obtain sufficient support to be elected (Hermalin and Weisbach, 1998; Cai, Garner, and Walking, 2006). The majority of the

sample firms hold their annual meeting during the first 3-4 months of the fiscal year. Thus, because these directors constitute the board for the majority of the fiscal year, we assign directors on the slate at the annual meeting in a given fiscal year as the directors for that year.

We define a CEO turnover event as a change in the identity of a CEO. For turnover regressions, we identify the board in place before the CEO was dismissed since this board is the one responsible for replacing the CEO. Thus the CEO turnover date relative to the meeting date is important for our purpose. Figure 1 illustrates the timeline. If a CEO turnover occurred after the annual meeting date, then the board that determined the replacement was the board elected for that year. That is, turnover and *Co-opt* are measured contemporaneously. If a CEO turnover occurred before the annual meeting date, then the board responsible for replacing the CEO is the one elected in the previous year so we use the lagged value of *Co-opt* in the turnover regression. In non-turnover years, since both the lagged and contemporaneous boards decide on the CEO's 'non-replacement,' we use the average of the lagged and contemporaneous values of *Co-opt*. For regressions of CEO compensation, we use the contemporaneous co-option measure because this is based on the board that is in place for the majority of the year and also because performance-based pay will be decided by the board at the end of the fiscal year.

Our proxy for the importance of firm-specific human capital is R&D/Assets. As in Bizjak, Brickley, and Coles (1993), we replace missing values of R&D by zero. As a measure of firm value, we approximate Tobin's q by the market-to-book ratio of assets. Specifically, q is defined as book assets minus book equity plus market value of equity all divided by book assets. This calculation is consistent with much of the literature.³ Appendix 2 describes all the variables

³ Because we do not have data on replacement cost of assets or market value of debt, our formulation is only an approximation. But our measure does avoid the *ad hoc* assumptions about depreciation and inflation rates that some other measures of q require. Erickson and Whited (2006) argue that simple measures of q do at least as well as more

used in this study.

2.2. Summary statistics

Table 1 provides the summary statistics of the key variables used in the study. To minimize the influence of outliers, throughout the paper, we winsorize all variables at the 1st and 99th percentiles. The winsorized values are presented in Table 1. The average firm in the sample is large, with sales of \$4.8 billion. This is not surprising, given that our sample is S&P 1500 firms. The average board has about 10 directors, with 65% classified as independent directors. *Co-opt* has a mean value of 0.54. Thus, on average, although 65% of the directors are technically independent, over half of the board was selected after the CEO's appointment, and these new directors are therefore likely to be sympathetic to the CEO. Additionally, we find that new directors constitute the majority of the board for half of all firm-year observations. The measure of co-option that assumes inside and affiliated directors are always co-opted, *Co-opt_Alt*, has a mean value of 0.71.

Figure 2 shows that, as expected, co-option increases over the CEO's tenure. This appears to be driven by *Co-opt_Indep* (the ratio of new independent directors to board size). *Co-opt_Aff* (the ratio of new affiliated directors to board size) and *Co-opt_Insider* (the ratio of new insider directors to board size) do not increase much in tenure. *Co-opt_Alt*, a more inclusive measure of co-option, is larger than *Co-opt*, though the two are highly correlated ($\rho = 0.88$).

Figure 3 shows that, on average, over the CEO's tenure, *Frac_Indep* (ratio of all independent directors to board size) is quite stable. Further examination reveals that *Co-opt_Indep* is increasing over the tenure of the CEO, while *Frac_Indep_Before* (the number of independent directors appointed before the CEO divided by board size) is decreasing. This

complicated measures. Chung and Pruitt (1994) find that the market-to-book ratio explains at least 96.6 percent of the variability of the Tobin's *q* of Lindenberg and Ross (1981).

suggests that CEOs are replacing independent directors appointed before they joined office with new independent directors. This is not necessarily inconsistent with Hermalin and Weisbach (1998) or Shivdasani and Yermack (1999), because recent regulation such as the NYSE/Nasdaq listing requirements have forced firms to maintain a certain fraction of independent directors.

3. Costs of co-option: CEO turnover and the sensitivity of CEO turnover to performance

One of the key functions of the board is to evaluate CEO performance and to dismiss the CEO if his or her performance is poor. Various studies argue that a lower sensitivity of CEO turnover to performance reflects weaker internal governance and captures the extent to which CEOs are entrenched (Weisbach, 1988; Denis, Denis, and Sarin, 1997; Huson, Parrino, and Starks, 2001; Dahya, McConnell, and Travlos, 2002). Hermalin and Weisbach (2003) suggest that CEOs have incentives to co-opt the board to maintain their jobs and receive better benefits. To the extent that co-opted boards are more sympathetic to the CEO, they are likely to facilitate greater CEO entrenchment. This should be reflected in a lower turnover rate and lower turnover-performance sensitivity.

We explore these hypotheses using a logistic specification. The dependent variable is *CEO Turnover*, which is an indicator variable that equals one if the CEO has been replaced and equals zero otherwise. Explanatory variables are included as follows: $\alpha_0 + \alpha_1 Co-opt + \alpha_2 (Co-opt \times Performance) + \alpha_3 Performance + Controls$. It is well-known that prior performance is negatively related to the likelihood of CEO turnover (Weisbach, 1988; Warner, Watts, and Wruck, 1988; and Parrino, 1997). Prior performance is the annual stock returns in the year prior to the CEO turnover. If turnover rate decreases in co-option then α_1 will be negative, and if turnover-performance sensitivity decreases with co-option then α_2 will be positive. Control

variables include firm size, an age indicator variable that equals 1 if the departing CEO is between 64 and 66 years of age (to proxy for normal retirement, as in Murphy and Zimmerman (1993)), CEO tenure, CEO ownership, industry (2-digit SIC) and year dummies. In this experiment and others, some specifications are based on *Co-opt_Alt* rather than *Co-opt*.

Table 2 reports the results. Here and throughout the paper, all standard errors are adjusted for heteroskedasticity and firm-level clustering (Petersen, 2007). Column 1 (4) presents the logistic regression results for the specification above using *Co-opt* (*Co-opt_Alt*). Using *Co-opt*, the coefficient on prior returns (α_3) is negative, implying that CEO turnover is sensitive to performance in a firm with *Co-opt* = 0 (true for about 10% of the observations). Consistent with our hypothesis, the coefficient on the interaction term of co-option and performance is significantly positive, indicating that as co-option increases, the sensitivity of CEO turnover to firm performance decreases. In fact, for a fully co-opted board (*Co-opt* = 1 in about 20% of the observations), there is no sensitivity of performance to turnover (see last row of Table).⁴ The result using *Co-opt_Alt* (column 4) is similar, but weaker.

This result is further confirmed when we estimate turnover regressions for the subsample of firms with high and low co-option, where the two groups are based on the median value of *Co-opt*. The results are reported in the columns 2 and 3 of the table. We find that turnover is sensitive to prior returns for both the high co-option group (coeff. = -0.19; p = 0.08) and the low co-option group (coeff. = -0.69; p < 0.01). Consistent with our expectation, the difference in sensitivities across the two groups, however, is both economically and statistically significant (see last row of Table). We find similar (but weaker) results when we perform subsample

⁴ It is quite possible that our results here are driven by voluntary turnovers rather than forced turnovers. We include all turnovers here because of the well-known difficulty in classifying turnovers as forced or voluntary, but we note in Section 8.7 that our results are stronger when we consider various definitions of forced turnover.

analysis using *Co-opt_Alt* (not tabulated for brevity). In sum, board co-option is associated with a lower sensitivity of CEO turnover to performance which suggests that one potential cost of board co-option is CEO entrenchment.

Nonetheless, counter to our hypothesis, the coefficients on *Co-opt* and *Co-opt_Alt* are positive, which indicates that turnover probability increases with co-option for a firm with zero returns. Given that the average return is positive in our sample, this suggests that, controlling for performance and other characteristics, CEO turnover rate increases with co-option. While this might appear to be an odd result, perhaps higher turnover (independent of performance) is not necessarily a sign of good governance. Dismissing qualified and successful CEOs frequently might make it harder to attract talented CEOs in future.

4. More costs of co-option: CEO pay levels, pay hikes, and pay-performance sensitivities

In addition to making decisions on CEO retention and dismissal, boards also determine the appropriate CEO compensation. We examine below the impact of co-option on CEO pay levels, pay hikes, and the sensitivity of pay to performance.

4.1. CEO pay levels

Entrenched CEOs and CEOs of firms with weaker monitoring receive greater compensation (Borokhovich, Brunarski, and Parrino, 1997; Core, Holthausen, and Larcker, 1999; Hartzell and Starks, 2003). If co-opted boards are more sympathetic to the CEO, then it is possible that CEO pay would increase with co-option. To test this, we estimate OLS regressions of *CEO pay* on *Co-opt* (or *Co-opt_Alt*) and controls. We expect the coefficient on co-option to be positive. As mentioned earlier, our primary measure of CEO compensation is the total pay. We also examine the effect of co-option on the primary components of CEO total pay: option

grants and cash compensation. The control variables, based on prior literature (see Murphy (1999) for an excellent review of CEO compensation), include firm size, performance, CEO tenure, and industry and year dummies.

Table 3 presents the results. We ignore CEO turnover years and require that the CEO's tenure is at least 1 year. This is because the CEO pay in a turnover year might reflect compensation only for part of the year. Also, CEOs in their first year may receive higher than average stock compensation (to align their incentives) and higher bonus (including signing bonuses). Column 1 (4) presents the results based on total CEO pay for *Co-opt* (*Co-opt_Alt*), while columns 2 and 3 present the results for *Co-opt* based on the value of option grants and cash compensation, respectively. Column 1 results indicate that a CEO who has fully co-opted the board (*Co-opt* = 1) gets \$1.9M higher pay compared to the CEO of a firm with zero level of co-option. This effect is economically significant relative to the average total CEO pay of \$4.8M.

We obtain similar results for stock grants. A CEO who has fully co-opted the board receives \$1.3M more than a CEO of a firm with zero co-option. This statistically significant difference is large relative to the mean value of option grants (\$2.2 million). For cash compensation, again the coefficient on *Co-opt* continues to be statistically significant, but in economic terms this represents a modest increase relative to the mean (\$0.2M versus \$1.4M). The last result is not surprising given that Section 162(M) of the IRS tax code limits the amount of non-performance related pay that is tax-deductible (Perry and Zenner, 2001). In terms of the control variables, we find that pay is positively related to firm size and stock price performance.⁵

In all cases above, using our alternative definition of board co-option, *Co-opt_Alt*, yields results that are similar in statistical and economic significance.

⁵ Instead of using contemporaneous *Co-opt*, we also use the average of the contemporaneous and the lagged *Co-opt*, since the lagged board may also be partly responsible for CEO compensation. Our results are robust to this change.

4.2. CEO pay hikes and pay-performance sensitivities

We next examine the impact of co-option on CEO pay hikes and CEO pay-performance sensitivities. A CEO who has co-opted the board, in addition to receiving higher pay, may also be awarded larger pay hikes, *ceteris paribus*. Thus, we expect that pay hikes would be positively related to co-option. Further, Hartzell and Starks (2003) find that pay-performance sensitivity increases with monitoring intensity. Consequently, we expect that if co-option results in weaker monitoring, then pay-performance sensitivity should decrease in co-option.

To examine these hypotheses, we use a specification similar to that in Aggarwal and Samwick (1999) and Garvey and Milbourn (2006).⁶

$$\begin{aligned} \text{CEO total pay hike} = & \gamma_0 + \gamma_1 \text{Co-opt} + \gamma_2 \text{Performance} + \\ & \gamma_3 (\text{Performance} \times \text{cdf of Performance Variance}) + \text{Controls} \end{aligned} \quad (1)$$

CEO total pay hike is the change in CEO total pay. The inclusion of the cumulative distribution function (*cdf*) of performance variance follows Aggarwal and Samwick (1999) who argue that pay-performance sensitivity decreases in firm risk. As in these papers, performance is expressed as dollar return. Dollar return is computed as lagged market capitalization times the stock return. Based on extant literature (for example, Jensen and Murphy, 1990), we expect average pay-performance sensitivities to be positive. Control variables include CEO tenure, year and industry dummies, and a *Low Compensation* dummy, which controls for the ratchet effect in pay (Bizjak, Lemmon, and Naveen, 2007). *Low Compensation* equals 1 if the CEO's compensation in the prior year was below the median of his or her peer-group (same industry in terms of 2-digit SIC and similar size in terms of sales) and zero otherwise. We drop firm-years

⁶ We could also examine the ex-ante pay performance sensitivity (delta), computed as in Core and Guay (2002). This measure however, is based on the entire portfolio of stocks and options owned by the CEO, and it is not clear how much of that is provided by the current board of directors. For this reason, the ex-post measure (how actual pay change each year relates to firm performance) is a better measure in this context. Garvey and Milbourn (2006) also argue that it is more meaningful to examine changes in total pay rather than changes in total portfolio wealth.

that had a turnover in the current or previous year and require that the CEO's tenure be at least 2 years. This ensures that we do not consider pay hikes based on pay for fractional years.

Column 1 of Table 4 presents the results with changes in CEO total pay. Consistent with our hypothesis, we find that γ_1 is both statistically and economically significant. The CEO of a board that is fully co-opted gets a pay hike of \$330,000 more, on average, than the CEO of a board that is not co-opted. In comparison, the average annual CEO pay hike of all sample firms is only \$99,000. The results based on *Co-opt_Alt* (column 4) yield similar conclusions, though weaker in statistical terms.

As in Bizjak et al. (2007), the coefficient on the low compensation indicator variable is significantly positive, indicating that, all else equal, CEOs whose pay is below their peer group receive larger pay hikes. The sensitivity of pay to performance for the median firm ($cdf = 0.5$) is 0.99 ($= \gamma_2 + 0.5\gamma_3$). On average, the CEO receives a pay hike of 99 cents for every 1000 dollar increase in market capitalization.

To further examine whether the pay-performance sensitivity varies with co-option, one possible approach is to interact *Co-opt* with performance and the *cdf* of performance variance. Of course, this leads to triple interaction terms, making interpretation difficult. We therefore estimate the above regression for subsamples based on high- and low-values of co-option. Columns 2 and 3 represent equation (1) above estimated for sub-samples based on co-option. For both groups, we continue to find that changes in pay are sensitive to performance. The last row of the table indicates that the sensitivity of pay to performance for a median firm with high *Co-opt* is 1.07 and for a firm with low *Co-opt* is 0.90. The pay-performance sensitivities across the high and low co-option groups, however, are not significantly different ($p = 0.59$).

5. Benefits of co-option: firm-specific human capital and reduction in managerial myopia

To this point, our results suggest that co-option is associated with significant costs. CEOs with boards that are co-opted to a greater extent have lower turnover-performance sensitivities, higher pay, larger pay hikes, but not higher pay-performance sensitivities. One interpretation is that co-option is bad for firms. There may, however, be sound economic reasons for allowing co-option and the resulting entrenchment of the CEO. One potential benefit of entrenchment is that it allows the CEO to invest in firm-specific human capital. For instance, Burkart et al. (1997) suggest that in firms where managerial initiative or firm-specific human capital is important, it may be better to reduce the monitoring of the CEO and give the CEO more power. Another strand of the literature argues that CEO entrenchment (through anti-takeover amendments) may help reduce managerial myopia (DeAngelo and Rice, 1983; Stein, 1988). CEOs can invest in projects that have long-term payoffs without worrying about being dismissed through takeovers. Knoeber (1986) suggests that golden parachutes similarly allow the CEOs to invest in long-term projects. Co-opted boards, by lowering the sensitivity of turnover to performance, could play a similar role and allow managers to take on projects with long-term payoffs. These studies suggest that, all else equal, higher co-option should lead to more investment in firm-specific human capital and in projects with long-term payoffs.⁷

Following other studies, we assume firms with a larger ratio of R&D expenditures to assets place more importance on firm-specific human capital (Titman and Wessels, 1988).

⁷Adams and Ferreira (2007) and Almazan and Suarez (2003) develop theoretical models to examine some instances when it may be optimal to have a less independent board (their terminology is “management-friendly” or “weaker” board). Adams and Ferreira focus on the advisory role of the board. They argue that the quality of the board’s advice improves when the CEO provides the board with better information. The CEO, in turn, provides better information if he knows the board will not use the information to control project choice, i.e., he provides better information when the board is weaker. Almazan and Suarez suggest that weak boards and severance pay are substitutes for incentive compensation. In their model, shareholders optimally cede power to the CEO in some cases to save on compensation costs.

Higher R&D also may indicate less managerial myopia and investment in long-term projects (McConnell and Wahal, 2000). Accordingly, we estimate regressions of R&D/Assets on *Co-opt* while controlling for firm and CEO characteristics. If co-option is associated with investment in firm-specific human capital and implementation of long-term projects, then the coefficient on *Co-opt* should be positive. Our selection of control variables is consistent with the literature (e.g., Coles, Daniel, and Naveen, 2006a).

Table 5 presents the results. Column 1 presents the results for regressions of R&D intensity on *Co-opt*. We find that R&D/Assets increases with co-option. These results are also economically significant. Based on the estimates in column 1, R&D/Assets for a firm with a fully co-opted board is higher by 1.0 percentage points relative to a firm with zero co-option. This represents a 37% increase relative to the mean R&D/Assets of 2.7 percent. The coefficients on the control variables are generally consistent with earlier studies. Results based on *Co-opt_Alt* (column 2) are similar, but weaker. Overall, the results suggest that co-option does provide benefits in terms of encouraging CEOs to invest in projects with longer term payoffs and to invest in firm-specific human capital.

6. Factors affecting board co-option

We now attempt to identify the economic forces that determine the level of co-option. As discussed earlier, higher co-option could provide the CEO incentives to invest in firm-specific human capital and to invest in projects with long-term payoffs. Thus if shareholders are optimally ceding power to the CEO, then co-option should increase with R&D intensity.

In terms of other control variables, we rely on Hermalin and Weisbach (1998), who model CEO pay and board composition as the outcome of a bargaining game between the CEO

and the board. They predict that the board becomes less independent as the CEO's bargaining power increases vis-à-vis the board. We extend their logic and examine whether board co-option increases as the CEO's bargaining power increases. To the extent that the CEO's bargaining power increases with his tenure as the CEO, his added position as the chairman of the board (CEO duality), and his prior performance, we expect that board co-option will increase in these variables. Finally, Shivdasani and Yermack (1999) suggest that CEOs of small firms may be more involved with board selection. We thus expect that co-option will decrease in firm size. Our specification is as follows:

$$Co-opt = \eta_0 + \eta_1 R\&D/Assets + \eta_2 Returns + \eta_3 ROA + \eta_4 CEO\ duality + \eta_5 CEO\ Tenure + \eta_6 Firm\ Size + Controls \quad (2)$$

All independent variables are lagged. Control variables include industry and year dummy variables. We expect that η_1 through η_5 will be positive while η_6 will be negative.

Table 6 presents the results. As with Table 4, we exclude firm-years with a CEO turnover event in the current or prior year and require that the CEO's tenure be at least 2 years. This is because the firm performance measures in such years will not reflect the performance of the current CEO, and hence the CEO's bargaining power, correctly. Column 1 presents results for specification (2). Since co-option increases mechanically with CEO tenure, column 2 presents results with CEO tenure excluded. Consistent with our arguments, we find that the coefficient on R&D/Assets is significantly positive. Columns 3 and 4, which estimate the same specifications but use *Co-opt_Alt* instead, deliver the same conclusions, albeit the results are weaker in statistical terms.

In terms of control variables, the coefficient on the indicator variable for CEO duality is significantly positive, suggesting that CEO power is an important determinant of co-option. Surprisingly, though, the CEO's prior performance does not appear to be important in explaining

co-option. The coefficient on firm size is significantly negative suggesting that all else equal, board co-option decreases with firm size.

Of course, Tables 5 and 6 and common sense all suggest that co-option and R&D intensity are jointly and simultaneously determined. Accordingly, we estimate a system of two equations using three-stage least squares. Table 7 presents the results for two systems, one for each of our two measures of co-option. In both systems, the coefficient on co-option as a determinant of R&D intensity is positive and significant. In addition, the coefficients on R&D as a determinant of the extent of board co-option are positive and significant. The coefficients on some of the control variables differ from those estimated using OLS. The reason may be some propagation of specification error in the system estimated using 3SLS.

Overall, our results in Sections 5 and 6 are consistent with economic factors, particularly the nature of the investment opportunity set as measured by R&D intensity, driving the extent of board co-option. Moreover, it appears that a relatively co-opted board is one dimension of an organization form that implements investment in relatively intangible, long-term projects.

7. Consequences of board co-option

We have established thus far that co-option is associated with both costs and benefits. A natural question at this point is: how does co-option affect firm value? Of course, if firms choose co-option optimally, if there are no transaction costs to altering co-option, and if suitable control variables are included in the regression specification, then there would be no obvious reason to observe a relation in data between co-option and firm performance (Demsetz and Lehn, 1985). This does not mean that such a relation does not exist. It simply means that, if there is a relation, it arises from the envelope of value-maximizing organization forms (see Coles, Lemmon, and

Meschke (2006), among others). In contrast, a relation between performance and organization structure (co-option, in this case) can arise quite naturally in the presence of transaction costs.

In the spirit of Coles, Daniel, and Naveen (2006b), we present two “models” that predict a nontrivial relation between firm value and board co-option. Our first model relies on transaction-cost-based departures from optimal board co-option. Our second model does not rely on transactions costs, but still generates a prediction between optimal co-option and firm value. Both models predict a positive relation between firm value and co-option for firms that stand to benefit from greater co-option (such as high-R&D firms). Appendix 1 provides a detailed discussion of the two models.

We use Tobin’s q as a proxy for firm value (as is common in the literature). Controls are as in Coles et al. (2006b). To examine whether the value addition is highest for firms that most stand to benefit from co-option, specifically firms with high R&D intensity, we estimate the following equation

$$q = \lambda_0 + \lambda_1 Co-opt + \lambda_2 Co-opt \times R\&D\ Dummy + \lambda_3 R\&D\ Dummy + Controls \quad (3)$$

In order to provide a clear interpretation of the effect of co-option on q for R&D-intensive firms, we employ a dummy variable, *R&D Dummy*, which equals 1 if R&D/Assets is above the 75th percentile and is zero otherwise (see Coles et al., 2006b). We choose the 75th percentile because R&D expenses are skewed, with 57% of the observations having zero R&D.⁸

Table 8 presents the results. Columns 1 and 5 report results for *Co-opt* and *Co-opt_Alt* using equation (3) without the interaction terms. In both cases, the coefficient on the co-option variable is significantly positive, indicating that, on average, q increases with co-option.⁹

⁸ Results are similar, but weaker, when we use R&D/Assets instead of the R&D Dummy.

⁹ Earlier studies do not examine the fraction of new directors, but disagree on the effect of the fraction of independent directors on firm value. Weisbach (1988), Byrd and Hickman (1992), Shivdasani (1993), Brickley et al. (1994), and Cotter et al. (1997) find that more-independent boards add value in some circumstances. Baysinger

Columns 2 and 6 present the results for equation (3) applied to *Co-opt* and *Co-opt_Alt*. The coefficients on *Co-opt* and *Co-opt_Alt* (λ_1) are now negative, though not statistically significant. For firms with low R&D, the relation between q and co-option is negative. The coefficient on the interaction term (λ_2), however, is positive and significant in both cases. R&D-intensive firms demonstrate a significantly different relation between q and co-option than do other firms. Moreover, the last row of the Table indicates that $\lambda_1 + \lambda_2 = 0.66$ for *Co-opt* and 0.82 for *Co-opt_Alt* ($p < 0.01$). These results indicate that for high-R&D firms, q increases with co-option.

We also estimate regressions of q on co-option for subsamples based on R&D intensity (Columns 3 and 4). We find that q is related to *Co-opt* for high-R&D firms but not for low-R&D firms. In untabulated tests, we find similar results using *Co-opt_Alt*.

Overall, the results in this section indicate that, on average, there is a positive relation between co-option and firm value. This appears to be driven by firms which most stand to benefit from co-option, such as high-R&D firms. For other firms there is no relation between value and co-option.

8. Exploring alternative interpretations and other robustness checks

In this section, we consider alternative interpretations of our results and discuss other robustness checks. To facilitate the discussion that follows, we summarize our main findings from Tables 2, 3, 4, 5, and 8 in Column (1) of Table 9 (the “base-case”).

8.1. Is Co-opt capturing the effect of CEO tenure?

and Butler (1985), Hermalin and Weisbach (1991), and Bhagat and Black (2001), find no relation between the fraction of outside directors on the board and Tobin’s q . Yermack (1996) and Agrawal and Knoeber (1996) find a negative relation between the fraction of outside directors and Tobin’s q , and Rosenstein and Wyatt (1997) and Klein (1998) find that insiders add value. Hermalin and Weisbach (2003) argue that one of the established findings in the literature is that “board composition, as measured by the insider-outsider ratio, is not correlated with firm performance.” (pg. 2)

One possibility is that, because co-option and CEO tenure are positively correlated, our co-option measure could be capturing the effect of CEO tenure. For instance, over time, the board understands the CEO's abilities better and so may not fire the CEO immediately following poor performance. This could translate into lower turnover-performance sensitivity. Similarly, pay levels and pay hikes could increase over the tenure of the CEO. All our regressions control for tenure, so it is unlikely that tenure is the driving force behind our results. We do not control for the effect of tenure on turnover-performance sensitivity and pay-performance sensitivity because this would require triple interaction terms. To consider such effects, we replace *Co-opt* with CEO tenure in all our regressions. We estimate subsample regressions for high- and low-tenure firms (based on median values of tenure). If tenure is the driving force, we should see it affect all our variables of interest in the same way as does *Co-opt*. Column (2) of Table 9 reports the findings. The results differ from the base-case in several ways. Turnover-performance sensitivity, pay levels, and pay hikes are unrelated to tenure. R&D is *negatively* related to tenure, and there is no significant difference in the effect of tenure on q across high- and low-R&D firms. Thus, it does not appear that *Co-opt* captures the effect of CEO tenure.

8.2. Is *Co-opt* capturing the effect of the "Involved CEO" variable of Shivdasani-Yermack?

Shivdasani and Yermack (1999) construct an indicator variable, *Involved CEO*, which equals 1 if the firm has a nominating committee and the CEO is part of the committee, or if the firm has no nominating committee. Following the Sarbanes-Oxley Act of 2002, the NYSE and the NASDAQ required firms to have completely independent nominating committees. Thus, following this restriction, the Shivdasani-Yermack measure would, by definition, be zero for all firms. Consistent with this, we find that *Involved CEO* drops from about 57% in 1998 (the first year for which IRRC has data on sub-committees) to about 2% in 2005. Nevertheless, it is

possible that our co-option variable does not provide additional explanatory power relative to *Involved CEO*. To check this, we repeat our regressions using *Involved CEO* as an additional variable. Our results remain qualitatively similar. Additionally, we use *Involved CEO* variable instead of *Co-opt*. Column (3) reports the results. In contrast to the base-case, however, we find *Involved CEO* has no effect on pay levels, pay hikes, or R&D. Further, we find no relation between q and CEO involvement as one would expect. Our results are not inconsistent with Shivdasani and Yermack but suggest that even though CEOs are not directly on the nominating committee, they still have a significant impact on director selection.

8.3. Is *Co-opt* capturing the effect of director inexperience?

Another possibility is that co-option reflects the inexperience of new directors. Higher co-option means that there are several new directors and these new directors are less experienced (at least in that firm). They may not be sympathetic to the CEO, but maybe they are slower to react to poor performance and more ready to award high pay. We explore this possibility in three different ways. First, we proxy for director experience using the average tenure of all directors in that firm. As before, we first include this as an additional independent variable in our main regressions, and the results are qualitatively similar (except in pay hike and R&D regressions). Further, we replace *Co-opt* with average director tenure in all the regressions. The regressions for subsamples are based on high and low average director tenure. Note that the predicted signs on the various coefficients are opposite to the base-case, because higher co-option is associated, on average, with *lower* director tenure. Column (5) reports the results. We do not find average director tenure to be related to turnover-performance sensitivity or q .

Second, we proxy for director experience using the average director age. Again, including this as an additional independent variable in our main regressions does not alter our

main inferences. Column (6) reports the results with *Co-opt* replaced with average director age and the subsample analysis based on average director age. Again, the predicted signs on the various coefficients are opposite to the base-case. We do not find turnover-performance sensitivity and pay hikes to be related to average director age.

As a final test, we construct an alternative measure of co-option that directly takes director experience into account. This is defined as the ratio of total tenure of new directors to the total tenure of all directors on the board. In other words, we weight each director by his tenure on the firm. While our original measure (*Co-opt*) assumes that all directors have equal influence on the board, this alternative measure assumes that directors with greater tenure have more influence on the board. This measure also ranges from 0 to 1, and has a mean (median) value of 0.38 (0.23). All else equal, greater tenure of the new directors will result in higher values of this alternative co-option measure. If director inexperience is driving our results, then we should not observe any relation between this measure and our variables of interest. Results (not tabulated) using this measure of co-option are similar to the base-case, but slightly weaker. This provides further evidence that it is not director inexperience that is driving our results.

8.4. Is Co-opt capturing the effect of the fraction of independent directors?

A fourth possibility is that our co-option measure is somehow picking up the effect of the fraction of (non-)independent directors. Prior literature has documented that the fraction of independent directors affects the efficiency of monitoring. The fraction of independent directors (*Frac_Indep*) consists of some independent directors who joined before the CEO assumed office and some who joined after the CEO assumed office. Consequently, if *Co-opt* and *Frac_Indep* are both included in the regression as independent variables, economic interpretation of the coefficients become problematic – a firm cannot change its *Frac_indep* without changing its *Co-*

opt also. Nevertheless, we include *Frac_indep* as an additional independent variable in our base-case regressions, and obtain qualitatively similar results. As before, we also replace *Co-opt* with *Frac_Indep* throughout and run regressions for subsamples based on high- and low-*Frac_Indep*. Note that the predicted signs on the various coefficients are opposite to the base-case, because higher *Frac_Indep* is traditionally associated with higher monitoring. Column (7) reports the results. *Frac_Indep* does not appear to have any effect on turnover-performance sensitivities, pay levels, or pay hikes. The effect of *Frac_Indep* on R&D is counter to expectation. Further, *q* is negatively related to *Frac_Indep* for low-R&D firms, but this is also opposite to the predicted relation. Thus, our results do not appear to be driven by the fraction of independent directors.

8.5. Are all independent directors the same?

We next examine whether new independent directors behave similarly to independent directors who joined before the CEO assumed office. To explore this, we split the fraction of independent directors (*Frac_Indep*) into the fraction of new independent directors (*Co-opt_Indep*) and the fraction of independent directors already on the board before the CEO assumes office (*Frac_Indep_Before*). Note that $Frac_Indep_Before = 1 - Co-opt_Alt$. We replace *Co-opt* in our main regressions by *Co-opt_Indep*. If independent directors cannot be co-opted by the CEO, results with *Co-opt_Indep* should be different from the results using *Co-opt*. This is not the case, however, as can be seen from Column (4). The results using *Co-opt_Indep* are very similar to our base-case results (except for turnover-performance sensitivity), suggesting that *new* independent directors are more sympathetic to the CEO.¹⁰

We next replace *Co-opt* in all our regressions by *Frac_Indep_Before*. If all independent

¹⁰ Core, Holthausen, and Larcker (1999) find that CEO total pay is positively related to various board and CEO ownership characteristics that proxy for agency costs, including the proportion of the board composed of new outside (both independent and affiliates) directors. Their sample is limited to 495 firm-years over 1982-1984. Further, they examine only the CEO total pay, and do not consider pay hikes, pay-performance sensitivities, turnover performance sensitivities, R&D, or *q*.

directors are similar, then the results using *Frac_Indep_Before* should be similar to the results with *Co-opt_Indep*. This is not the case, however, as can be seen from Column (8). The results are opposite to what we get with *Co-opt_Indep* (and thus opposite to the base-case). This suggests that the monitoring intensity of the board increases with *Frac_Indep_Before*.

Our results in Section 8.4, combined with our results in this sub-section suggest that *Frac_Indep_Before* is a more incisive measure than the overall fraction of independent directors of monitoring intensity of the board. Further, the results suggest that all independent directors are not the same; directors whose selection was influenced by the CEO are more sympathetic to the CEO.

8.6. Another proxy for investment in firm-specific human capital

So far we assume that R&D/Assets reflects the importance of firm-specific human capital. Another potential proxy for this is the idiosyncratic risk in stock returns. Specifically, we measure idiosyncratic risk as the variance of the residual from firm-level time-series regressions of daily excess stock returns on the Fama-French (1993) daily factors. This regression is estimated for each fiscal year.

We find that *Co-opt* is positively related to idiosyncratic risk. Further, q is positively related to *Co-opt* for firms with above median idiosyncratic risk. For others, there is no relation between q and *Co-opt*. These results are consistent with the benefits of co-option increasing with the importance of firm-specific human capital.

8.7. Forced turnover

Our measure of CEO turnover to this point includes both forced and voluntary departures. While our arguments are, perhaps, more applicable for forced turnovers, it is difficult to classify

turnovers as forced or voluntary.¹¹ Very often, even forced turnovers are reported to the press as voluntary. Nevertheless, we use an approximate classification scheme, similar to that used in other papers (such as Denis and Denis, 1995) to separate turnovers into forced or voluntary. If the CEO is 64 or older when she retires, we indicate the turnover as voluntary, otherwise the turnover is forced. We repeat our turnover regressions using forced turnover as the dependent variable. We continue to find that turnover-performance sensitivity decreases with co-option. The results remain qualitatively similar when we use alternative classification schemes such as defining the turnover as forced if the CEO is less than 60 when she leaves, or defining the turnover as forced if the CEO is not in the “normal” retirement age of 64-66 when she leaves.

9. Conclusions

In this study, we depart from traditional measures of board independence (insiders versus outsiders) and propose a new measure that reflects the effect of the CEO’s influence on the board. Our measure of board co-option is the fraction of the board that comprises directors appointed after the CEO assumes office. This is based on studies that suggest that CEOs have great influence in picking board members and that board members, regardless of whether they are independent in the legal sense, are more sympathetic to the CEO if they are appointed after the CEO assumed office (Mace, 1971; Lorsch and MacIver, 1989; Shivdasani and Yermack, 1999). We also create an alternative measure of board co-option based on the notion that the CEO exerts substantial influence over all inside and affiliated directors, regardless of when they were appointed. This measure is defined as the sum of all inside directors, all affiliated directors, and all independent directors appointed after the CEO assumes that position, all divided by board

¹¹ For firms that do not have a mandatory retirement age for their CEOs, it is possible that our arguments apply even to voluntary retirements, as the CEOs may be more likely to remain if they have co-opted the board.

size. We examine the benefits and costs associated with co-option.

We first document significant costs of co-option. We find that the sensitivity of CEO turnover to performance decreases with co-option. CEO pay and CEO pay hikes increase with co-option, but the sensitivity of CEO pay to firm performance does not vary with co-option.

We next provide evidence of benefits to co-option. In particular, CEOs of firms with higher co-option invest more in firm-specific human capital and in projects with long-term payoffs.

Third, we examine the economic factors that affect co-option, and find that co-option is higher in firms that require greater investment in firm-specific human capital, in firms with more powerful CEOs, and in firms where the CEOs have a greater influence on board selection.

Finally, we argue that under some specific conditions, we expect to find a relation between co-option and Tobin's q . We find a positive relation between q and co-option for high-R&D firms, where investment in firm-specific human capital is important.

Our findings suggest that traditional measures of independence (fraction of independent directors) used in the literature do not fully capture whether a director is independent of the CEO. We find that directors (including independent directors) whose selection was influenced by the CEO are more sympathetic to the CEO. In contrast, the fraction of independent directors who joined before the CEO appears to be a good measure of monitoring intensity of the board. Our results add to the literature on CEO involvement in director selection and shed further light on the factors affecting the make-up of the board.

Appendix 1. Relation between q and co-option: Two “models”

We propose two models that predict a relation between q and *Co-opt* and describe how this relation will vary with certain firm characteristics. See Coles, Daniel, and Naveen (2006b) for a similar treatment.

A1.1. Transaction costs based model

Consider a world where there are two kinds of firms: low-R&D and high-R&D firms.¹² Assume a hump-shaped function between Tobin’s q and board co-option holds for both high and low-R&D firms (see Figure 4). This would be the objective function that firms maximize in the absence of transaction costs. Since R&D-intensive firms stand to benefit more from co-option, the optimal co-option for high-R&D firms will be higher than that for low-R&D firms.

Suppose both high- and low-R&D firms choose their co-option optimally and that transaction costs to changing board structure are insignificant (that is, deviations from optimal co-option are short-lived) and random (that is, some firms have above-optimal and some firms have below-optimal co-option). Since any deviation from optimal co-option is detrimental to firm value, empirically the data would trace a hump-shaped relation between co-option and q for both high- and low-R&D firms. That is, one would extract the objective function itself. If we examine the relation between co-option and firm value for the entire sample, however, we do not expect to find a linear relation.

Now, suppose there are significant transaction costs to changing board co-option. In this world, there are likely to be long-lived deviations from optimal co-option within the bounds defined by the costs of adjusting to the optimum. Any prediction about the relation between co-option and firm value, therefore, will depend on where the majority of the firms will locate on the hump-shaped objective function. For example, if firms, on average, have higher co-option

¹² We examine R&D because, as discussed earlier, the benefits of co-option can be expected to increase with R&D.

than optimal (they are on the negatively sloped portion of the objective function), we expect to observe in the data a negative relation between co-option and firm value. On the other hand, if the majority of firms have lower-than-optimal co-option, we expect a positive relation between co-option and firm value. The above arguments apply to both high-R&D and low-R&D firms.

When the new CEO takes over the firm, by definition, the co-option is zero. Since optimal co-option is larger for high-R&D firms and since it takes time to increase co-option, these firms are more likely to have below optimal co-option. We would therefore expect to observe a positive relation between q and co-option for high R&D firms. Since optimal co-option is smaller for low-R&D firms, these firms may be more likely to have co-option that exceeds the optimum. In this case we would expect to observe a negative relation between q and co-option. Of course, this conclusion may be less certain given that firms that have relatively new CEOs, however, are more likely to be to the left of the optimum. Since turnover rate is only 12%, we expect that the overall relation between q and $Co-opt$ for low R&D firms is either negative or flat.

A1.2. Alternative model that does not rely on transaction costs

The model has the following elements. (i) There are two types of firms, “homogeneous” and “heterogeneous.” Heterogeneous firms are those that require extensive investment by the CEO in firm-specific human capital (Parrino, 1997). Examples of such firms would be those with high R&D requirements. Homogeneous firms do not require such investment in firm-specific human capital, and hence it would be relatively easy to find successors to replace the existing CEO (Parrino, 1997). Low-R&D firms would fall in this category. (ii) In contrast to Section A1.1, firms within each type are not similar. Specifically, they are endowed with varying *amounts* of growth options (positive-NPV projects). (iii) The *types* of growth options

differ across the two groups. For the heterogeneous firms, the growth options depend on the extent of investment in firm-specific human capital. As the extent of growth options increases, the need for firm-specific human capital increases, and hence it will be more important to encourage CEOs to invest in firm-specific human capital. For homogeneous firms, the growth options do not depend on investment in firm-specific human capital. (iv) To encourage the CEO to invest in firm-specific human capital, the firm allows the CEO to co-opt the board. The CEO, in turn, uses the co-opted board to pay himself higher compensation, and shields himself from being replaced if, ex-post, the outcomes turn out to be bad. (v) Higher growth options translate into higher q as long as the firm chooses a co-option that ensures that the maximum value can be extracted from its endowment of growth options.

What do these assumptions yield? For heterogeneous firms facing growth options that vary with the degree of investment required in firm-specific human capital, as the extent of the growth options increases, so does the need for investment in firm-specific human capital by the CEO, so a higher co-option will be optimal (to reduce the threat of firing).¹³ Of course, more growth options also means higher q . Thus, for heterogeneous firms, the trace of the individual firms' optima will generate, in the data, a positively-sloped relation between co-option and q . For homogeneous firms facing growth options that do not differ much in the amount of investment required in firm-specific human capital, as the quantity of those growth options increases, a less co-opted board (to ensure that these growth options will be undertaken and that the CEO will not shirk due to better monitoring) will be optimal. Again, more growth options also implies higher q . Thus, for homogeneous firms, the individual firm optima trace a flat or, if

¹³ Obvious similarities exist with the academic tenure process. Untenured professors do not have much incentive to invest in firm-specific human capital (such as service on school committees) and do not typically embark on projects that are risky or take time for fruition. One of the original reasons behind granting tenure was to encourage risk-taking in an academic sense.

co-option drifts upward with CEO tenure and there are associated costs of co-option, a negatively-sloped relation between co-option and q .

Figure 5 represents how the data would look under this model. The dotted curves depict the objective function of three firms of each type (chosen arbitrarily). The triangles (squares) represent the maxima for homogeneous (heterogeneous) firms. The downward (upward) sloping solid line represents the trace of the optima for homogeneous (heterogeneous) firms. The location of the objective function, which relates q to co-option for a given firm, depends on product market characteristics, industry characteristics, the set of governance mechanisms employed by the firm, and the nature and extent of available growth opportunities. For heterogeneous firms, moving to the right on the horizontal axis represents an increase in growth opportunities that differ along the dimension of firm-specific human capital.

Obviously, this simple model excludes some relevant aspects of the problem, including other governance characteristics such as institutional monitoring. Our “models” are meant primarily to illustrate how two very different approaches can support a significant relation in the data between performance and co-option. It also is the case that a combination of our models could be appropriate. In a combined model, the size of transaction costs would determine the extent of departures from the locus of value-maximizing combinations of q and co-option.

Appendix 2. Variable definitions

This appendix defines the variables used in the study. Compustat data items are defined as data#. CEO data are from Execucomp, stock return data from CRSP, accounting and operating segment data from Compustat, and board data from IRRC.

A.2.1. Board-related variables

<i>Variable</i>	<i>Definition</i>	<i>data item</i>
New director	Director who joined the board after the CEO joined the firm	
Board size	Total number of directors on the board	
Co-opt	Number of new directors / Board size = Co-opt_Insider + Co-opt_Aff + Co-opt_Indep	
Co-opt_Insider	Number of new insider directors / Board size	
Co-opt_Aff	Number of new affiliated directors / Board size	
Co-opt_Indep	Number of new independent directors / Board size	
Frac_Indep	Number of independent directors / Board size = Co-opt_Indep + Frac_Indep_Before	
Frac_Indep_Before	Number of independent directors who joined before the CEO assumed office / Board size	
Co-opt_Alt	(Number of new independent directors + number of affiliate directors + number of inside directors) / Board size = 1 – Frac_Indep_Before	

A.2.2. CEO-related variables

CEO Total Pay	Sum of all annual payments	TDC1
CEO Option Grants	Value of annual option grants	BLK_VALU
CEO Cash Compensation	Sum of salary and bonus	TCC
CEO Pay Hike	Change in CEO total pay	
CEO Delta	Expected dollar change in CEO wealth for a 1% change in stock price (using entire portfolio of stocks and options)	
CEO Vega	Expected dollar change in CEO wealth for a 0.01 change in stock return volatility (using entire portfolio of options)	
CEO Age6466 dummy	= 1 if $64 \leq \text{CEO Age} \leq 66$ = 0 otherwise	
CEO Tenure	Tenure as CEO of the firm, and equals fiscal year end date minus date joined as CEO	
CEO Ownership	Shares held by the CEO / Number of shares outstanding	
CEO Duality	= 1 if CEO is also the Chairman = 0 otherwise	

A.2.3. Firm-level variables

Return	Annual stock return for the fiscal year	
Dollar Return	Return \times Lagged market capitalization	
Market Capitalization		data25 \times data199
<i>cdf</i> of Dollar Return Variance	Cumulative distribution function of the variance of dollar return	
OCF/Assets	Operating Cash Flow / Assets	data308/data6
CAPEX/Assets	Capital Expenditure / Assets	data128/data6
R&D/Assets	Research & Development Expenditure / Assets	Max(0,data46)/data6
ROA	Return on Assets = EBITDA/Assets	data13/data6
Intangible assets	1 – (Net Property, Plant, and Equipment /Assets)	= 1 – (data8/data6)
Leverage	Debt / Assets	(data9 + data34) / data6
Tobin's <i>q</i> (Market-to-book)	(Assets – Book equity + Market equity) / Assets	(data6 – data60 + data199 \times data25) / data6
Segments	Number of business segments	
Firm size	Log(sales)	Log(data12)
Sales growth	Sales / Lagged Sales	
Risk	Standard deviation of residual from a firm-level time-series regression (estimated for each fiscal year) of daily excess returns on the Fama-French factors.	

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Table 1**Summary statistics**

The governance data are from Investor Responsibility Research Center (IRRC) for the period 1996-2005. Compensation data are from Execucomp, accounting data are from Compustat, and stock return data are from CRSP. *Return* is the stock return over the fiscal year. *Dollar return* is computed as lagged market capitalization \times Return. *R&D/Assets* is the ratio of R&D to book assets. *Tobin's q* is defined as the ratio of the market value of assets to the book value of assets. *Co-opt* is the ratio of the number of directors appointed *after* the CEO assumed office ("new" directors) to the board size. *Co-opt_Indep* is the ratio of new independent directors to the board size. *Frac_Indep* is the ratio of the number of independent directors to the board size. *Frac_Indep_Before* is the number of independent directors who were already on the board before the CEO joined divided by the board size. *Co-opt_Alt* is the sum of *new* independent directors and *all* non-independent directors, all divided by board size. *Average Director Age* is the average age of all directors on the board. *Average Director Tenure* is the average tenure (in the firm) of all directors on the board. *Involved CEO* is an indicator variable that equals 1 either if the firm has no nominating committee, or if the firm has a nominating committee and the CEO is a member, and equals 0 otherwise. *CEO Turnover* equals 1 if the identity of the CEO changes, and equals 0 otherwise. *CEO Total Pay* is measured using the Execucomp variable *TDC1*. It includes the Black-Scholes value of stock options granted (*Option Grants*; Execucomp variable *BLK_VALU*), salary & bonus (*Cash Compensation*; Execucomp variable *TCC*), the value of annual restricted stock grants, other annual compensation, long term incentive payouts, and all other total compensation. *CEO Total Pay Hike* is the change in CEO total pay. *CEO Tenure* represents the number of years served as the CEO of the firm, and is measured as fiscal year end date minus the date the executive became the CEO.

	Observations	Mean	Median
<i>Firm level variables</i>			
Sales (\$ Million)	11962	4752.88	1440.14
Return	11940	0.15	0.10
Dollar Return (\$ Million)	11928	556.83	99.01
R&D/Assets	11962	0.03	0.00
Tobin's <i>q</i>	11958	1.97	1.48
<i>Board-related variables</i>			
Board size	11968	9.50	9.00
Co-opt	11968	0.54	0.54
Co-opt_Indep	11968	0.36	0.33
Frac_Indep	11968	0.65	0.67
Frac_Indep_Before	11968	0.29	0.27
Co-opt_Alt	11968	0.71	0.26
Average Director Age (Years)	11968	58.99	59.33
Average Director Tenure (Years)	11968	8.49	8.08
Involved CEO	9817	0.34	
<i>CEO-related variables</i>			
CEO Turnover	11968	0.12	
CEO Total Pay (\$ '000s)	11968	4754.37	2546.46
CEO Option Grants (\$ '000s)	11968	2208.92	709.41
CEO Cash Compensation (\$ '000s)	11968	1431.77	1030.89
CEO Total Pay Hike (\$ '000s)	11751	99.51	113.72
CEO Tenure (Years)	11968	8.18	5.92

Table 2**Effect of co-option on CEO turnover–performance sensitivity**

The table presents logit regressions of CEO Turnover. *CEO Turnover* equals 1 if the identity of the CEO changes, and equals 0 otherwise. *Co-opt* is the ratio of the number of directors appointed *after* the CEO assumed office (“new” directors) to the board size. *Co-opt_Alt* is the sum of *new* independent directors and *all* non-independent directors, all divided by board size. The co-option measure used is effectively the co-option of the board at the time of dismissal. In years in which CEO turnover occurs, if the turnover occurs after the date of the firm’s annual meeting, then the contemporaneous co-option measure is used; if the turnover occurs before the firm’s annual meeting date, then the lagged co-option measure is used. In non-turnover years, we take the average of contemporaneous and lagged values of co-option measure. *Co-option* equals *Co-opt* in columns 1 – 3 and *Co-opt_Alt* in column 4. High and low *Co-opt* subsamples are based on median values of *Co-opt*. *Return* is the fiscal year stock return. *Firm size* is measured as log(sales). *CEO Age6466 dummy* equals 1 if the departing CEO’s age is between 64 and 66, and equals 0 otherwise. *CEO Tenure* represents the number of years served as the CEO of the firm, and is measured as fiscal year end date minus the date the executive became the CEO. *CEO ownership* is the fractional stock ownership of the CEO. Intercept, year dummies, and 2-digit SIC dummies are included but not reported. Absolute values of z-statistics are given in parentheses and are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

	Dependent variable: CEO Turnover _t			
	Full Sample (1)	High Co-opt (2)	Low Co-opt (3)	Full Sample (4)
Co-option (α_1)	0.653*** (4.1)			0.615*** (3.0)
Co-option \times Return _{t-1} (α_2)	0.558** (2.0)			0.588 (1.5)
Return _{t-1} (α_3)	-0.727*** (3.2)	-0.190* (1.7)	-0.693*** (3.7)	-0.819** (2.4)
Firm size _t	0.105*** (3.8)	0.145*** (3.9)	0.055 (1.2)	0.107*** (3.9)
CEO Age6466 dummy _t	1.217*** (11.9)	1.037*** (8.3)	1.660*** (9.2)	1.217*** (11.9)
CEO tenure _t	0.009 (1.3)	0.013* (1.9)	0.072*** (3.3)	0.015** (2.3)
CEO ownership _t	-0.031*** (3.0)	-0.035*** (2.9)	-0.007 (0.4)	-0.032*** (3.1)
Observations	8195	4130	3944	8195
Pseudo R ²	0.078	0.077	0.099	0.076
F-test	$\alpha_2 + \alpha_3 = -0.17$ p = 0.15	High-group α_3 – low-group $\alpha_3 = 0.50$ p = 0.02		$\alpha_2 + \alpha_3 = -0.23$ p = 0.05

Table 3
Effect of co-option on CEO pay

The table presents OLS regression results where the dependent variables are the *CEO total pay* (Columns 1 and 4), the Black-Scholes value of CEO *option grants* (Column 2), and CEO *cash compensation* (Column 3). We drop firm-years that had a turnover and require that the CEO's tenure be at least 1 year. This ensures that we do not consider pay for fractional years. CEO total pay is the total annual pay (Execucomp variable: *TDC1*). It includes the Black-Scholes value of stock options granted (Execucomp variable: *BLK_VALU*), cash compensation (Execucomp variable: *TCC*), the value of restricted stock grants, other annual compensation, long term incentive payouts, and all other total compensation. *Co-opt* is the ratio of the number of directors appointed *after* the CEO assumed office ("new" directors) to board size. *Co-opt_Alt* is the sum of *new* independent directors and *all* non-independent directors, all divided by board size. *Co-option equals Co-opt in columns 1 – 3 and Co-opt_Alt in column 4.* *Firm size* is measured as log(sales). *Return* is the fiscal year stock return. *ROA* is EBITDA/Assets. *CEO tenure* represents the number of years served as the CEO of the firm, and is measured as fiscal year end date minus the date the executive became the CEO. Intercept, year dummies, and 2-digit SIC dummies are included but not reported. Absolute values of t-statistics are given in parentheses and are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

	Dependent Variable			
	Total Pay _t (1)	Option Grants _t (2)	Cash Compensation _t (3)	Total Pay _t (4)
Co-option _t (β ₁)	1,933.0*** (6.2)	1,320.7*** (6.0)	201.6*** (2.9)	1,594.2*** (4.1)
Firm size _t	2,182.4*** (25.9)	992.7*** (18.1)	537.0*** (28.0)	2,191.8*** (25.8)
Return _t	846.7*** (5.3)	434.8*** (3.2)	229.4*** (11.5)	840.6*** (5.3)
ROA _t	238.4 (0.2)	917.4 (1.3)	76.6 (0.3)	54.7 (0.1)
CEO tenure _t	-46.4*** (3.0)	-40.1*** (3.9)	3.0 (0.8)	-22.3 (1.5)
Observations	10473	10473	10473	10473
R-squared	0.335	0.188	0.492	0.331

Table 4
Effect of co-option on pay-performance sensitivity

The table presents OLS regressions of *CEO Total Pay Hike*, defined as the change in CEO total pay. We drop firm-years that had a turnover in the current or previous year and require that the CEO's tenure be at least 2 years. This ensures that we do not consider pay hikes based on pay for fractional years. CEO total pay is given by the Execucomp variable *TDC1*. It includes the Black-Scholes value of stock options granted, salary and bonus, the value of restricted stock grants, other annual compensation, long term incentive payouts, and all other total compensation. *Co-opt* is the ratio of the number of directors appointed *after* the CEO assumed office ("new" directors) to board size. *Co-opt_Alt* is the sum of *new* independent directors and *all* non-independent directors, all divided by board size. *Co-option* equals *Co-opt* in columns 1 – 3 and *Co-opt_Alt* in column 4. High and low *Co-opt* subsamples are based on median values of *Co-opt*. *Dollar return* is computed as lagged market capitalization \times fiscal year stock returns. *CDF of dollar return variance* is the cumulative distribution function of the variance of dollar returns estimated over the sample period, and hence ranges from 0 to 1. Columns 2 and 3 are based on sub-samples of firms that have above and below median levels (high and low values) of *Co-opt*. *CEO tenure* represents the number of years served as the CEO of the firm, and is measured as fiscal year end date minus the date the executive became the CEO. *Low Compensation Dummy* equals 1 if the CEO was below the median compensation of his peer group (where the peer groups consists of firms that are similar in terms of sales and are in the same industry), and equals zero otherwise. *PPS* denotes pay-performance-sensitivity for the median firm (*cdf* = 0.5). Intercept, year dummies, and 2-digit SIC dummies are included but not reported. Absolute values of t-statistics are given in parentheses and are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

	Dependent variable: CEO Total Pay Hike _t			
	Full Sample (1)	High Co-opt (2)	Low Co-opt (3)	Full Sample (4)
Co-option _t (γ_1)	329.67** (2.1)			334.35 (1.6)
Dollar return _t (γ_2)	1.84*** (5.7)	2.03*** (4.5)	1.64*** (3.5)	1.84*** (5.7)
Dollar return _t \times <i>cdf</i> of dollar return variance (γ_3)	-1.70*** (5.1)	-1.92*** (4.0)	-1.48*** (3.0)	-1.70*** (5.1)
<i>cdf</i> of dollar returns variance	932.80*** (5.1)	1,026.22*** (3.6)	780.09*** (3.2)	942.10*** (5.2)
CEO tenure _t	-12.51* (1.9)	-8.78 (1.3)	-13.08 (0.7)	-10.00 (1.6)
Low compensation dummy _{t-1}	1,505.45*** (14.5)	1,773.11*** (11.1)	1,277.04*** (9.3)	1,496.75*** (14.4)
Observations	9025	4390	4635	9025
R-squared	0.073	0.077	0.083	0.073
F-test	$\gamma_2 + 0.5\gamma_3 =$ 0.99; p < 0.01	$\gamma_2 + 0.5\gamma_3 =$ 1.07; p < 0.01	$\gamma_2 + 0.5\gamma_3 =$ 0.90; p < 0.01	$\gamma_2 + 0.5\gamma_3 =$ 0.99; p < 0.01
F-test	High-group PPS – Low-group PPS = 0.17; p = 0.59			

Table 5**Effect of co-option on investment in firm-specific human capital**

The table presents OLS regressions of $R\&D/Assets_t$, defined as the ratio of R&D to book assets. $Co-opt$ is the ratio of the number of directors appointed *after* the CEO assumed office (“new” directors) to the board size. $Co-opt_Alt$ is the sum of *new* independent directors and *all* non-independent directors, all divided by board size. $Co-option$ equals $Co-opt$ in column 1 and $Co-opt_Alt$ in column 2. $CEO\ tenure$ represents the number of years served as the CEO of the firm, and is measured as fiscal year end date minus the date the executive became the CEO. $CEO\ cash\ compensation$ is the sum of salary and bonus. $CEO\ vega$ is the expected change in CEO wealth for a 1 percentage point change in stock return volatility. $CEO\ delta$ is the expected change in CEO wealth for a 1 percentage point change in stock price. $Market-to-book$ is the market value of assets to the book value of assets. $Firm\ size$ is measured as the logarithm of firm sales. $Leverage$ is the ratio of total book debt to book assets. $OCF/Assets$ is the ratio of operating cash flow to assets. $Sales\ growth$ is the one-year growth in sales. $Return$ is the fiscal year stock return. Intercept, year dummies, and 2-digit SIC dummies are included but not reported. Absolute values of t-statistics are given in parentheses and are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

	Dependent Variable: $R\&D/Assets_t$	
	(1)	(2)
$Co-option_t (\phi_l)$	0.010*** (4.0)	0.004 (1.3)
$CEO\ tenure_t (\times 10^3)$	-0.587*** (4.6)	-0.372*** (3.0)
$CEO\ cash\ compensation_{t-1} (\times 10^6)$	0.291 (0.5)	0.042 (0.7)
$CEO\ vega_{t-1} (\times 10^6)$	15.200*** (4.9)	16.000*** (5.1)
$CEO\ delta_{t-1} (\times 10^6)$	-0.517 (1.4)	-0.557 (1.5)
$Market-to-book_t$	0.010*** (11.6)	0.010*** (11.8)
$Firm\ size_t$	-0.005*** (6.8)	-0.005*** (7.0)
$Leverage_t$	-0.040*** (7.1)	-0.040*** (7.0)
$OCF/Assets_t$	-0.132*** (8.9)	-0.132*** (8.9)
$Sales\ growth_t$	-0.008*** (3.8)	-0.008*** (3.5)
$Return_t$	-0.008*** (7.9)	-0.008*** (8.1)
Observations	10406	10406
R-squared	0.504	0.502

Table 6
Determinants of board co-option

The table presents OLS regressions of two proxies for board co-option. *Co-opt* is defined as the ratio of the number of directors appointed *after* the CEO assumed office (“new” directors) to board size. *Co-opt_Alt* is the sum of *new* independent directors and *all* non-independent directors, all divided by board size. We drop firm-years that had a turnover in the current or previous year and require that the CEO’s tenure be at least 2 years. *R&D/Assets* is the ratio of R&D to book assets. *Return* is the fiscal year stock return. *ROA* is the ratio of EBITDA to book value of assets. *CEO duality* equals 1 if the CEO is also the chairman of the board, and equals 0 otherwise. *Firm size* is measured as the logarithm of firm sales. *CEO tenure* represents the number of years served as the CEO of the firm, and is measured as fiscal year end date minus the date the executive became the CEO. Intercept, year dummies, and 2-digit SIC dummies are included but not reported. Absolute values of t-statistics are given in parentheses and are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

	Dependent Variable: Co-opt _t		Dependent Variable: Co-opt_Alt _t	
	(1)	(2)	(3)	(4)
R&D/Assets _{t-1}	0.584*** (4.2)	0.390** (2.2)	0.181* (1.7)	0.041 (0.3)
Return _{t-1}	0.005 (0.9)	0.006 (0.9)	0.005 (1.2)	0.005 (1.1)
ROA _{t-1}	-0.044 (0.7)	0.044 (0.6)	-0.037 (0.7)	0.027 (0.5)
CEO duality _{t-1}	0.075*** (6.8)	0.156*** (11.3)	0.007 (0.8)	0.065*** (6.5)
Firm size _{t-1}	-0.009** (2.1)	-0.030*** (5.7)	-0.013*** (3.9)	-0.028*** (7.1)
CEO tenure _{t-1}	0.027*** (31.9)		0.019*** (28.1)	
Observations	7450	7450	7450	7450
R-squared	0.454	0.121	0.417	0.122

Table 7**Board co-option and R&D: 3SLS**

The table presents 3SLS regressions of board *co-option* and *R&D/Assets*. In Model 1, the proxy for co-option is *Co-opt_t*, defined as the ratio of the number of directors appointed *after* the CEO assumed office (“new” directors) to board size. In Model 2, the proxy for co-option is *Co-opt Alt_t*, defined as the sum of *new* independent directors and *all* non-independent directors, all divided by board size. *R&D/Assets* is the ratio of R&D to book assets. *Return* is the fiscal year stock return. *ROA* is the ratio of EBITDA to book value of assets. *CEO duality* equals 1 if the CEO is also the chairman of the board, and equals 0 otherwise. *Firm size* is measured as the logarithm of firm sales. *CEO tenure* represents the number of years served as the CEO of the firm, and is measured as fiscal year end date minus the date the executive became the CEO. *CEO cash compensation* is the sum of salary and bonus. *CEO vega* is the expected change in CEO wealth for a 1 percentage point change in stock return volatility. *CEO delta* is the expected change in CEO wealth for a 1 percentage point change in stock price. *Market-to-book* is the market value of assets to the book value of assets. *Leverage* is the ratio of total book debt to book assets. *OCF/Assets* is the ratio of operating cash flow to assets. *Sales growth* is the one-year growth in sales. Intercept, year dummies, and 2-digit SIC dummies are included but not reported. Absolute values of t-statistics are given in parentheses and are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

	Model 1: Co-option = Co-opt		Model 2: Co-option = Co-opt Alt	
	Co-option _t	R&D/Assets _t	Co-option _t	R&D/Assets _t
R&D/Assets _t	1.144 ^{***} (6.1)		0.443 ^{***} (3.0)	
Co-option _t		0.042 ^{**} (3.2)		1.564 ^{***} (4.3)
Return _{t-1}	-0.004 (0.7)		0.001 (0.3)	
ROA _{t-1}	-0.112 ^{***} (3.0)		-0.029 (1.2)	
CEO duality _{t-1}	0.068 ^{***} (10.7)		-0.003 (1.4)	
Firm size _t	-0.007 ^{***} (2.8)	-0.005 ^{***} (9.9)	-0.012 ^{***} (6.3)	0.020 ^{**} (2.6)
CEO tenure _t	0.027 ^{***} (63.8)	-0.001 ^{***} (3.9)	0.019 ^{***} (59.6)	-0.030 ^{***} (4.4)
CEO cash compensation _{t-1} (× 10 ⁶)		0.247 (0.5)		-0.519 (0.6)
CEO vega _{t-1} (× 10 ⁶)		15.300 ^{***} (6.1)		-12.000 (0.9)
CEO delta _{t-1} (× 10 ⁶)		-0.294 (1.4)		-0.547 [*] (1.7)
Market-to-book _t		0.010 ^{***} (23.6)		0.004 [*] (1.7)
Leverage _t		-0.034 ^{***} (10.3)		-0.039 ^{**} (2.0)
OCF/Assets _t		-0.120 ^{***} (18.8)		-0.035 ^{***} (2.6)
Sales growth _t		-0.004 ^{**} (2.0)		-0.035 (1.4)
Returns _t		-0.008 ^{***} (7.5)		-0.006 ^{***} (2.9)
Observations	6630		6630	

Table 8**Effect of co-option on firm value**

The table presents OLS regressions of *Tobin's q*, defined as the ratio of the market value of assets to the book value of assets. *Co-opt* is the ratio of the number of directors appointed *after* the CEO assumed office ("new" directors) to board size. *Co-opt_Alt* is the sum of *new* independent directors and *all* non-independent directors, all divided by board size. Co-option equals *Co-opt* in columns 1 – 4 and equals *Co-opt_Alt* in columns 5 and 6. *R&D* is the R&D dummy in columns 2 and 6 and is R&D/Assets in the other columns. R&D dummy equals 1 if R&D/Assets is greater than the 75th percentile, and equals 0 otherwise. The high (low) R&D subsamples corresponds to R&D dummy = 1 (= 0). *Segments* is the number of business segments in which the firm operates. *Leverage* is the ratio of book value of total debt to book value of assets. *Firm size* is measured as the logarithm of firm sales. *Board size* is the logarithm of the number of directors on the board. *Risk* is the variance of the residual from a firm-level time-series regressions of daily excess stock returns on the Fama-French daily factors. This regression is estimated for each fiscal year. *ROA* is the ratio of EBITDA to book value of assets. *Intangible assets* is one minus the ratio of net PPE to book value of assets. *CEO ownership* is the fractional stock ownership of the CEO. Intercept, year dummies, and 2-digit SIC dummies are included but not reported. Absolute values of t-statistics are given in parentheses and are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

	Dependent Variable: Tobin's <i>q</i>					
	Full sample (1)	Full sample (2)	High R&D (3)	Low R&D (4)	Full sample (5)	Full sample (6)
Co-option _t (λ_1)	0.125** (2.2)	-0.045 (1.0)	0.468*** (3.0)	-0.008 (0.2)	0.164** (2.4)	-0.073 (1.3)
Co-option _t × R&D _t (λ_2)		0.705*** (4.2)				0.891*** (4.2)
R&D _t	10.121*** (11.8)	0.444*** (4.3)	8.581*** (7.0)	7.624** (2.5)	10.162*** (11.9)	0.199 (1.4)
Segments _t	-0.043*** (3.5)	-0.051*** (3.9)	-0.151*** (4.7)	-0.005 (0.5)	-0.043*** (3.5)	-0.051*** (4.0)
Leverage _t	-0.580*** (3.3)	-0.718*** (3.9)	-0.655 (1.5)	-0.428*** (3.3)	-0.574*** (3.3)	-0.716*** (3.9)
Firm size _t	0.036* (1.8)	0.026 (1.2)	0.133*** (2.8)	0.024 (1.5)	0.038* (1.8)	0.027 (1.3)
Board size _t	-0.111 (1.4)	-0.156* (1.9)	-0.176 (0.8)	-0.088 (1.5)	-0.111 (1.4)	-0.149* (1.8)
Risk _t	0.009*** (4.6)	0.012*** (5.7)	0.016*** (4.2)	0.004** (2.5)	0.009*** (4.6)	0.012*** (5.7)
ROA _t	6.179*** (17.8)	5.422*** (14.9)	6.705*** (11.2)	5.759*** (17.2)	6.174*** (17.8)	5.406*** (14.9)
ROA _{t-1}	1.530*** (5.4)	1.470*** (5.1)	1.310** (2.5)	1.231*** (5.3)	1.533*** (5.4)	1.487*** (5.1)
ROA _{t-2}	0.426 (1.2)	0.427 (1.1)	-0.689 (1.1)	1.936*** (7.6)	0.424 (1.2)	0.418 (1.1)
Intangible assets _t	1.301*** (8.4)	1.281*** (7.9)	3.168*** (6.2)	0.789*** (6.2)	1.301*** (8.4)	1.285*** (7.9)
CEO ownership _t	0.008* (1.8)	0.005 (1.1)	0.011 (0.8)	0.004 (1.3)	0.008* (1.8)	0.006 (1.2)
Observations	10857	10857	2888	7969	10857	10857
R-squared	0.426	0.396	0.363	0.523	0.426	0.395
F-test		$\lambda_1 + \lambda_2 = 0.66;$ p < 0.01	High λ_2 – Low $\lambda_2 = 0.48;$ p < 0.01			$\lambda_1 + \lambda_2 = 0.82;$ p < 0.01

Table 9 Robustness

The table reports our key results using various alternative specifications. TPS refers to Turnover-Performance Sensitivity. PPS refers to Pay-Performance Sensitivity. Rows 1 – 8 examine the costs of co-option. Row 9 examines the benefits of co-option. Rows 10 – 12 examine the value impact of co-option. Base case (Column 1) refers to results reported in the main tables with *Co-opt* as the variable of interest. *Co-opt* is the ratio of the number of directors appointed *after* the CEO assumed office (“new” directors) to the board size. Columns 2 – 8 represent the results from regressions that replace *Co-opt* with various alternative board-related and CEO-related variables. For subsamples, the high and low groups are based on these alternative variables. Column 2 reports results where *Co-opt* is replaced with *CEO Tenure*. *CEO Tenure* represents the number of years served as the CEO of the firm, and is measured as fiscal year end date minus the date the executive became the CEO. Since the base-case already includes CEO tenure in all specifications, this effectively amounts to re-estimating our base-case regressions without *Co-opt* as an independent variable. Regressions for subsamples, instead of being based on *Co-opt*, are based on whether the CEO tenure is above or below median. Column 3 reports results where *Co-opt* is replaced with *Involved CEO* and subsamples are based on whether *Involved CEO* = 0 or 1. *Involved CEO* is an indicator variable that equals 1 either if the firm has no nominating committee, or if the firm has a nominating committee and the CEO is a member, and equals 0 otherwise. Column 4 reports results where *Co-opt* is replaced with *Co-opt_Indep* and subsamples are based on whether *Co-opt_Indep* is above or below median. *Co-opt_Indep* is the ratio of new independent directors to the board size. Column 5 reports results where *Co-opt* is replaced with *Average Director Tenure* and subsamples are based on whether *Average Director Tenure* is above or below median. *Average Director Tenure* is the average tenure (in the firm) of all directors on the board. Column 6 reports results where *Co-opt* is replaced with *Average Director Age* and subsamples are based on whether average director age is above or below median. *Average Director Age* is the average age of all directors on the board. Column 7 reports results where *Co-opt* is replaced with *Frac_Indep* and subsamples are based on whether *Frac_Indep* is above or below median. *Frac_Indep* is the ratio of the number of independent directors to the board size. Column 8 reports results where *Co-opt* is replaced with *Frac_Indep_Before* and subsamples are based on whether *Frac_Indep_Before* is above or below median. *Frac_Indep_Before* is the ratio of the number of independent directors who were already on the board before the CEO joined to the board size. The predicted sign represents the relation we would expect for potential alternative proxies for co-option. Absolute values of t-statistics are given in parentheses and are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

Row	Result	Pred. Sign	Base Case (1)	CEO Tenure (2)	Involved CEO (3)	Coopt_Indep (4)	Pred. Sign	Director Tenure (5)	Director Age (6)	Frac_Indep (7)	Frac_Indep_Before (8)
1	TPS for high group Table 2, Column 2 (α_3)	0/-	-0.19* (1.7)	-0.29*** (2.6)	-0.10 (0.7)	-0.30** (2.4)	-	-0.39*** (2.8)	-0.52*** (3.2)	-0.46*** (3.0)	-0.52*** (3.0)
2	TPS for low group Table 2, Column 3 (α_3)	-	-0.69*** (3.7)	-0.44*** (2.7)	-0.68*** (4.5)	-0.43** (2.5)	0/-	-0.28** (2.2)	-0.24** (2.1)	-0.25** (2.0)	-0.26** (2.2)
3	Diff. in TPS between High and Low groups	+	0.50** (2.3)	0.15 (0.8)	0.58*** (2.8)	0.13 (0.6)	-	-0.11 (0.6)	-0.28 (1.4)	-0.21 (1.1)	-0.26 (1.2)
4	Total CEO Pay Table 3, Column 1 (β_1)	+	1933*** (6.2)	10.15 (0.8)	216 (1.1)	1578*** (4.4)	-	-145*** (6.9)	-99*** (4.4)	399 (0.8)	-1594*** (4.1)
5	CEO Total Pay Hike Table 4, Column 1 (γ_1)	+	330** (2.1)	-4 (0.8)	-94 (0.7)	360** (2.1)	-	-40*** (4.4)	-13 (1.3)	149 (0.7)	-334 (1.6)
6	PPS for high group Table 4, Column 2 ($\gamma_2 + 0.5\gamma_3$)	0/+	1.07*** (5.0)	0.95*** (4.6)	0.77** (2.4)	1.00*** (4.6)	+	0.91*** (4.4)	0.95*** (5.0)	0.75*** (3.7)	1.02*** (4.5)
7	PPS for low group Table 4, Column 3 ($\gamma_2 + 0.5\gamma_3$)	+	0.90*** (4.1)	1.05*** (5.1)	1.20*** (5.9)	0.95*** (4.5)	0/+	1.05*** (5.0)	1.04*** (4.7)	1.23*** (5.5)	1.00*** (4.7)
8	Diff. in PPS between High and Low groups	-	0.17 (0.5)	-0.10 (0.4)	-0.43 (1.1)	0.05 (0.1)	+	-0.14 (0.5)	-0.09 (0.3)	-0.48 (1.6)	0.02 (0.1)
9	R&D ($\times 10^2$) Table 5, Column 1 (ϕ_1)	+	1.02*** (4.0)	-0.03*** (2.8)	-0.23 (1.4)	1.02*** (3.6)	-	-0.08*** (4.5)	-0.08*** (3.3)	1.15*** (2.8)	-0.41 (1.3)
10	Tobin's q for high R&D Table 8, Column 3 (λ_1)	+	0.47*** (3.0)	0.013* (1.7)	0.29** (2.0)	0.46** (2.4)	-	-0.009 (0.6)	-0.04*** (2.9)	-0.18 (0.5)	-0.60*** (3.0)
11	Tobin's q for low R&D Table 8, Column 4 (λ_1)	0/-	-0.01 (0.2)	0.001 (0.6)	0.04 (1.2)	-0.09* (1.7)	0/+	-0.002 (0.4)	-0.01** (2.0)	-0.21** (2.4)	-0.00 (0.1)
12	Diff in Tobin's q between High and Low groups	+	0.48*** (3.0)	0.012 (1.5)	0.25* (1.7)	0.55*** (2.8)	-	-0.007 (0.5)	-0.03** (2.2)	0.03 (0.1)	-0.60*** (2.9)

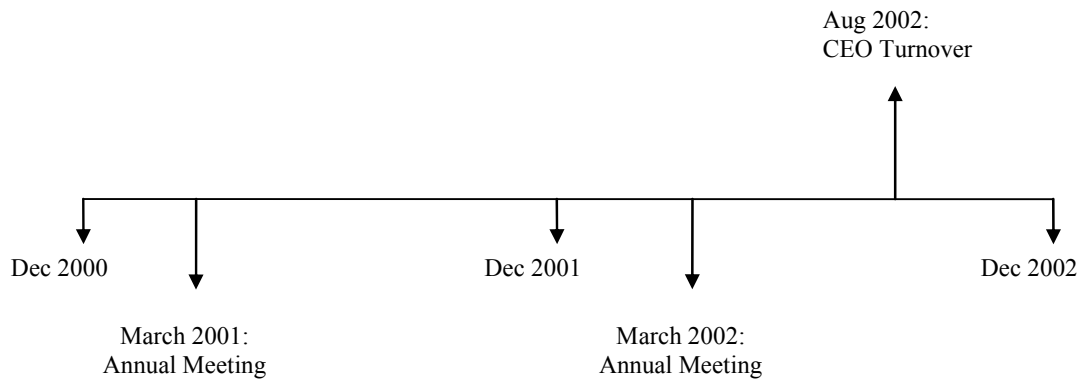


Figure 1. Timeline

The example above illustrates how we define various board co-option measures. Consider a firm that has a December fiscal year end and normally has its annual meeting in March. Co-option for year 2001 is based on the slate of directors presented at the March 2001 annual meeting, because this is the board in place for the majority of the year. Thus, by definition, co-option is based on the board prevailing at the end of the year rather than at the beginning of the year. Similarly, co-option for the year 2002 is based on the slate of directors presented at the March 2002 meeting. Assume a CEO turnover event occurs in August 2002 (i.e., after the annual meeting date). Then the board that determined the CEO turnover is the board in place since March 2002, and hence turnover and co-option are measured contemporaneously. If the turnover occurs before the annual meeting (say, February 2002) then the board that determined the turnover is the board elected as of March 2001, and the lagged co-option measure is used in regressions. For non-turnover years, because both the lagged and contemporaneous boards decide on the CEO’s ‘non-replacement,’ we use the average of the lagged and contemporaneous values of co-option. For regressions of CEO compensation, we use the contemporaneous co-option measure because this is based on the board that is in place for the majority of the year and also because performance-based pay will be decided by the board at the end of the fiscal year.

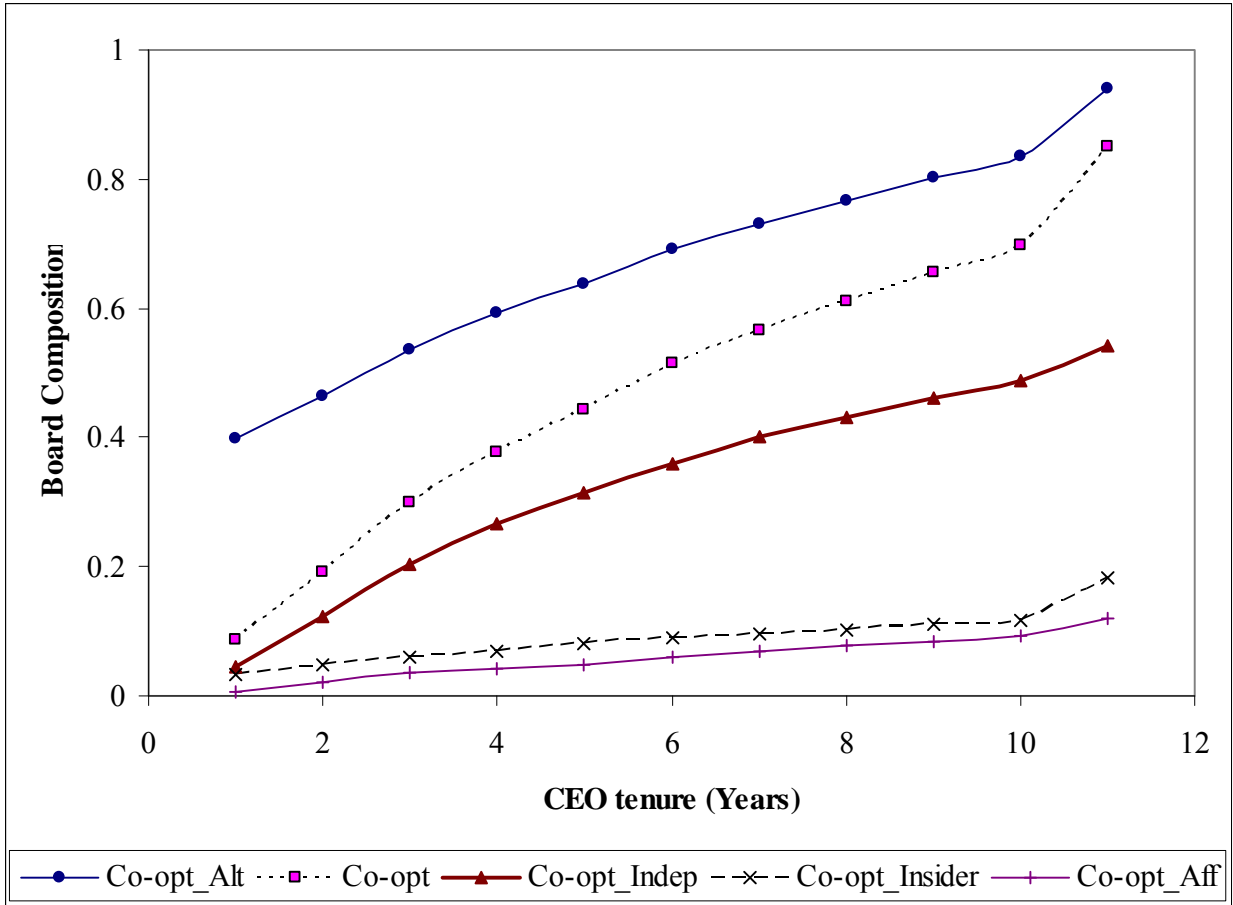


Figure 2. Co-option and CEO tenure

The figure shows how co-option varies with CEO tenure. *Co-opt* is the ratio of the number of directors appointed *after* the CEO assumed office (“new” directors) to the board size. *Co-opt_Alt* is the sum of *new* independent directors and *all* non-independent directors, all divided by board size. *Co-opt_Indep* is the ratio of the number of new independent directors to the board size. *Co-opt_Insider* is the ratio of the number of new inside directors to the board size. *Co-opt_Aff* is the ratio of the number of new affiliated directors to the board size. CEOs are put in 11 groups based on their tenure, where CEO tenure is measured as fiscal year end date minus the date the executive became the CEO. All CEOs with ≤ 1 year are put in the 1st group, CEOs with tenure greater than 9 years but ≤ 10 years are put in the 10th group, and CEOs with greater than 10 years are put in the 11th group.

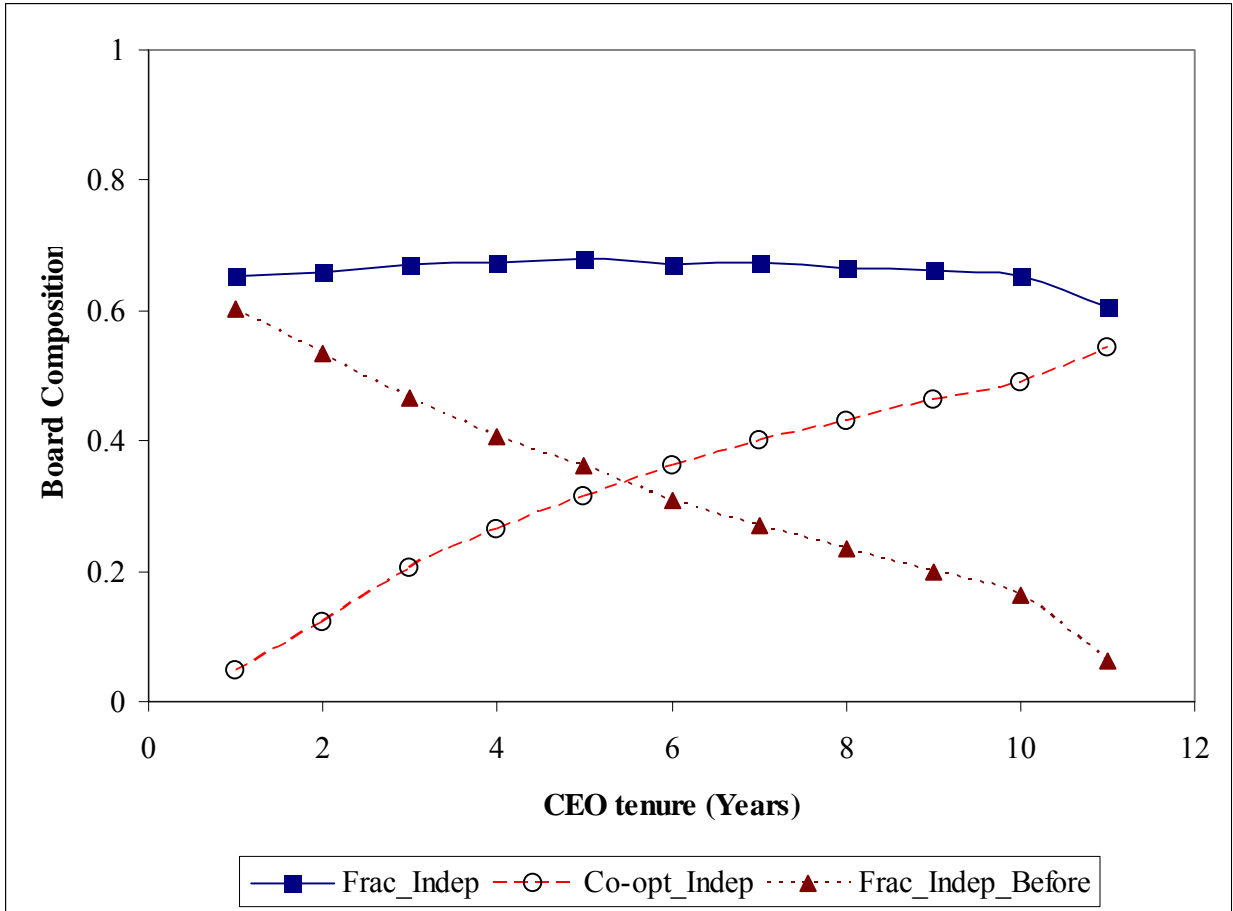


Figure 3. Board composition and CEO tenure

The figure plots various measures of board composition against CEO tenure. *Frac_Indep* is the ratio of the number of independent directors to the board size. *Co-opt_Indep* is the ratio of the number of independent directors appointed *after* the CEO assumed office to the board size. *Frac_Indep_Before* is the ratio of the number of independent directors appointed *before* the CEO assumed office to the board size. CEOs are put in 11 groups based on their tenure, where CEO tenure is measured as fiscal year end date minus the date the executive became the CEO. All CEOs with ≤ 1 year are put in the 1st group, CEOs with tenure greater than 9 years but ≤ 10 years are put in the 10th group, and CEOs with greater than 10 years are put in the 11th group.

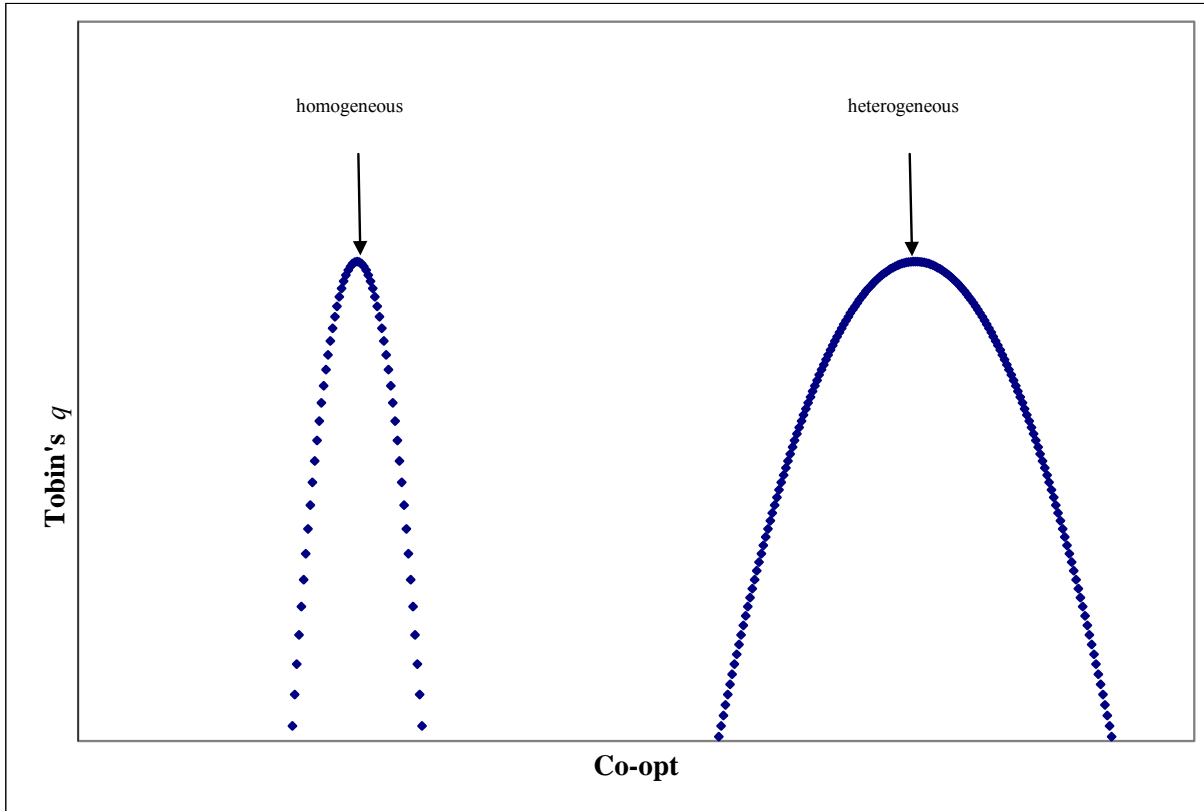


Figure 4. Relation between q and board co-option in the presence of transaction costs

The figure presents hypothetical data based on a transaction-costs based model. In this world, there are two types of firms, “homogeneous” and “heterogeneous,” each having distinct optimal board co-option. Transaction costs are significant and hence deviations from optimal board co-option are likely to be permanent. Assume also that the deviations are random, in that, some could be above-optimal and some could be below-optimal. The locus of points represents the objective function that firms maximize in the absence of transaction costs.

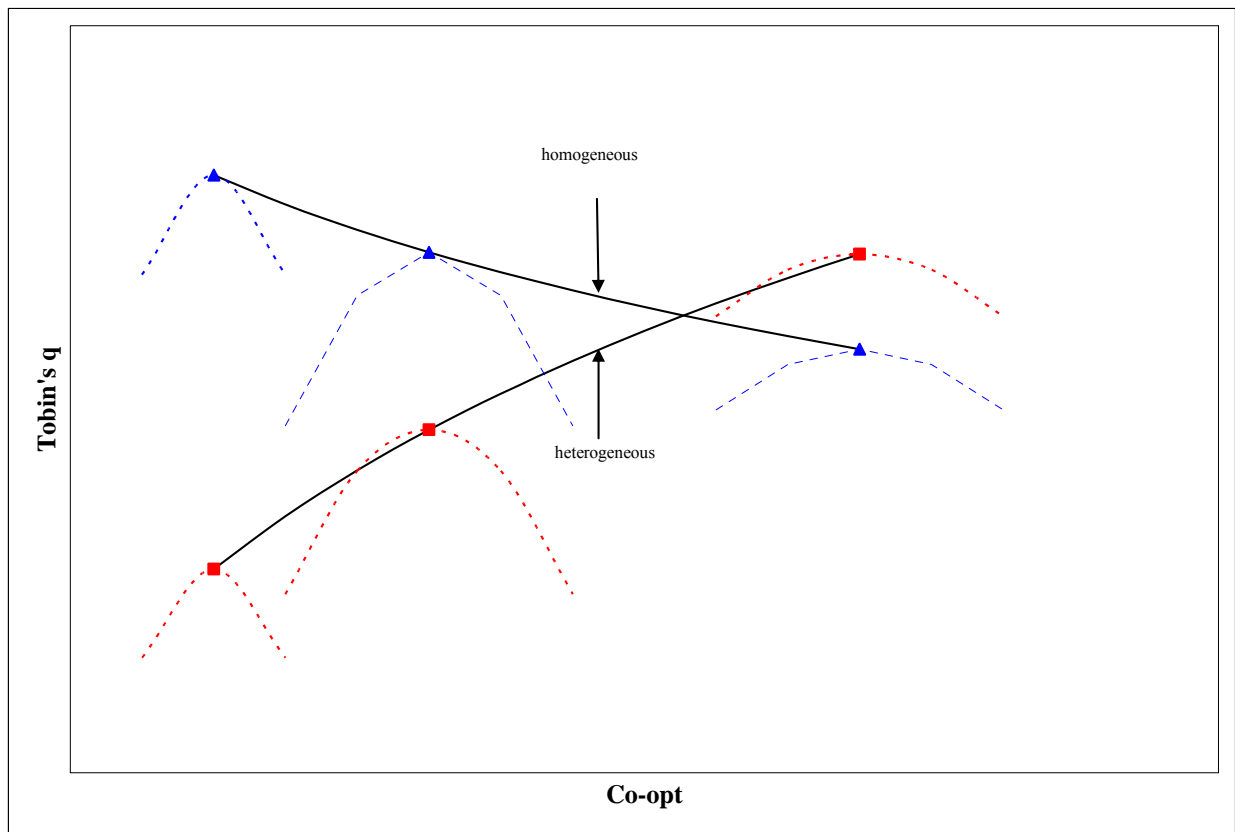


Figure 5. Relation between q and board co-option as a collection of optima

This figure presents hypothetical data based on a model with no transaction costs. In this world, there are two types of firms, “homogeneous” and “heterogeneous.” While homogeneous firms have growth options that do not vary with the investment in firm-specific human capital required of the CEO, heterogeneous firms have growth options that vary with the amount of investment in firm-specific human capital. Within each type, firms are endowed with different levels of growth options. Each firm chooses board co-option so as to maximize firm value that can be extracted given its growth options. The dotted curves depict the objective function of three firms (chosen arbitrarily) of each type. The triangles represent the maxima for homogeneous firms and the squares represent the maxima for heterogeneous firms. Empirically, one would detect a negative relation between q and co-option for homogeneous firms (the downward sloping solid line that connects the optima for homogeneous firms); also one would detect a positive relation between q and co-option for heterogeneous firms (the upward sloping solid line that connects the optima for heterogeneous firms)